



(NCBSSDPA 2015)

CONFERENCE PROCEEDINGS

International Conference On National Capacity Building Strategy For Sustainable Development And Poverty Alleviation

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Dubai International Academic City, Dubai. UAE.**

26-28 May 2015

WELCOME SPEECH

WELCOME MESSAGE

Dear Conference Participants,

Greetings from American University in the Emirates (AUE)!

With great excitement and anticipation, I welcome you to the 2nd International Conference organized in collaboration with Scholarlink Research Institute (SRI), Manchester, United Kingdom with the Theme National Capacity Building Strategy for Sustainable Development and Poverty Alleviation (NCBSSDPA 2015).

AUE is proud to collaborate with SRI in offering a unique conference opportunity that will witness scholars, experts, professionals, and dignitaries to address one of the most complex issues of the 21st century by sharing ideas, generating solution mechanisms and expanding mutual understanding.

Our collaboration with SRI to host this conference exemplifies the research passion of AUE with the goal to bring scholars around the world to dynamic Dubai to understand more about the world from a variety of academic perspectives. This also promotes a global approach to the education of students, so they can contribute more effectively to national and regional development, for growth, peace and sufficiency economy.

I am sure you will experience a very successful and productive conference in Dubai, United Arab Emirates (UAE), and will be able to implement the approaches learned from the great speakers. May your deliberations help to contribute towards the designing and implementing of improved stratagems and greater mutual understanding during the years ahead for building strategy for sustainable development and poverty alleviation.

I encourage you all to take full advantage of the learning and networking opportunities presented throughout the conference days and wish you all a very successful conference.

With Best Wishes,

Professor Muthanna G. Abdul Razzaq
President, The American University in the Emirates



WELCOMING WORD

Dear Colleagues,

Scholarlink Research Institute (SRI), Manchester, United Kingdom, welcomes you to the 2nd International Conference, to be held at the **The American University in the Emirates**, Dubai International Academic City, Dubai, UAE, after the great success of the 1st International Conference that was held in University of Ghana in May 2014. SRI has a mission to bring together International Scholars as well as Practitioners and Scholars from related fields from all over the world with different intellectual traditions and expert views. It is particularly fitting that a scholarly reflection and dialogue on fundamental questions, dilemmas and poverty challenges confronting Nations as raised by the Conference theme **International Conference on Theme National Capacity Building Strategy For Sustainable Development And Poverty Alleviation**.

The **NCBSSDPA 2015** aims to bring together academics and professionals to share their ideas and recent findings on all aspects of **National Capacity Building Strategy for Sustainable Development and Poverty Alleviation**. The conference will discuss relevant research topics in order to provide a broad vision on sustainable development of agricultural sector as a vital part of the rural economy, with emphasis on food security, environmental conservation, resources and economics management, and alternate renewable energy sources as well as oil and gas in such a way to bring about the reduction and alleviating poverty in countries.

I would like to thank **Prof. Muthanna G. Abdul Razzaq, President and CEO; American University in the Emirates. Dubai International Academic City, Dubai UAE** for his warmly embrace and genuine concern to ensure that knowledge/research is shared freely without monetary attachment, I will always remember the opportunity you offered our Institute to organize these International conference in your University of great repute, and also for finding time out of your tight Schedule to receive and welcome all delegates present.

I would also like **Dr. Abhilasha Singh, Director, International Office, American University in the Emirates. Dubai International Academic City, Dubai UAE** for the several role she played to ensure that the International conference become a success. So many times we communicated through email, she was never tired and kept replying and encouraging us that it's possible. Mummy, big thanks.

Thanks to **Dr. Majeed Ali Hussain, Associate Professor of Econometrics, College of Business Administration, American University in the Emirates, United Arab Emirates**, you provided the link that made the international conference possible and to be held in your great University. I so much appreciate your candid effort.

Many thank our Keynote Speakers, **Prof. Adejuyigbe Samuel. Mechanical/Mechatronics Engineering Department, Federal University, Oye Ekiti, Ekiti State of Nigeria, and Prof. Lynne M. Walters. Texas A&M University, United States**, for their contributions to this event, as well as speakers/paper presenters, observer, listeners accompany person, delegates and students from different Universities spread around different countries, you are the reason why we are gathered here today in Dubai. Without your presents, our effort would have been in vain.

Enjoy your stay in Dubai, an amazing crossroads of cultures and a great ongoing experiment in internationalization. The UAE is an attractive location for higher education with a large concentration of satellite campuses of some of the world's leading higher education institutions. As a melting pot of ethnicities, it's also the perfect location for the study of language learning. Dubai is an amazing stage, with a mix of ambitious architecture and world-class sights. We hope that this great backdrop will stimulate thought-provoking presentations, new research collaborations, partnerships and friendships.

Engr. Dr. Ogbeide Sam
Managing Editor
Scholarlink Research Institute
<http://sric.scholarlinkresearch.com>

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26-28 May 2015

KEYNOTE SPEECH

NATIONAL CAPACITY BUILDING STRATEGY IN ENGINEERING AND TECHNOLOGY (NCBSET)

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Professor of Computer Aided Engineering (CAD, CAM, CIM, CAPP), Manufacturing Engineering and Management.

Administrator (Director), Works and Services, FUNAAB 2009 - 2011

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Abstract

This paper looked at capacity building in engineering and technology in advanced countries and developing economy in pursuit of more secure, stable, and sustainable world which enhances their human, Institutional and Infrastructure capacity. In the global economy of the 21st Century, engineers play a key role in overall economic development for countries and regions. In well developed countries, the role of the engineer is well understood and utilized. In much of the developing world, however, the available engineering talent is typically below critical mass – and economic development and even important basic societal needs that rely on engineering- such as clean water supply and sanitation – lack the technical talent to address them. (Russel. Jones). Technology as basic tool for National Development, and its attendant effects as a catalyst for National Development with emphasis on Nigeria as a Nation, The Professional Scientist, Technologist and Engineers were treated. This paper also revealed that the Technological Development which is so vital to the educational and industrial development in developing countries had, for long, not been given due emphasis. In most of the developing Countries, the little attention paid to technological development and engineering is on paper and where policies are made they are shabbily implemented. And also the pace of industrial development is nothing to write home about, since some are already closing down their industry, most especially in Nigeria. Therefore, a clarion call on our industrialists, educationists, capacity builders, engineers, and the policy makers to look at some of the areas enumerated in this write up to develop some of the societal needs in the areas of technological development and fabrications rotten away in our tertiary educational sector and seriously looked at the possibility of commercializing some of the end products.

Keywords: Capacity Building, Engineering, Technology, National Development, Nigeria.

INTRODUCTION

Capacity Building in Engineering and Technology

Capacity building is a dedication to the strengthening of economies, governments, institutions and individuals through education, training, mentoring, and the infusion of resources. Capacity building aims at developing secure, stable, and sustainable structures, systems and organizations, with a particular emphasis on using motivation and inspiration for people to improve their lives (Russel C. Jones)

Capacity building in engineering environment is a level for economics, social and sustainable development, and is recognized as a priority in the global engineering community. In today's global economy every country has to acknowledge the need to create sustainable at all levels of engineering services, products and amenities in order to provide for the needs of communities in a world of diminishing resources, environmental challenges and a strong need to reduce the consumption of limited resources This can be achieved partially by ensuring appropriate and suitable engineering educational programmes of an accredited quality. A competent engineering workforce base can then provide several paths to sustainable development as well as to ensure that all role-players and stakeholders including investors focus on sustainability and equitable solutions for engineering services, amenities and products. In case of developing countries the utilization of foreign aid and investment funds should be managed by professionally competent people and groups (Yashim Brijmohan)

With this role comes a wide range of responsibilities for joint capacity building such as;

- Mobilizing cooperation amongst engineering societies around the world in collaboration with Volunteers.

- Partnership that will make available volunteer engineers from firms, government agencies, and academia to be sent around the world to assist with capacity building.

Development of Different Types of Occupations in Capacity Building

There are thousands of occupations, where one can have a capacity building and they vary greatly in both the type of work involved and the education and training required.

Adejuyigbe (1998) said that everyone hopes to get a job that he will find interesting, enjoyable, and rewarding. A profession one chooses for himself may offer adventure, challenge, and accomplishment.

Sometimes, it is also possible that a career chosen for one self can also present uncertainty, difficulty, and disappointment. It is necessary therefore to plan yourself for the career having the following in mind.

- ***Knowing yourself; knowing your capability; your interests; Needs; Desires; Attitude; and the jobs that are available and the opportunities they offer.***

Knowing the above points will lead you to a success and happiness in your chosen career. It is a pity that in Nigeria, the younger ones just choose a career without necessarily knowing what the future holds for them

The development of Science and Technology will have to start from our Universities, Polytechnics, Colleges of Education and Research Institutions, where the training of the Scientists, Engineers, Technologists, and Technicians are done, because of their multiplier effects on the need of our immediate society.

Those originally termed **engineers** were those who specialized in the construction of military equipment and fortifications. By 1850, however, there had been a developed body of knowledge distinct from science, which was the province of the **technologists** and had to be mastered by anyone hoping to become an engineer. There are different purposes in the minds of the scientists and technologists;

- **Scientist Purpose** is to understand the world around him. Originally, this was the natural world, virtually unchanged by man's endeavours, nowadays it is a world modified very considerably by man's technological achievements.

- **The Technologists** main purpose, however, is to meet some human needs (other than satisfying man's curiosity) perceived either by himself or by someone else.

Building Science, Engineering and Technology Capacity

Building science, engineering and technology capacity in developed or developing countries is crucial to the development issues that face the world today, including economic growth, poverty reduction, improved health and sustainable development. UNESCO identifies capacity building as one of the five functions that the Organization performs. Capacity development is complex and multi-dimensional and occurs at the individual organisational and institutional level, (UNESCO, 2009). The UK National Commission for UNESCO (UKNC) is working in a number of areas to support science, engineering and technology capacity building in developing countries, especially those in sub-Saharan Africa. Some of the areas are;

- Science Communication
- Access to Research Outputs
- Learned Societies
- Engineering Education in Africa

Engineering is the profession that puts power and materials to work for man. Once a scientific principle is understood, the next is engineering which translate the scientific discoveries into software for facilitating concrete products or goods for man's comfort. It is the oldest professions in the world, dating back to ancient times, are for example, the pyramids of an ancient Egypt. It is the application of scientific principles to the optional conversion natural resources into structures, machines, products, systems and process for mankind. In its modern form involves people, money, materials, machines and energy. Is the profession that harnesses mathematical and scientific knowledge, gained through experience, study and practice and applies it to the efficient use of materials and forces of nature.

Science Capacity

According to Bamiro (2012) Science designates man's organized attempts to comprehend how things work as causal systems. Science creates understanding which itself is neutral, but that understanding may be used by man to invent or improve or create technology.

- ❖ Scientific capability or "know-why" is acquired through research and its acquisition from whatever sources - domestic or foreign - can take place meaningfully only if there exists *a critical mass of scientific manpower in our country - within our firms and/or in our national R & D institutions including basic education and training institutions*

Engineering Capability Built-up

Engineers used steel and concrete to construct buildings, dams, roads and bridges. They use metal, glass, and plastics to make hundreds of everyday products. Engineers transform water power into electricity that light our homes and run our factories. They harness the power of gasoline and other fuels that drive our airplanes, trains, ships and automobiles. Engineers themselves often discover or create new materials and source of power that serve man. To put power and materials to work and engineer must know and use principles of science and mathematics.

The original traditional engineering disciplines are:

- (i) Civil Engineering
- (ii) Mechanical Engineering and
- (iii) Electrical Engineering

According to Bamiro (2012) Engineering is the package of actions we take to put technology to work in the production of goods and services. Engineering provides the final vehicle for producing development out of the knowledge provided by technology and, by extension, science. Thus, *engineering capability comes into play in the translation of new technologies or processes into plants and processing machinery.*

Technology Capability Built-up

Technology is the study, mastery and utilization of manufacturing and industrial methods, systematic application of knowledge to practical tasks in industry. It is the application of scientific knowledge for practical purposes, the employment of tools, machines, materials and processes to do work, produce goods, perform services, or carry out other useful activities. It also refers to all the ways man uses his inventions and discoveries to satisfy his needs and desires. Is the systematic knowledge and action, usually on industrial processes but applicable to any recurrent activity. It is closely related to science and engineering. It also refers to all the ways man uses his inventions and discoveries to satisfy his needs and desires. Ever since man appeared on the earth, he has had to work to obtain food, clothing and shelter.

According to Bamiro (2012) while science essentially aims at understanding how things work ("know why"), *technology* relates to ways of doing things ("know-how"). *Technological capability or know-how* has always been in existence in any human society. What varies is the level and intensity of its transformation of materials into goods and services most especially on a scientific basis

Engineering and Technology as a Basic Tool for National Development and Capacity Building

These are some areas that Engineering and Technology has played a Basic Tool for National Development and Capacity Building; which the Developing Nations are not paying emphasis to.

- **Agricultural Mechanisation**

Mechanisation can be achieved by the use of the Agricultural Engineers and the agricultural equipment and implements, to achieve the optimum performance in Agriculture thereby reducing the cost of food that is very unstable and soaring high. It will also afford the Nigerian farmers to produce abundant food all the year round. Other areas include Farming Technology and Soil Maintenance.

- **Iron and Steel Industry**

The products obtained from Iron and Steel industry should be the function of Mechanical Engineers and should be of high standard enough so as to be worked upon by the machine tools industry. This will make the manufacturing of essential parts and products needed for diversified Nigerian Industrial set up.

- **Small Scale Industries**

With the phenomena of transfer of technology, small-scale industrial entrepreneur must play an important role in revitalising a depressed economy. This is the area of Production/ Industrial Engineers and Economists. Small-scale industries are where individuals engage in the production of a particular component, which sustain the economy.

- **Health Equipment and Accessories**

It is the responsibility of the machine tools industry to be saddled with the manufacture of modern health equipment and accessories used in our hospitals. Nigeria produces a lot of medical doctors but lack the necessary equipment, tools and accessories needed to practice their profession. The health equipment and accessories production is for Production / Manufacturing Engineers.

- **Defence and National Security Equipment and Artillery**

Developed countries place great emphasis on the tools industry to provide the equipment and artillery used for their defence and security.

- **Printing Industry for Educational Books**

Appropriate textbooks for the educational system is lacking seriously. The printing industry is finding it very difficult to print books for the growth of our educational system. Good books that disseminated the information needed for the educational system is produced by the used of standard, adequate and modern printing machines, which is one of the product of machine tools industry and Engineers.

- **Automobile Industry and Spare Parts for Maintenance**

The non-availability of spare parts for maintenance of vehicles and even the inability to purchase the new one is at increase. To actually attain total dependence in Automobile Industry is the function of Automobile Engineers.

- **Change in the Trend and Operations of Manufacturing Industries and Springing up of other Industries**

At present, most of the Nigerian manufacturing industries are dominated by low technology and light industry such as food, beverages etc, but the establishment of heavy engineering industry is lacking. Which our Engineers should look at.

Other Allied industries that will service the machine tools industry will also spring up, like

- Electrical industry where electric motors, electrical elements like relay, alternators, transformers are made;
- Metal bearing industry
- Belts, brake industries, etc.

- **Stoppage or Gradual Elimination for Imported Machines**

Most of the machines and equipment used in Nigerian Manufacturing Industries are imported. This involves a lot of foreign exchange, which should have been conserved for Nigerian use. With the development of standard machine tools, there will be gradual phasing out to importation of machines used and its eventual stoppage.

Civil Engineers – Infrastructure Development, Urban Planning, Water Supply, Homes, Sanitation, Roads, Bridges, Buildings, Public Works Agencies, Structures, Watershed Management, Land Planning.

Electrical/ Computer Engineers – Energy, Communication, Computer Technologies, Information Technology Capacity, Electrical Systems

The Development of Process Equipment using Mechanical and Agricultural Engineering Design in Nigerian Universities

There are some equipment development in our various research institutes and universities in Nigeria. They are just laying waste without making use of them in our industrial development. I will only cite two examples in this write up and also show some of the end products which can be utilized for our development.

Adejuyigbe (2010) in his Inaugural lecture showcase of what he had been able to do in the area of the development of local processing equipment which can be very useful for our development and change our situation from poverty to wealth

Machining Operations

- Developments of Textbooks and Coolant for Machining
- The use of soybean, groundnut oil, palm oil as an alternative to soluble oil in machining mild steel materials was also carried out
- Development of Tool Wear Detector –
- Development of Single Point Tool for Machining Plastic Materials - represented the expanded image analysis of the scanned image of the new parting-off tool.

Machines Fabricated and Developed

A research into machine fabrication and development was carried out. Extensive work has been done in this area of research that will add wealth to our economy if properly harnessed. Some of the machines fabricated and constructed are presented.

Looking at the Industrial sector of our economy we research into how some of the problems in this sector can be eliminated. Some of the works done in the areas are further enumerated;

- Design, fabricate and carry out the performance evaluation of a domestic water treatment plant for the Nigerian market, using Ibadan as a case study
- Developed a suitable die casting mould, designed and constructed, suitable for the production of various sizes of key blanks
- Design of a radiation- recuperative heat exchanger for a 200kg capacity rotary furnace.
- Also the design, moulding and performance evaluation of cylindrical fibre- cement silo for storing two-tonnes of maize were carried out. The coconut fibre (coir) was used.
- Design, fabrication and performance evaluation of bean dehuller having the average capacity of 3.6 kg/h and efficiency of 75.7 % for the use of our local and mini industrial farmer

- The development of Pump Housing and Impeller by casting using local raw materials which could compare favourably in terms of performances with the imported ones
- Designed and fabricated the prototype incubator for birds.
- The design and fabrication of a pineapple fruit juice extractor that operates using pressure which is provided by screw press for the purpose of squeezing juice out of pineapple fruits was done.
- The design, construction and performance evaluation of a locally developed cassava chipping machine was carried out

The automobile industry encounters a lot of problems when working on the automobile engine.

- Developed an Internal Combustion Engine Valve Installation Machine.
- Looked at the local mechanic problems and developed auxiliary equipment for improved reliability of tyre removing machine.

Human Factor Engineering/ Ergonomics

Human Factor Engineering / Ergonomics were researched into. Some of our model contributions in this field of specialization are enumerated below:

In relation to human comfort

- Alternative energy resources and potential in the next millennium.
- The ergonomic assessment of mass transit vehicles in Nigeria using a state owned mass transportation company as a case study.
- The Ergonomic Evaluation of Furniture in Higher Institutions using FUTA School of Engineering as a case study.
- An Anthropometric data of Nigerian paraplegics and also developed a tricycle

In researching into industrial engineering ergonomics

- The incessant burst of crude oil pipeline in Nigeria which has resulted in the death of so many in Nigeria and has been a problem and concern to all. Solutions were proffered to reduce incidence of crude oil burst and explosion.
- Cost-to-Worth Value Engineering Analysis of Manufacturing Industries in Nigeria.
- The machine installation, mounting of shaft alignment and balancing, lubricant, lubrication, gasket and seal, for the machine installation for Oye Local Government, in Ekiti State.

In the area of environmental ergonomics

- The environmental pollution from vehicle sources which continues to attract worldwide attention was researched into.
- Conducted a technical assessment of mechanic village in Lagos state – layout model.
- Conducted a survey of automobile materials using Peugeot as a case study. It was however discovered that the materials used nowadays has changed to what is used to be.

Adewumi (2012) in his Inaugural Lecture showcase what he had been able to do in the area of developing process equipment for food engineering thus;

- Equipment for the measurement of angle of repose for granular materials;
- Equipment for the measurement of comparative strength for Bio-materials;
- Development of Locust bean Streaming Machine;
- Development of Burr Type Locust Bean Dehulling Machine;
- Concave Type Locust Bean Dehulling Machines;
- Hydro-cyclone for separating Legume Hulls;
- Plantain slicing / Chipping machine
- Cocoa depoding machine;
- Cashew Decorticator;
- Melon Sheller;
- Cassava Chipping machine;
- Citrus Juice Extractor;
- Mango Juice / Pulp Extractors;
- Vegetable Oil Extractor;
- Charcoal Fueled Garri Fryer;
- Medium Scale Legume Thresher/Cleaner;
- Cross Flow Grain Classifier; and
- Aerodynamic Modeling and Particle Dynamics Studies in Agriculture

Adewumi has more that he had developed in his Inaugural lecture book but lamented that there are inadequate relationship between research Institutions and the end users.

General Technical Capacity Building in Sub-Saharan Africa

The importance of relevant technical capacity building in all facets of life cannot be over-emphasized and Sub-Saharan Africa cannot be an exception. Alfred Watkins, the World Bank S&T Program Coordinator succinctly captured the essence for capacity building at all skill levels and this is shown in Figure 1.

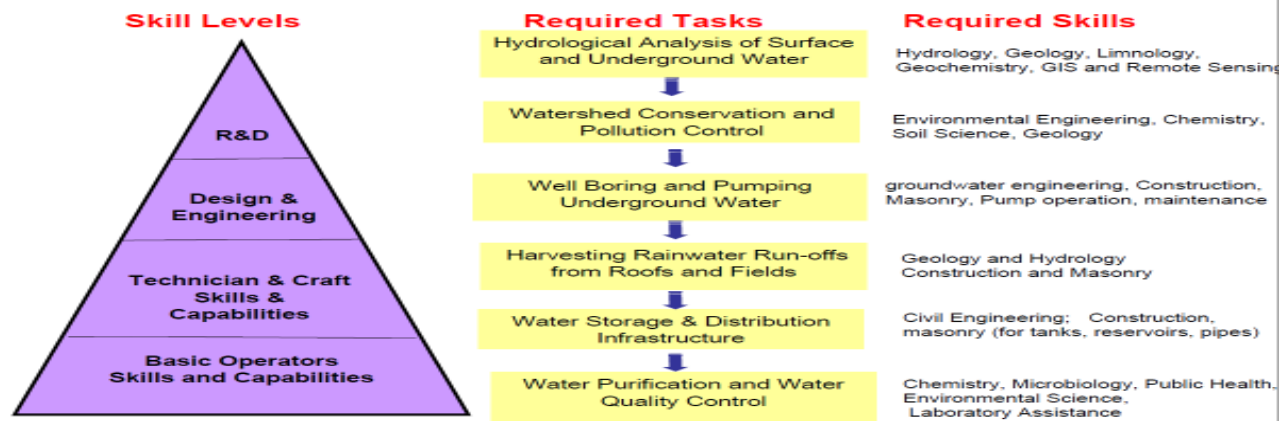


Figure 1: Figure showing capacity building is needed at all skill levels. Source: Alfred Watkins (2007)

The pattern of technical capacity building in sub-Saharan Africa is largely identical. The capacity building effort is generally characterized by:

- instability and inadequate support to research and development activities;
- inconsistent policies
- lack of political commitment at top governmental levels;
- low public awareness of the need and importance of scientific and technological capacity
- poor recognition and reward for achievements in science.

Adebifa (2004) noted that no single indicator is available yet for measuring science and technology capacity in Africa. Only a detailed assessment in a given country can reveal the real and present level of its research capacity, and properly characterize its structure. National experiences are reviewed below under three of the most common models:

1. Support for Individual Scientists

This modality has had limited success in countries like Nigeria, Ghana and Sierra Leone. Although the individual scientists received personal benefits that upgraded their skills or expanded opportunities for international exposure, the impact of the projects were hardly felt beyond their immediate environment. Financial support from donors did not usually anticipate the requirements for institutionalization of project outcomes, nor did it provide specifically for project outreach that would multiply the effects of capacity strengthening.

2. Support to Universities and Research Centres

The number of scientists in African universities often increased more rapidly than the available funding for research. But, regardless of the amount of resources available, a number of practical considerations continue to limit African efforts to increase research capacities through institution building. Among them are the following:

- universities and public research centres lack adequate numbers of technicians, specialists, and qualified managers to support the desirable level of research
- universities often tend towards the European tradition which pursues scientific knowledge without entrepreneurial enthusiasm; they do not generally emphasize applied research that would interface closely with the private sector. Their academic culture promotes scholarly research and publication, but it is not geared towards business development or industrial applications
- the trend of diminishing funds per researcher has intensified in the last decade · the imbalance between human and financial resources has exacerbated another problem: the cost of maintaining research infrastructure (laboratories, equipment, physical plant, etc.) has risen sharply, leading to their stagnation, degradation and obsolescence
- research teams do not always have functioning basic facilities, access to current literature, compatible teaching and administrative load, nor the cooperation of their institutions

- because the key ingredient-funding-is often not reliable nor programmed for long term support, research teams easily become isolated; they need to be nourished by external contacts at conferences, in networks, and by exchanging research fellows
- nationally-sourced funds (especially government subvention) are applied mainly to staff salaries. It is the external funds that usually support research projects. This leads to the tendency to load excessive numbers of under-qualified workers on to the research fund
- promotion policies and rewards are more favorable to administrative and managerial functions than for research and scientific achievements. This leads inevitably to high rates of turnover in research staff, which in turn undermines efforts to develop a cadre of skilled and experienced researchers.

3. Support for Networks and Promotion of Networking

In an initial attempt to identify success factors in research networks, a 1998 colloquium in Bellagio, Italy, identified a number of critical elements. These were reported by Prewitt (1998) to include:

- balancing open membership with quality · good governance system
- common needs assessment with shared ideas about problems and solutions
- financial stability
- adequate project management capacity
- institutional ownership of the research programme (Adubifa 2004)

Nigerian Economy and the Trend of Engineering and Technology for Economic Advancement, Productivity and Development in the Nigeria Industry

The Nigerian economy is going worse in their contribution to the Gross Domestic Products (GDP) growth. Collins Nweze in his write up on the FDC Economic report for September, 2012 said “The total amount of government debt outstanding in Nigeria is N6.89 trillion, representing a mere 17.9 percent of Nigeria’s debt to Gross Domestic Product (GDP)”.

Adejuyigbe (2010) and Ibadode (2006) looked at the contribution of manufacturing to the growth of GDP in Nigeria which was about 4% compared to some advanced countries (G7) which had 19% contribution. Although, comparing Nigeria’s debt-to-GDP ratio of 17.9% is comparatively low, relative to the debt to GDP ratio of Ghana (41.2 percent) or South Africa (38.8 percent).



Fig. 2 Showing the departure and arrival in Nigeria

The Challenge

According to Bamiro (2012) reclaiming and building our local economies by working to create and sustain locally owned enterprises that sustainably harvest and process local resources to produce jobs and the goods and services that we need to live. The imperative of the above is the need for us to seek to understand, and hopefully steer, the forces that drive globalisation and global competition healthy, happy, and fulfilling lives in balance with the environment. This is shown in the Figure 2 above looking at the departure from Nigeria and few coming back to the country Nigeria.

The Trend of Engineering and Technology

As somebody who has been in the engineering profession for the past 41 years, starting as a Fitter Machinist from Trade Centre, Osogbo, now a Professor in the field of Mechanical, Computer Aided Engineering, Production/ Manufacturing and Management, I will be looking at the trends of Engineering and technology for economic

advancement, productivity and development in Nigeria from the developments in the computer industry which has a profound impact on the manufacturing industries from design to machine processing as well as the management and marketing components (Adejuyigbe, 2002, Brown, 1990). In both the developed and developing countries, most of the technological processes can be characterized by the rapid development and wide spread application of CAD/CAM/CAE systems.

Foundry/Casting Industry in Nigeria

It is unfortunate that despite the early start of foundry, which is the oldest engineering industry in Nigeria, starting over twenty countries ago, it stills very much lag behind. (Inuwa, 1995).

The state of Nigerian foundry industries is only at Jobbing and captive level. The production type of foundries, which determines a high level of industrial development, has not been established in Nigeria (Inuwa, 1995).

An appraisal of Foundry Technology Development in Nigeria was carried out (Adejuyigbe, 2002). It was concluded that the majority of foundry industry in Nigeria are sand casting job shops. They used wood pattern and very little of metal and have the required manpower needed to man various operations. The area of foundry operations had been thought too difficult to computerize. The process and accurate parts produced by computerize types of automation machines eluded the developing countries like Nigeria.

Industrial Automation and Communication

An appraisal of Industrial Automation and Communication in Nigeria Manufacturing Industries was conducted (Adejuyigbe and Akinola, 2003). Using nine major industries in Osun State, the study revealed that the major industries in Osun State were confronted with the problems of under – utilization of industrial automation and communication. This is caused by the problem relating to lack of a well-developed industrial community, lack of allocation and mismanagement of funds; and inadequate availability of automated machines and communication equipment.

Computer Appreciation for Production Planning and Control in Nigeria Industries

An appraisal of Computer Appreciation and its use for Production Planning and Control in some Nigeria Industries was carried out (Adejuyigbe, 1994). The evaluation of the establishment of planning and control department with the use of computer in their production planning and control was done. It was however discovered that 50% of the company have computer in their production planning and control department.

The Adoption of Computer Integrated Manufacturing in Nigeria Industry

A research was recently conducted into the adoption of Computer Integrated Manufacturing (CIM) in Nigeria using manufacturing industries in the South western zone as a case study (Ogedengbe, et al., 2002). The result revealed that the level of understanding of CIM is generally low (that is, poor) with an average rating of 38.8% and those adopting the CIM system attracted 17.3% of the total point of the review instrument used.

Textile Industry in Nigeria

Adejuyigbe 2010 analysed the textile industries that has closed down in Nigeria. This can be summarized in the Table 1 below. It is pertinent to note that the closing down of this section is going on daily basis without a replacement or new ones been developed. In my own candid opinion we need this type of industries to make us thick as a country. The pertinent question is that when will this type of industrial loss continue? It is time we all sit down to actually see what can be done to revert this situation

Table 1: Textile Companies that Have Closed Down within the last 10 Years

S/N	LAGOS STATE	16	Nigeria Synthetic Fabrics Ltd.		KANO STATE
1	Afprint Nig. Plc.	17	Reliance Textile Ltd.	1	Bagauda Textile Mills Kano
2	Western Textile Mills Ltd	18	First Spinner Plc.	2	Kano Textile Printers Ltd
3	President Industries Nig. Ltd	19	Specomill Textile Ltd.	3	Dangote Textiles
4	Pacific Weaving Coy. Ltd				
5	Vinkay Industries Nig. Ltd		KADUNA STATE		OTHER STATES
6	Nibeltex Industries Ltd.	1	United Nigerian Textile Ltd	1	Asaba Textiles Mills Asaba
7	Abel Abu Industries Ltd.	2	SRC Industries L:td	2	Stretch Fibres Industries Ltd
8	Jay Bee Industries Nig. Ltd.	3	Arewa Textiles	3	Horison Fibres Industries Ltd
9	Aswani Industries Nig. Ltd.	4	Matex Nig. Ltd	4	Aba Textile Mills Ltd, Aba
10	Kay Industries Nig. Ltd.	5	Supertex Limited	5	Dorji Textile Mills Ltd, Benin
11	Diamond Spinner Nig. Ltd.	6	Blanket Manufacturing Co. Ltd	6	Edo Textile Mills Ltd, Edo
13	Texlon Nig. Ltd.	7	Finetex Ltd	7	Odu'a Textile Industries Ltd, Ado Ekiti
14	Bhojray Industries Plc.	8	Kaduna Textile Ltd		
15	Textile Specialities Nig. Ltd.	9	Unitex Ltd		

Source: Nigeria Textile Manufacturers Association, February, 2009 and Adejuyigbe, 2010

Focus on Nigerian Education and Training for Capacity Built-up

Since the introduction of Western Education in Nigeria around the year 1840, technological education has always been treated as relatively insignificant aspect of the Country's educational system (Fagbemi, 1988, Adejuyigbe, 1996, 2007). The education ordinances of 1882, 1887, 1903, and 1916 all have one major characteristic in common, that is, the relegation of technological education to the background (Fagbemi, 1988, Adejuyigbe, 1996, 2007). In Nigeria today the production of the required technical personal is not appropriate or adequate to the need of our growth. Even the growth of the Universities, Polytechnics, Colleges of Education, Research Institute are not commensurate with the rate of the production of appropriate and seasoned technological personnel needed to man various aspects of our developments.

Nigerian Education and Training Institutions

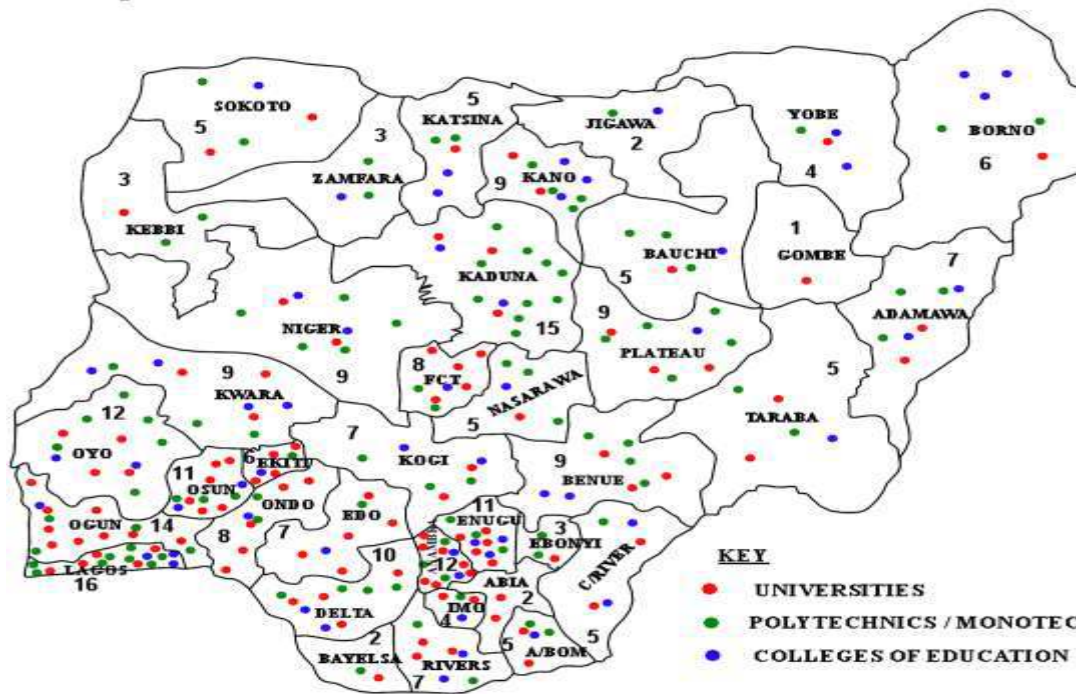
As at 2012, Nigerian Education and Training Institutions comprises of;

- Universities – 122
- Polytechnics – 71
- Monotechnics – 47
- College of Education – 79
- Secondary Schools/Technical and Vocational Training Institutions- 14,942
- Primary Schools- More than 45,000

Transition from Junior Secondary School to;

- Senior Secondary School – 60%
- Technical Colleges – 20%
- Vocational Training Centres – 10%
- Apprenticeship Scheme – 10%

Figure 2.3: HIGHER EDUCATIONAL INSTITUTIONS IN NIGERIA



Source: Bamiro (2012)

The Key Challenge in Nigerian Education and Training

A key challenge at present towards actualizing the desired quality university education remains the paucity of high quality academic staff. There were a total of 27,391 academic staffs within the University system as at 2006 comprising Federal – 17,836 (65%), State- 7,586 (28%) and Private 1972 (7%). Of these, Professor/Reader cadre constituted just 5,483 (20%), Senior Lecturer Cadre 6,475 (23.6%), while Lecturer cadre constituted 15,436

(56.4%). Computation using current approved student/teacher ratios however indicates that the Nigerian University System requires a total of 34,712 academic staff for effective course delivery across the disciplines. [NUC Executive Secretary]

Adejuyigbe (1994a, 1994b &1996) in his analysis said that in Nigeria and Ghana today, the growth of the Universities, Polytechnics, Colleges of Education, Research Institutes and Industries is not commensurate with the rate of the production of the appropriate and seasoned technological personnel needed to man various aspects of the development needs of these Countries. Technological education, which is so vital in our educational and industrial development, had for long not been given due attention and emphasis. The little attention paid to technical and vocational in Nigeria and Ghana at the turn of the century was to be expected since the British Administrators were mostly interested in producing administrative assistant.

Suggested Routes of New 6-3-3-5 System developed by Adejuyigbe in 2007

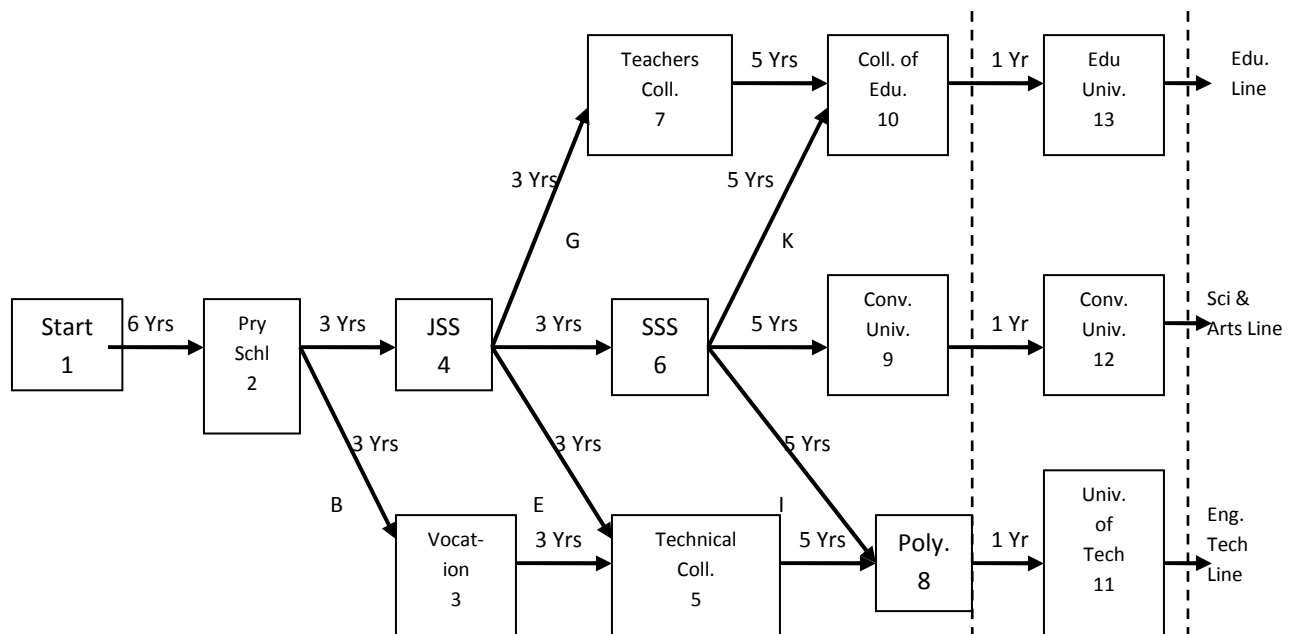


Fig 3. Educational, Science and Art, Engineering and Technological Lines for the New Suggested 6-3-3-5 System of Education in Nigeria and Ghana.

Table 2: CPM Calculations for the Proposed 6-3-3-5 System of Education for Nigeria and Ghana using Education, Science, and Technological Lines.

Activity Code No.	Duration t	Earliest start	Earliest finish	Late start	Late finish	Slack	Critical Yes or No
1 – 2 A	6	0	6	0	6	0	Yes
2 – 3 B	3	6	9	6	9	0	Yes
2 – 4 C	3	6	9	6	9	0	Yes
3 – 5 D	3	9	12	9	12	0	Yes
4 – 5 E	3	9	12	9	12	0	Yes
4 – 6 F	3	9	12	9	12	0	Yes
4 – 7 G	3	9	12	9	12	0	Yes
5 – 8 H	5	12	17	12	17	0	Yes
6 – 8 I	5	12	17	12	17	0	Yes
6 – 9 J	5	12	17	12	17	0	Yes
6 – 10 K	5	12	17	12	17	0	Yes
7 – 10 L	5	12	17	12	17	0	Yes
8 – 11 M	1	17	18	17	18	0	Yes
9 – 12 N	1	17	18	17	18	0	Yes
10 – 13 O	1	17	18	17	18	0	Yes

Note: Activities A-L = Undergraduate; M-O = Masters Level
Source: Adejuyigbe (2007)

CONCLUSION

From the foregoing therefore, it becomes incontrovertible that without the necessary capacity, developing countries and countries with economies in transition will be unable to identify and solve their own development problems. The details of Agenda 21 as agreed at the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil, in 1992 remains the global blueprint for sustainable development. Chapter 37 of Agenda 21, 'National mechanisms and international cooperation for capacity building', notes that:

- "The ability of a country to follow sustainable development paths is determined to a large extent by the capacity of its people and its institutions as well as by its ecological and geographical conditions.
- "Specifically, capacity building encompasses the country's human, scientific, technological, organisational, institutional and resource capabilities.
- "A fundamental goal of capacity building is to enhance the ability to evaluate and address the crucial questions related to policy choices and modes of implementation among development options, based on an understanding of environmental potentials and limits and of needs as perceived by the people of the country concerned. As a result, the need to strengthen national capacities is shared by all countries. (UNEP 2012)

It can be concluded that Engineering and Technology is a vital tool for development of a Nation Capacity Built-up. There is a dire need for a serious call to our Industrialist, educationist, engineers, capacity builders, and policy making bodies to actually abandon their nonchalant attitude towards the development of Engineering and Technology, in developing countries like Nigeria. They need to practicalised what they put down in papers to a practical values, so that the development witnessed in Developed Countries through Technology can also be witnessed in our developing economy, so that 20:2020 in Nigeria will not be a mirage

In the industrial development sector, It can be concluded that;

- Most of the foundry industries in Nigeria still adopt sand casting technique of Jobbing or captive type. This type lack the modern day Computer-Aided high mechanized production type of foundry like mechanized squeezes and flask less moulds mechanized lines.
- Some of the Nigeria Industries have automation installed into their manufacturing industries, but failed to use them. Robotic recorded 0% which shows that the concepts of automatic are not yet known. Although in the research it was agreed upon that it will improve the quality of their products.
- Nigeria Industries are starting to be aware that the Production Planning and Control are to be computerize, since about 50% of the industry under study had comprise their production planning and control unit
- The level of understanding, usage and adoption of Computer Integrated Manufacturing (CIM) among Nigerian Manufacturing Industries is very low. Some even see it as a treat to their jobs. It is therefore recommended that: The highly mechanized squeezes and flask less moulds mechanized lines using Computer throughout its production should be encouraged in Nigeria.
- Computer Aided Engineering (CAE) in all its areas. Robotics, Automation, CAD, CAM. CADD, CIM, CAPP should be introduced into all facets of our industries so that accurate and good data and high level quality products can be obtained; so that Nigeria can move forward industrially which will minimize our dependence on foreign goods.
- Universities Industries, Research Institutions should organize workshops, and seminars like this, for the purpose of giving extensive, quantitative and qualitative education, so as to have enough practical oriented experts on the field, so that we can move theory to practical as demanded in this conference
- In order to keep the planning process close to satisfying market needs, today's strategists emphasize the importance of interacting frequently with key customer and suppliers. To remain internationally competitive, the Nigeria firms must sustain a high rate of internal learning that both refines current practices and leads to the adoption of better procedures in the workplace.

In the educational sector, this paper used Critical Path Method (CPM) to plan the Continuity of Technological Education with other educational routes like Education and Sciences that have their route from Grammar School type. The model developed tagged 6-3-3-5 type of educational system proffer solution to the problem identified areas in our educational system both in Nigeria and Ghana. It eliminated totally the non-continuity of the engineering and technological education problems identified in 6-3-3-4 system of education. If the above suggested system 6-3-3-5 is adopted, it will enhance productivity, eliminate grudges, remove inferiority complex and enhance the sense of belongingness to the possessors of technological certificates. It will also bring the emancipation of technological evolution needed in developing countries like Nigeria and Ghana since the engineering family will be willing to work together as a team.

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EDUCATION AS A MEANS OF NATIONAL SUSTAINABILITY

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Learned Audience,

At the outset, I would like to express my sincere thanks to Scholarlink Research Institute, Manchester, United Kingdom for organizing international conference on national capacity building strategy for sustainable development and poverty alleviation (NCBSSDPA 2015) and providing a platform to the sustainability leaders, researchers, professionals and practitioner from across the world.

We at American University in the Emirates are delighted to collaborate with Scholarlink Research Institute (SRI), to epitomize our firm commitment to sustainable development and promoting excellence in academic research. On this occasion, it is an immense pleasure to share my thoughts on a topic that is vital to our collective future.

Ladies and Gentleman, the topic of sustainability is no more only a desire, but has become a natural necessity and in the present era, embracing a culture of sustainability are equally important goals for both developed and developing nations. The concern here is how and what needs to be done. To ensure a life with dignity, 2015 is the year when countries will shape and adopt a new development agenda that will build on the Millennium Development Goals (MDGs).

Although the eight Millennium Development Goals (MDGs) of United Nations –ranges from halving extreme poverty rates to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015 is agreed by all the world's countries and all the world's leading development institutions, yet its implementation poses a challenge, especially with global population growing with time, along with poverty and unemployment undoubtedly challenging all nations to double the food production by 2050 to combat hunger and malnutrition and meet the needs of a fast-growing population. Needless to mention, the enormous strain added on our environment! Unquestionably we need national sustainability so that no more people should fall into the hands of ignorance and for this reason we need to open doors for quality education to equip people with necessary skills to help them solve their problems and bring about national sustainability.

Hence the time more than ever calls for seeking a sustainable culture to achieve a suitable way of life for the present while simultaneously making sure that the needs of future generations are not being compromised. It is unfortunate that most of the time our goals are focused on instant gratification, and such shortsightedness is leading to future financial and environmental challenges, which in turn is jeopardizing the chances of sustainable development. Granted, that the nations around the world are trying to reverse this situation but the efforts are still not enough. Much has been debated in various international forums and it has been realized that a very simple incontestable fact is that the issue of sustainability is vital to our survival and needs to be addressed by our global society.

Educate and Educate

The fact is that the vital issues of sustainability are a major concern for the environmentalists, social workers as well as the educated layman. Understanding the causes and consequences lead to finding solutions and this can only happen through education. Literacy in major areas of sustainability, like global warming, reduction of the risk of disaster, biodiversity, poverty, resource efficiency, carbon foot printing, pollution, waste management etc. will indeed help in imbibing sustainable lifestyles. Awareness and conservation techniques taught right from the beginning will encourage the learners to be more alert while using the natural resources available. Needless to mention that education also hones the skills of problem solving and critical thinking, which are major skills required for national capacity building and leading towards sustainable development. If we were to “invest in people” and provide them with needed merit goods like education and health, these people indeed will then be more productive. Fostering skills and values needed for sustainable practices and bringing about the commitment to work individually and as a community towards a sustainable world can be made possible, only with tutelage.

While designing the strategy for effective tutelage, we should not forget that the different stakeholders in society have a different perception of the possibilities of bringing about sustainability and this can be achieved only through a well-planned curricula formulated by looking into the different perspectives of sustainability. Needed is, sharing knowledge and viewpoints, through discussions and debates and through expert voices in this regard. Hence, I hope my fellow colleagues and both the academicians and professionals will concur with me that education, both basic and higher, is an essential tool to obtain sustainable nation.

Undoubtedly, we have no reason to disagree that education can be a global asset to fight with the social problems related to poverty, inequality, insecurity, disease etc., and related global security issues and hence is a means to achieve national sustainability.

The Road Ahead

Sustainability and Education should be considered as the two sides of a coin and go hand in hand. Education is an essential pre-requisite for attaining sustainability. The three major components of sustainability – environment, society and economy ultimately lead to human wellbeing. As human beings are the only species on earth that can make a difference to the current scenario, it becomes clear that bringing a change to the attitudes of people can have a change towards sustainability. Awareness can be raised through training and education, and the curricula can be used as a tool for practical solutions.

In conclusion, education can have a long term impact on an individual and is always considered as a powerful means of encouraging behavioral and social changes. It will certainly help to address the issues faced in this regard and will play a key role in transforming human lives, hence the issues of sustainable development should be integrated into all levels of educational systems to change the mindsets and facilitate positive outcomes. We need to focus on sustainability education for knowledge transfer, changing the mind sets and building a work force with traits like leadership, hard work, perseverance, character building, inventiveness, passion & positive attitude for a sustainable nation. . As Sheikh Zayed bin Sultan Al Nahyan said "The real asset of any advanced nation is its people, especially the educated ones, and the prosperity and success of the people are measured by the standard of their education", when people are given the knowledge and awareness it will meanderingly affect poverty and unemployment rates.

At this point of time, let us not forget that the challenge for delivering quality education and preparing the next generation leaders for sustainable nation starts from good parenting and societal belief that only quality education and hard work can pave the door to success. Considering the magnitude of change, and the required skills to excel, a major structural reform is required in the elementary education to address the issue of sustainability. The elementary and secondary schools in the region indeed have the potential to improve the prospects for economic development and better quality of life, yet the pedagogy utilized for the purpose of transferring the knowledge is also crucial. Further the transition from the high school to the university should be smooth and not challenging for students. The time is calling for equipping the youth with the global values of fairness, tolerance, empathy, peace, harmony and quality education can play an instrumental role to ensure national sustainability.

Lastly, the role of women in ensuring lasting peace cannot be negated. Certainly, the national capacity building for sustainable nation is not possible without the active participation of women, as our culture demands them to be the sole providers of parenting and for this reason their active involvement informally or formally can be a key contributor to sustainable nation. Clearly, we need to educate our youth throughout the elementary, secondary and higher education the approaches for ensuring a culture of sustainability. These are the simple ingredients that any educational system must include in order to ensure a well-educated, tolerant, secured, skilled society and peaceful world-that is a self-sustainable nation!

Conservatively speaking, whether it is population growth or reducing carbon foot prints and having eco-friendly environment, the evidence suggests that we should cease looking for ‘quick-fix’ solutions and focus on long term strategy of quality education for national capacity building and sustainable nation and hence regardless of the numerous challenges, we need to undoubtedly believe in- “NOTHING IS IMPOSSIBLE” to make it happen. In other words, needless, to say the challenge always is to be proactive as just considering reactive repairs and fixes might not be an option in the future.

On this note I wish you all a very successful conference and highly encourage you all to take full advantage of the learning and networking opportunities presented throughout the conference days.

**Conference On National Capacity Building Strategy For
Sustainable Development And Poverty Alleviation**
(NCBSSDPA 2015)

**CR1006, Block 10,
American University in the Emirates,
Dubai International Academic City, Dubai. UAE.**

26-28 May 2015

*Track One: National Capacity Building Strategy in Learning,
Education and Teaching (NCBSLET)*

A CRITICAL EXAMINATION OF CAPACITY BUILDING THROUGH HEALTH PROMOTION PROGRAMME IN A TERTIARY INSTITUTION IN NIGERIA

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ABSTRACT

The need for people to focus more on how diseases can be prevented, rather than on how they can be treated have been emphasized in recent times since it has been observed that a huge burden of diseases exist but the number of health care providers are few. Hence the need to organize capacity building through health promoting programs becomes imperative. This paper critically examined the health promotion programs organized by a tertiary institution in south west Nigeria through lecturer series and health seminars, community services which includes measurements of blood sugar, blood pressure and body mass index of people in the university community and participation in physical exercises. People's responses to these programs and the need for evaluation were also examined. Ways to improve the participation of those capacity building programs are organized for to ensure that it increases community ability to respond to emerging health issues was recommended. The implications for sustainable development and poverty alleviation was emphasized in line with ensuring that resources are not wasted in treatment endeavors when health issues can be prevented by teaching members of the university community ways to improve their lifestyle and enjoy good health.

KEYWORDS: capacity building, health promotion program, university community, health seminars, community services, sustainable development.

INTRODCUTION

It has been observed that a huge burden of disease exist but the number of health care workers or providers available to tackle the increasing number of cases (the number of people who fall sick) are relatively small (Ayankogbe, 2014). There is therefore need for people to focus more on how diseases can be prevented, rather than on how they can be treated. There is also emphasis that each individual should take control of their own health and the first step in taking control of one's health is to understand their health status, (Konwea, 2011).

The term capacity building is not a new terminology in health service but has become more popular in literature, (Hawe, King, Noort, Gifford, & Lloyd, 1998; Smith, Coveney, Cartar, Jolley, Laris, 2004). Capacity building in health promotion has been defined as processes or development of sustainable skills, resources and commitments that will lead to improvement in health and health promotion in various settings and health sectors in order to prolong and multiply health gains many times over (Labonte, Woodard, Chad & Laverack, 2002; Cooker, 2005; Bowen). Capacity building thus refers to the ability of an initiative or program to build upon or add value to existing resources to promote effective, efficient sustainable outcomes (Smith et al, 2004; Crisp, Swerissen & Duckett, 2002). It is about increasing the capabilities of people to articulate and address community health issues and to overcome barriers to

achieve improved outcome in the quality of their life (Labonte et al. 2002).

One of the ultimate goals of capacity building is to run programs that will respond to particular types of issues like building capacity for disease surveillance or heart disease prevention as posited by Hawe, King, Noort, Jordens and Lloyd (2000). Capacity building therefore is concerned with improving the capability and productivity of people through training and retraining, conferences, seminars, induction courses, collaboration, through welfare packages directed at empowering the members of staff. These programs are also geared towards providing knowledge to help improve the health of the populace and ensure that they are current with issues related to their health. This will enable the members of staff to move with the global trend in health.

However, as reported by Hawe et al (2002) capacity building in health promotion funding is tied most of the time to direct activities with population groups in relation to specific disease entities or national targets. So that efforts or endeavours seeking to sustain programs and multiply health gains as a result are disguised with health promotion budget at the lower levels.

Health promotion programs include education which consists of creating opportunities for learning. These learning are intended to improve personal health literacy and thereby the capacity of individual and community to act to improve and protect their health. (Smith et al., 2004). Hence the Ottawa Charters as cited by Smith et al. (2004) defined health promotion as the process of enabling people to exert control over the determinants of health and thereby improve their health. It involves activities that are directed towards enabling people to take action.

Need For Capacity Building through Health Promotion Programs in Nigeria

For effective and efficient health care delivery program, curative and appropriate preventive, promotive, and rehabilitative health care programs must go hand in hand. Curative care is very expensive and hazardous; to reduce costs and minimize the undesirable effects of curative care, increased emphasis must be placed on preventive health care. Mass health education is one way of achieving this in a community.

The whole world is facing seriously palpable economic “meltdown” today. This obviously worsens the already deplorable socio-economic situations prevalent in Nigeria, where there is a high unemployment rate, food shortages, lack of basic infrastructures such as good roads, good transportation, stable electricity, functional health care system, good housing, safe and adequate water supply, and high illiteracy rate. According to the World Population Data Chart 2008, majority of Nigerians live under a per capital income of less than \$2 per day (Population Reference Bureau, 2008). Also, not only are child maternal mortality rates high, the incidence and prevalence of non communicable diseases such as hypertension, diabetes, cancer etc are increasing.

According to UNICEF, malnutrition plays a significant role in the causation of high infant and child mortality rates in Africa. So also, obesity, poor nutrition and stress contribute substantially to the development, treatment and outcome of these non-communicable diseases. As shown by the 2010 world population data report, the average life expectancy at birth in Nigeria is 45 years for males and 47 years for females. Also, the maternal, infant and childhood mortality rates in Nigeria are amongst the highest in Africa. This is grossly unacceptable in a country blessed with both human and material resources.

The need for worksite capacity building a health promotion, strategy arose primarily because many individual life style change education and social education program were having only modest effect in

behavior change. It was also based on the assumption that if capacities improved, through seminars or education of the workers and community service, health indicators would improve and be sustained beyond the often-limit program period (Labonte et al., 2005). Capacity building is of particular importance to health promotion because it increases the likelihood that effective health promotion program will be sustained.

The Situation in a Tertiary Institution in Southwest, Nigeria

The University community mirrors the society at large. Stress is ever present from all angles, poor nutrition due to poor dietary knowledge, lack of regular physical exercise and inappropriate attention to personal health are not uncommon features even in a highly literate community. These, apart from aging may have contributed to increasing prevalence of non communicable diseases in the University community

During the health screening program conducted in all the 16 Local Government Areas of the State to mark 100 days in office of the state governor, a high prevalence of diabetes mellitus and hypertension was noticed as reported in the dailies recently. Adegun and Konwea (2009) reported a high prevalence of hypokinetic disorders among academic and non academic staff of the institution. Statistics at the University health centre also showed a rising incidence of diabetes and hypertension amongst the staff and students.

From research and epidemiological studies, infectious diseases such as HIV/Aids, Tuberculosis (TB), malaria, diarrhoea, acute respiratory diseases and non-communicable diseases such as hypertension, cancer, diabetes, road traffic accident, malnutrition, political assassination, and pregnancy-related complications account for more than 80% of the causes of morbidity/mortality in Nigeria. Most of these diseases that cut people down in their prime are preventable.

By bringing the stakeholders together in a forum and disseminating information on topical health issues affecting the University Community in particular and the International Community in general, will avail the University the opportunity to take informed decisions on positive health living. This will not only lead to improved individual, family and community health, but to increased productivity and enhanced economic growth as well.

The aim of preventive health program, therefore, was to health educate, inform and advise the University Community on topical health issues relevant to the community with the hope that people will be able to

make informed decisions about appropriate behavioural changes and the adoption of healthy life style that will promote healthy living and longevity. Looking at the prevailing health problems facing the country today, the need for people to adopt a healthy life style cannot be over emphasized while awaiting the messiah who will improve health infrastructure and health care delivery program of Nigeria.

Capacity Building through Health Promotion Programs in a State Tertiary Institution

In view of the above, the health centre of the tertiary institution began the organization of a 4-day program of events tagged 'health centre week' to educate the community. The maiden edition of the program took place in 2006 and others in 2009, 2011 and in 2014. For every year the process of the program included health promoting activities as shown on table 1

Table 1. Activities of the 4- day health promotion program

Activities	Process
Awareness campaign	A week to the program and the week of the program through use of posters, handbills, live band (boys brigade) and Disc jockey. With members of staff of the health centre moving to the different departments in the institution to create awareness.
Lectures with interactive sessions	In the University main auditorium where topical issues related to prevailing health conditions of staff were presented and discussed.
Community Service	Includes measurement of Blood sugar, Blood Mass Index, Blood Pressure and Voluntary blood donation. The community service took place in four designated points in the university campus.
Physical Activity tagged "EKSU walk"	Involve walking from the campus gate to a designated area where minor exercises are engaged in.

The theme for each of the seminars as shown on table 2 was developed as a response to health issues and cases reported by both members of staff and students at the university Health Centre. Each health week was enriched with topical issues to provide information to the university community in order to improve the knowledge and capabilities in maintaining their health. This was to ensure that people would be able to make informed decision about appropriate behavior changes and the adoption of healthy lifestyle that would promote healthy living and longevity which ultimately will lead to enhanced productivity.

Table 2; Themes of the health centre week organized

Year	Theme
2006	Sudden death: causes and prevention.
2009	Impact of nutrition and stress on longevity
2011	Healthy living a panacea for longevity and wealth creation.
2014	Stemming the scourge of diabetes, hypertension and cancer in Nigeria.

The objective of the worksite health promotion program in 2009 was to highlight the relationship between good nutrition, stress and longevity, encourage the adoption of right nutritional habit for healthful living, highlight the importance of voluntary blood donations as opposed to "blood selling", encourage the habit of donating blood voluntarily amongst the youth, to highlight importance of responsible sexual behavior, the effects of smoking on health, and the dangers of self medication. The target audiences were Students, staff, visitors, vendors of the institution and invited guests.

Responses of Staff to the Capacity Building through Health Promotion Programs Lecture Series/ Health Seminars

The health seminars formed a very important aspect of the health week and provided an opportunity for informal learning for staff which is one of the types of learning for health promotion (Hawe, et al., 2000). It provided opportunity for this type of learning where the learners are aware of their engagement in the learning process. The workers in the university were therefore aware that learning was occurring so that they may develop more skills in promoting and maintaining their own health.

However, the number of those who attended was quite few compared to the total number of staff in the university. According to the records of the health centre the number of those who attended from other institutions, like the state teaching hospital, the school of nursing, two other higher institutions in the state were more than those for which it was organized. This is not surprising since it is possible that most of the people saw it as an activity meant for the staff of the health centre. Also other normal work activities were running currently with the health centre week, it was therefore not compulsory for all to attend, and possibly the other reasons stated on table 3

Table 3: Reasons for not attending the health seminar

Reasons	very Frequent response	Less Frequent response	Not response a
The program was for the members of staff of the health centre	33	19	6
I was not aware of the program	22	8	28
I was aware but I forgot to attend	6	27	25
I was too busy in the office	40	10	18
My boss did not permit me to go	8	24	26
There was no time to attend	15	33	10
I had work to do in the office	45	6	7
It is not compulsory/ necessary	12	11	35

Data reported here are from reports and interview with the Director of health service, the Matron and 56 other members of staff of the health centre (making a total of 58 responses representing sixty percent of the health centre staff n=96). Who gave a report of the reasons people gave when they interviewed or interacted with them after the programs.

The Community Health Service

The community health service was provided to carry out measures that would enable workers to determine their health status in relation to their blood pressure, blood sugar level, and body mass index. It was meant to enable workers to determine the risk of developing diseases related to these measures and this would help them determine whether or not changes needed to be made in order to avoid becoming ill since it is easier to prevent diseases than to recover from it.

This approach emphasized how to foster skill development through health promoting capacity building program that involved learning by accident or incidental learning. According to Hawe et al (2000) it describes a non formal workplace learning where the learner is not consciously aware that learning was taking place. Workers may not know they are learning about health promotion, so the ownership of the new skills by them may be increased. This approach was described to be a useful strategy for those who do not perceive themselves to have the time to attend seminars or conferences to learn new things. Those who had health issues were asked to see the doctor who provided information on what was observed about their health status and what to do to remain healthy or improve and maintain their health depending on the finding. However, this incidental learning may lead to informal learning where seminars and conferences to consciously provide information and improve the knowledge of participants on health issues observed to be prevalent amongst the populace. (Hawe et al, 2000).

In this academic institution, however, it was reported by the workers in the health centre that most of those referred to see the doctor did not do so. It was also observed that peoples turn out for the aspect was also not satisfactory as indicated by the members of staff of the health centre as reported in another study (Konwea, 2014). Reasons mentioned in an interview with some members of the health team and workers of the university include 'fear of wrong report of a situation that may lead to unnecessary worries', that 'there was no need trying to find out if one can get a disease or not', 'it was not necessary', some believe 'they had no problem or that they can never have problem'.

Furthermore there were those who had no trust for the process. They saw it as a 'plan of management to screen out people who were not in good state of health' and then 'judge their level of productivity based on their health status'. Hence, they feared that it was just a way to monitor the health status of the workers. Most of the designated areas were visited more by students of the institution than the workers for which it was organized.

Physical Activity or Exercise Program

The physical activity segment of the health centre week involved making members of staff park their cars at the entrance of the campus gate and walk into and around some areas of the campus and then engage in some mild exercises. This became a part of the universities monthly program after the 2014 edition of health week. The University Sport Council was charged with the responsibility of ensuring the continuity of the program. It was observed that the turn out on the day it took place during the health week was very high but the percentage of those who participate in the 'walk' reduced every month.

The reason for this could be the fact that during the health week it was compulsory for all members of staff of the health centre to attend, the management staff including the Vice- chancellor were in attendance, all those who got to the campus at the time were not allowed to drive in so it became necessary to walk down or wait. Hence it increased the curiosity of those who came late and they walked in to find out what was going on. The number of those who participate continued to dwindle after the first edition to the extent that most of the members of staff of the health centre did not participate again.

Need for Evaluation of the Capacity Building through Health Promotion Program

Smith et al (2004) defined evaluation is as the assessment of the extent to which an action achieves a valued outcome. They emphasized that health promotion outcomes that should come from capacity building includes: Improve health knowledge, motivation concerning healthy lifestyle, Knowledge of where to go and what to do to gain access to health and other support services, empowering people by giving people necessary skills and confidence and Self-efficacy to participate in everyday activities. Evaluation therefore involves access of the success of an intervention against a set of indicators or criteria (Cooker, 2005)

Nutbeam (1998) posited that one indicator that should be used to assess the achievement of health promotion outcome is to aim at improving health literacy This has to do with improving the knowledge relevant to the

problem of interest and ensuring self empowerment – i.e providing opportunities for workers to be empowered both in knowledge and ability to change certain lifestyles that would lead to improvement in health .

It aims at changing or influencing the attitude and behavior. Health promotion programs should influence workers and enable them to adopt behaviours that are beneficial to their health and reject those that are detrimental to same. Hence the emphasis on the need for capacity building to enhance the ability of participants to build their research skill.

Nutbeam (1998) also emphasized the need to ensure that what is presented would be beneficial to the workers by ensuring that they are related to current health issues and would be beneficial to them in the future. For example a population of workers between the ages of 50 and above should benefit from health education program related to their feeding, coping with stress or middle age and degenerating health problems as well as how to slow down the aging process and other topical issues that would enable them prepare for that stage of life. Kegler, Norton and Aronson (2008) confirmed that much of community health improvements can occur through organization who develop program, obtain and allocate resources and implement policies that directly affect the quality style for community residents.

Health promotion program would succeed more if workers or a group of the leaders, heads of departments and /or the representatives of each unit participated in the program planning and implementation. Broad participation in planning process was started by Kegler et al (2008), as one of the characteristics for achieving substantive chance in capacity building. As well as a strategically partnership among highly committed and strategically placed individuals.

Timing in terms of responding to real and competing needs also play a key role in determining people's response to capacity building program. Hence Kegler et al (2008) placed emphasis on combination of people in the right place at the right time.

Availability and use of funds provided or resources limitation is also very important. According to Kegler et al. (2008) programs have to have funding to exist.

Conclusively, the programs in the institution should be planned and evaluated to determine how they can improve the participation of members of the university community. It should also engage community groups or departments in the programs. The barriers to participation should be identified and ways to overcome these barriers. Also effective methods of

communicating with the people and addressing issues related to their needs by involving them in the planning as well as increased community ability to respond to emerging health issues may help in increasing participation and accessing the effect of capacity building on positive health outcomes.

Implications for Sustainable Development and Poverty Alleviation

Sustainable development is the development that meets the need of the present without compromising the ability of the future generation to meet their own needs. (United Nations Development of Economic and Social Affairs Division for Sustainable Development, 2013). People either benefit or suffer from the choices that are made from one generation to the other. The goal of sustainable development can only be achieved in the absence of high prevalence of debilitating communicable and non communicable diseases. The purpose of health promotion programs is to detect early asymptomatic, undiagnosed cases at high risk and then prevent complications through the prompt and effective treatment of diagnosed cases of hypertension, diabetes as well as other health issues plaguing the University community. This will help in reducing the rate of absenteeism form work, low productivity due to ill health and extra cost in the treatment of complicated cases as well as death of members of staff and other members of the University community.

Capacity building program is an approach to community building that raises peoples knowledge, awareness and skills to use their capacity and form available support systems to resolve the underlying courses of mal-development (Emeahara, Ibeagha, & Agbanusi,2009). There had been cases reported by the health centre where extra cost was incurred by the University to refer complicated cases either to other tertiary health institutions and even outside the country for treatments or care requiring more sophisticated and advance technology which are absent in the country. Some of those cases ended with successful results while some ended in the loss of the staff to death. This is an indication of waste of resources which if spent on educating the populace (if they respond) would reduce the cases of some of the health problems . Losing staff as a result of death from preventable health issues and expenses as a result of seeking care does not favor poverty alleviation or foster sustainable development.

A sign of wholeness of the body and mind is shown in the vitality and high energy level to accomplish any task or goal. Helping and teaching people to take control of their wellbeing therefore is of utmost importance. According to the United Nations Development of Economic and Social Affairs Division for Sustainable

Development (2013) health is a precondition for sustainable development, therefore it emphasized the need for governments to increase public awareness for health aspects especially with emphasis on nutrition, communicable diseases, population issues and health hazards from modern lifestyle through secondary and adult education. Hence the need for health educators and other stakeholders in health to focus attention to develop positive attitude towards programs geared towards improving their health and attention to lifestyle and endeavors (Emeahara, et al. 2009). This will also ensure that development is sustained and less would be spent on the treatment of health problems thus alleviating poverty that would have occurred from low productivity and treatments abroad

CONCLUSION

Capacity building through health promotion programs in the workplace is necessary for the achievement of sustainable development and alleviation of poverty in the tertiary institution. However programs have to be organized in ways that will appeal to the members of the community that it is organized for. This may be achieved by involving them in the planning and implementation of the programs and identifying the barriers to effective involvement of those the program is organized for. This will ensure that people are empowered to take control of the determinants of health and improve their well being and thus their productivity which will on the long run ensure that development is sustained and resources will not be spent on the curative which is more expensive than prevention programs..

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NO EASY ROAD: INNOVATIVE PROFESSIONAL DEVELOPMENT OF SCIENCE TEACHERS IN MALAWI

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ABSTRACT

This paper focuses on some challenges of the democratization of the education process in Malawi following the advent of the Multi-Party Democracy in 1994. The paper analyzes issues of quality, relevance and equity that have punctuated reforms over the past two decades with particular reference to the Professional Development of Science Teachers in Community Day Secondary Schools (CDSSs). The first part offers a brief historical overview of the effects of the rapid expansion of the Secondary School Education Sector in Malawi since the late 90s. The second part discusses how Mzuzu University and the Ministry of Education, Science and Technology (MoEST) have together provided Teacher Professional Development. The third part presents a summary of the outcomes and/or lessons learnt from the Secondary School Teacher Improvement Project (SSTIP). It finally concludes by highlighting the Malawian experience that given the right support, both financially and materially, and coupled with a strong political will, the SSTIP Programme can potentially re-train under-qualified Science Teachers in pedagogical skills and subject matter to a level where they can cope with curricular changes, and update their skills in subject matter and more importantly, improve on their use of educational materials in the Secondary Schools.

KEYWORDS: MoEST, Mzuni, SSTIP, IN-SET, talular, democratization, equity

INTRODCUTION

Following the second Presidential Democratic Elections in 1999, the Malawi Government established about 240 Community Day Secondary Schools (CDSSs) by transforming what used to be Distance Education Centres (DECs) and also constructed 31 additional new Secondary Schools as had earlier promised the electorate in their Election Manifesto. As a result, the Secondary School student population rose to about 65,000 in Conventional and Private Secondary Schools, while more than 100,000 students registered in CDSSs (MoEST PIF Preliminary Report, 2000).

This dramatic increase in student population eventually influenced a big teacher shortfall in Secondary Schools which was at that time estimated to be at about 12,000. The expansion of Secondary Education also piled pressure on Tertiary Education as the then only university- the University of Malawi (Unima) could not manage to absorb all the school leavers that qualified for University Education. At that time, only 0.03% could be admitted to this University as (Chibambo, 2014) observes. Because of the pressures to broaden and increase access to tertiary Education, the Government established a second national university- Mzuzu University (Mzuni) which is located in the Northern Region of Malawi. Mzuni's establishment followed an Act of Parliament of 1997. Initially, Mzuni was established to train teachers for Secondary Schools to supplement the University of Malawi which had been,

among other programmes, training Secondary School teachers since 1965. In the meantime, Mzuni's total student enrolment has risen about six-fold from 550 in 2003 to about 3,500 in 2015. Mzuni started enrolling students in 1999 under the Faculty of Education only. As its mission, Mzuni is committed to provide high quality Education, Training, Research, and other complementary services to meet the technological, social and economic needs of individuals and communities in Malawi.



EDUCATION: *is fundamental to economic and social development*

Up until very recently, the majority of the teachers in CDSSs were under qualified. Most of them had either a Malawi School Certificate of Education (MSCE) or an O-Levels and a Primary Teaching Certificate. Initially, they went into Distance Education Centres to supervise the students, nevertheless, most of them ended up teaching in the CDSSs following an acute shortage of qualified Secondary School teachers. These teachers were mostly able to teach Junior Certificate of Education (JCE) subjects at Forms 1 and 2, respectively. However, they got cognitive challenges when it came to teaching Senior Secondary School classes (MSCE).

Realizing the need to improve the quality of education in CDSSs, the Malawi Government with the financial support from the African Development Bank (AfDB), initiated the Secondary School Teacher Improvement Programme (SSTIP) to help improve the teaching of Mathematics and Sciences in Secondary Schools by strengthening teachers' abilities so that they could apply the new *knowledge* and *skills* in their teaching. Borich (1988) has listed some key behaviours that contribute to effective teaching and such behaviours include clarity, variety, task orientation, engagement in the learning process and moderate to-high success rate. He contends that it is safe to say that without knowledge and skills to present lessons that are task-oriented, and that actually engage students in the learning process at moderate to-high rates of success, no teacher can be truly effective in producing desirable patterns of student achievements and attitudes. High quality education is, therefore, directly related to excellent teaching and successful learning. In addition to these factors, school resources such as textbooks also do influence student achievement as (Heyneman, et.al., 1981) suggests. Moreover, Bloom's (1979) Model of School Learning, defines achievement as a linear function of three things, related as follows:

$$Y = F(X_1, X_2, X_3)$$

Where Y = achievement as measured by criterion-referenced tests

X₁ = a set of cognitive entry characteristics

X₂ = a set of affective entry characteristics such a attitude and

personality, and

X₃ = the quality of instruction.

Bloom (1979) further argues that, of the three constructs, namely cognitive, affective characteristics, and quality of instruction, which are casually related to learning, do account for all the variations in academic achievements and or quality of education. One can therefore understand that where the quality of instruction in schools is not as expected, even if the students are bright and motivated, they will be unable to achieve the anticipated academic results. Since the most

critical challenge faced in the Secondary Sub-sector in Malawi is lack of adequate qualified teachers, Mzuzu University, a Secondary School Teacher Training Institution, is playing a major role in training well qualified teachers who are critical and nerve center in the provision of quality education in the country. Indeed, the professional development of both new and old teachers is key to improving instructional quality as J.W. Hanson cited in Ikejiani, O (ed.) (1964) asserted,

"An important sign of the long-range health of a nation is the spirit and quality of its teachers. There is no substitute for teachers who are dedicated to their nation and to their learners. It is for this reason that African Nations are correct in emphasizing the importance of getting the very best people possible into teaching and making every effort to keep them there. The future of the nation rests in the hands of the teachers, for the qualities they possess today will inevitably be reflected in the citizens of tomorrow."

Therefore, in considering raising the quality of teaching and quality of education alike, one must begin at the teacher development level. Teacher development must be seen as a continuum of learning, with teachers located at various places along the continuum. The stage of a country's development will also affect the range of learning experiences on this continuum. Teaching experience is gained over time. Long-term goals for excellence in teaching should be ambitious, but short and mid-term goals must reflect the reality of the everyday working situation for teachers (Craig, et al., (1998).

CONTEXT OF THE PROBLEM

Because of persistent low pass rate at the MSCE level, MoEST through the Department of Teacher Education and Development (DTED) initiated the SSTIP Programme to help improve the teaching of Mathematics and Sciences in CDSSs. Mzuzu University was contracted to run a 5-year Innovative Teacher Professional Development Model. The three-month SSTIP Training Programme started with an initial intake of 204 CDSS teachers in January, 2004. The trainees were those teachers who were already teaching in CDSSs but did not possess a diploma or a first degree. Prior to the commencement of SSTIP, the staff in the Faculty of Education conducted a Needs Assessment where gaps in the teachers' subject knowledge and teaching skills were identified and documented. The SSTIP programme, therefore, was guided by the assumption that better educated teachers can make informed choices and decisions about the curriculum, and will have a larger body of knowledge to draw upon when teaching students. In addition to knowledge of

subject matter, the programme was also concerned with pedagogy; assuming that teachers need to know not only what to teach but also how to teach it.

METHODOLOGY AND IMPLEMENTATION OF THE SSTIP PROGRAMME

The implementation of the programme is described and analysed with respect to the Innovative Curriculum of the programme and the mode of training. This paper, therefore, gives an analysis of the inputs, processes, and outputs of the SSTIP residential training for cohorts 1 to 5 of Mathematics and Science teachers (N=1122) drawn from all the Six Educational Divisions of Malawi. Selection was based on the criteria that the participants were those teachers who had taught natural Sciences and or Mathematics in CDSSs for at least two years, and had good credit passes in the relevant Science subjects at MSCE level.

THE OBJECTIVE OF THE SSTIP PROGRAMME

The objective of the SSTIP Programme was two-fold:

- To improve the academic competencies of Mathematics and Science teachers in CDSSs in Malawi and thereby strengthening their ability to apply knowledge and skills in teaching; and
- To enable those who would do well in this twelve-week residential In-service Education Training (IN-SET) to be eligible for entry into a Diploma Programme either at Domasi College of Education or in any State Universities. In other words, these were the type of teachers that needed a bridging course before qualifying for entry into the said Diploma and or Degree Programme.

THE CURRICULUM FOR THE SSTIP PROGRAMME

The curriculum comprised of the following subjects: Communication for Academic Purposes, Education, Mathematics, Biology, Physics and Chemistry. Communication for Academic Purposes and Education Foundations were service subjects, while the others were subject content as per Mid- Term Evaluation of SSTIP Cohort I Report (Chimwenje, et al., 2004). These combinations took into consideration the subjects that the trainees were teaching in their respective schools. Science and Technology, as a subject was taken care of by combining Biology, Physics and Chemistry. This was so since the curriculum designers had been informed that Chemistry and Physical Sciences would soon be re-introduced in Secondary Schools as core courses instead of Science and Technology.

Department of Languages and Literature

The course in Communication was designed with the background that CDSS teachers require strengthening of their spoken and written language skills and also require

additional communication skills to help them function more effectively as managers. Literature, structures and statements that provoke critical thinking were also used for discussions. For example, “The eyes of a frog cannot prevent a cow from drinking water.” Discuss. That is, “Where there is a will, there is away.” Moreover, the communication course was compulsory.

Department of Education and Teaching Studies

The Department of Education and Teaching Studies offered an education course entitled Integrated Foundations of Education and Pedagogical Issues. The Department believed that teachers are key to the quality of education in Malawi and that they wanted to help them realize that they teach learners not subjects, and that their prime responsibility was to help individuals realize their full potential in life. The course offered combined Pedagogical and Foundations of Education issues. The four components of the course included The Art and Science of Teaching, Educational Media and Technology, Testing, Measurement and Evaluation, and Teaching Practicum Aspects.

BASIC SCIENCES

There were four Basic Science courses. These courses were offered by the Departments of Biology, Chemistry, Mathematics and Physics.

The Biology Department

The Biology Department offered intermediate Biology content its Methodology. The Needs Assessment conducted by the Faculty of Education at the initial stage of the Programme revealed that such topics were necessary for this group of students. The Needs Assessment also indicated that some topics in the new MSCE syllabus were considered to be more difficult by teachers than others. The difficult topics were the ones that were included in the Biology syllabus. For example, Genetics was considered one of the most difficult topics. Efforts were also made to provide relevant background knowledge, and to link the topics properly. A methodology component was incorporated in the usual content course. This meant that after teaching each topic, issues related to how it can be taught were also discussed immediately. The Department handled the course content by taking into consideration the Biology syllabus at MSCE and beyond. Practical lessons were planned in such a way that emphasis was placed on using materials that might be available in CDSSs.

Physics and Chemistry Departments

The Physics and Chemistry Departments offered intermediate Physics content and its Methodology, Chemistry content and its Methodology respectively. The aims and objectives of the course outlines were in

line with those of the SSTIP. The selected course topics aimed at providing a deep understanding for them to teach effectively in their schools. They also aimed at introducing them to Physics and Chemistry at an Advanced level since they were only teaching Science and Technology then. The practical sessions for the Methodology courses were also conducted using the readily available resources, an approach commonly known as *Talular*. This was done in order to provide them with skills to make their own materials and also encourage them to be innovative. At this level, the most difficult modules were Moles and Molarities in Chemistry; and Electricity and Magnetism in Physics.

Department of Mathematics

The Department of Mathematics offered Mathematics I, Mathematics II, and Mathematics Methodology. Mathematics I covered pure Mathematics topics, while Mathematics II covered Applied Mathematics. The facilitators made deliberate efforts to make sure that the learners acquired the practical working knowledge of Mathematics. The learners acquired the Mathematical skills required to solve problems arising in Mathematics as a subject as well as other science subjects. The way this subject was handled was dictated by the requirements of the MSCE syllabus. Advanced topics suited for A-Levels were also presented. Here, emphasis shifted from an algorithmic approach to a more rigorous and abstract approach. Reasonable efforts were also made to include a good number of examples and

exercises for the learners practice. Just like in Physics and Biology, methodology and content courses were simultaneously taught in this subject. This means that after teaching each content, issues regarding how best it can be taught were discussed immediately. In Mathematics, there were also topics that were considered more difficulty by the learners, such as Number Bases, Probability, and Linear Programming, among others.

RESULTS AND DISCUSSION

Based on the results of the overall performance of the SSTIP (see Figures 1 and 2 below), it can be concluded that the Teacher Professional Development Programme was a success. The In-service Education Training (IN-SET) had demonstrated that it was possible to upgrade teachers in mathematics and scientific concepts by designing a curriculum that suits their needs and abilities. The general performance of most of the participants, both male and female, was good and very encouraging. Out of 1122 participants, 700 successfully completed the programme, representing 63%. But the performance for Cohort 2 was even much better as 154 out of 200 passed, representing 77%. This was a very remarkable achievement. Nevertheless, the performance of Cohort 3 was not as good as expected since only 56% (N=168) passed out of 300. A review of the challenges of Cohort 3 showed that the selection process was less rigorous and problematic.

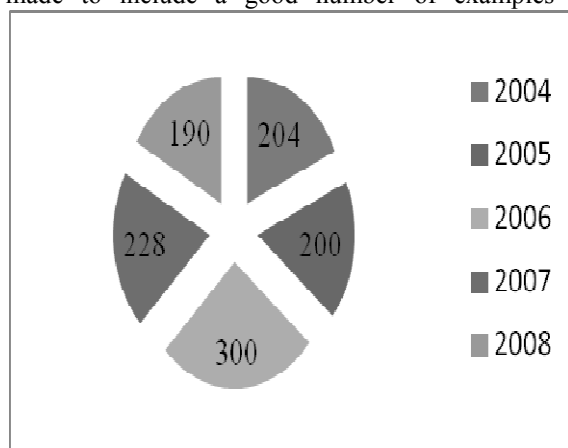


Figure 1: Summary of SSTIP Enrolment from 2004 – 2008 (clockwise).

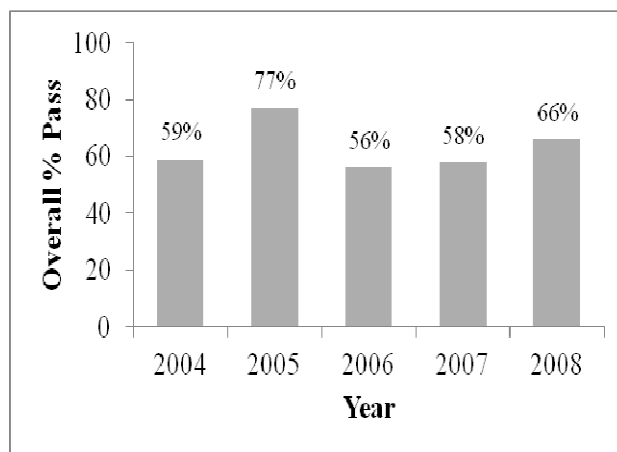


Figure 2: Summary of overall performance for each cohort from 2004 – 2008.

However, during Cohort 5, 125 students passed out of 190 in all the subjects in their end of Programme Examinations, representing 66%. In recognition for their hard-work, all successful candidates (N=700) were issued with *Certificates of Achievement*.

IN-SET of Science and Mathematics Teachers in Malawi is extremely important because of the periodic

reviews usually done, every 5 years, on the Malawi School Curriculum. Science and Mathematics teachers, therefore, urgently need practical guidance to cope with the anticipated changes. Consequently, efforts were made in the SSTIP to enable ill-equipped schools to adopt activity-based teaching. Teaching using locally available resources (Talular) was also emphasized. In addition, a variety of Concept-based Experiments (CEs)

were designed for the Science courses, to enable them link content learnt to actual observations. This perfectly agrees with Craig, et.al. (1998) who observed that even when small changes with teachers and their learning environments are made, for instance, changes of the right type, they can make a difference to children's learning and retention in the educational system. Hence, helping teachers to be knowledgeable and responsible enough to make needed adjustments to the learning environment is one of such right changes. Likewise, since the Content and Methodology courses were combined, and that recent modifications in the Sciences and Mathematics School Curricular were well anticipated, it enabled the learners to directly reflect on what they were teaching in their schools.

Findings from several Case-studies have shown that the academic and professional training of teachers has a direct and positive bearing on the quality of their performance and consequently on the achievement of students as (Avalos and Haddad,1981; Schiefelbein and Simmons, 1981) cited in Lockheed and Verspoor (1991) observed. In particular, specific factors such as the years of teacher training, the teacher's verbal fluency, subject matter knowledge, adequate books and materials and knowing how to use them, teacher expectations of pupil performance, time spent on classroom preparation, and frequent monitoring of student progress are known to affect student achievement (Farrell and Oliveira, 1993; Fuller and Clarke, 1994; Ginsburg & Schubert, 2001).

At the end of each IN-SET programme, it was pleasing to note that participants were more enlightened on how to teach most of the difficulty topics in the MSCE Science syllabi, e.g., in

- i) **Biology:** Genetics, Photosynthesis, and Respiration.
- ii) **Chemistry:** Moles and Molarity (preparation of solutions – chemical reagent).
- iii) **Physics:** Nuclear physics, Electricity, and Magnetism.
- iv) **Mathematics:** Number bases, Probability, Functions, and Linear programming.

In addition, participants were committed to learning, and had an immediate opportunity to gain feedback on their studies from facilitators and their peers. Similarly, they shared experiences and knowledge through Participatory Approaches which ultimately benefitted their respective schools.

CONCLUSION AND RECOMMENDATIONS

The following factors were the major strengths that greatly contributed to the success of the programme:-

- i) Content and methodology courses were combined, recent modifications in the Science and

Mathematics School Curriculum were included in the courses to enable the learners have a direct reflection of what they were teaching in schools.

- ii) Funding by **AfDB** for each Cohort was timely and adequate that influenced the availability of instructional resources.
- iii) Prompt timing in procurement of teaching and learning resources enabled the students to have enough practical skills in the laboratories, for example, hands-on approach to learning.
- iv) Course Facilitators, Management, and Support Staff were very committed to the SSTIP and this too contributed to its success.
- v) Assurance of being recognized by an award and the possibility to pursue a Diploma /Degree Programme motivated the trainees.
- vi) The Programme brought awareness to the public in Malawi that there was great need to help teachers in CDDs upgrade themselves.

Challenges of the SSTIP

- Gender imbalances among the students as there were fewer female teachers (about 16%) who participated in the Programme. MoEST should monitor gender equity within the Secondary Education Sector.
- MoEST in partnership with Mzuni should design specific bridging programmes in natural sciences targeting potential female teachers in order to increase equity and access.
- In view of the challenges faced during the selection process of Cohort 3 students, all stakeholders should ensure that the selection process is rigorous and balanced.

CONCLUDING REMARKS

Although the quality of instruction and attainment results at MSCE were not as good as those from the Conventional Government Secondary Schools, particularly in Science subjects, CDSSs have provided more opportunities and broadened access to education by democratizing the education process in Malawi. Hence, the need for Malawi to provide more rigorous IN-SET Programmes for Science teachers cannot be over-emphasized. As alluded above, even small changes with teachers and their learning environments and coupled with the right *political will*, can make a difference to students' learning and retention in the educational system.

RELEVANCE OF THIS PAPER TO THE THEME OF THE CONFERENCE

From these findings, it can be safely concluded that this paper is **tying** well with the theme of this conference: The SSTIP Programme has been presented as one of the beacons to national capacity building strategies for

sustainable development and poverty alleviation. Well trained teachers are key to national development, poverty alleviation and empowerment of individuals including the vulnerable groups such as women and physically challenged individuals. Educated individuals are likely to create an educated nation and propel national development. Moreover, the approach adopted by SSTIP is highly sustainable as it emphasized on use of affordable and locally available resources (Talular). More importantly, upon upgrading of these teachers, their contribution was recognized by MoEST and it accordingly elevated their status through promotion, which in turn, improved their social and economic welfare. In addition, some of them got admitted into various institutions of higher learning to pursue diploma/degree programmes.

AREAS FOR FURTHER RESEARCH

There is need for further research on the impact of the SSTIP graduates particularly on their post-performance in the CDSSs. Also, studies are necessary to find out how many of these graduates (N=700) managed to progress to Diploma/Degree Programmes using this award, and how they performed in the new Programmes against those who did not attend the SSTIP.

ABOUT THE AUTHOR

Docks Richard Jere is a Lecturer in Educational Studies and formerly Coordinator for SSTIP at Mzuzu University. He started his career as a teacher. He obtained his BA (Ed.) degree from the University of Hull in 1980 majoring in Educational Assessment and Statistics and subsequently earned an MA(Ed.) from the University of Reading (U.K). Mr Jere has also attended various Advanced short courses in Psychological Testing and **Research** at ETS (Princeton), IOWA, and Wisconsin- Green Bay in USA. Prior to joining the University he worked at the Malawi Institute of Education (MIE) as an **Assistant Director** responsible for IN-SET, Research and Evaluation Programmes for a decade. In the late eighties, for six years he was also an Assistant Director in charge of the Testing and Research Department at the Malawi National Examinations Board.

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BUILDING CAPACITY FOR STUDENT-TEACHERS THROUGH THE DEVELOPMENT OF AFFECTIVE TRAITS AND DISPOSITIONS

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ABSTRACT

Building capacity for student- teachers in the area of affective traits and dispositions has become increasingly important for effective teaching and learning in the 21st Century. This important area of teacher training has been neglected over the years. Affective variables, most educators concede, are important. Students' attitudes towards learning, for example, play a major role in how much learning those students subsequently pursue. The values students have regarding truthfulness, honesty, humility, co-operation and integrity shape their daily conduct. And students' self-esteem influences almost everything they do. There is little doubt, therefore that the affective status of students should concern all educators. The paper discusses this important element in teacher training and development which is crucial for effective teaching/learning. To develop professional teachers who can play the crucial role in the sustainable development of society, the paper advocates for the inclusion of a relevant course for imparting requisite affective traits and dispositions to student- teachers for a more inclusive and effective learning.

KEYWORDS: capacity building, student-teachers, education, development, affective traits

INTRODCUTION

Affective variables, most educators agree are important for learning. Students' attitudes towards learning usually play a major role in how much learning those students subsequently pursue. The values and ideals students have regarding truthfulness, honesty and integrity shape their daily conduct. And students' self-esteem influences almost everything they do. There is little doubt, therefore that the affective status of students should concern all educators. According to Rimland (2013) affective domain deals with attitudes, values and emotions. It is often referred to as the "valuing" domain. *The Chronicle of Higher Education (2005)* defined dispositions as values, commitments, and professional ethics that influence behaviours towards students' families, colleagues and communities. These dispositions are guided by beliefs and attitudes related to values such as caring, fairness, honesty, faith, enthusiasm, responsibility and social justice. Other affective traits as listed in the Continuous Assessment booklet of the basic and secondary schools in Nigeria are punctuality, humility, perseverance, co-operation, tolerance and so on. However, these affective traits, even though listed are neither taught nor assessed in the education system.

Popham (2009) asserted that fewer classroom teachers actually assess the affective status of their students. He argued that affective status of school students is in every bit as important as the cognitive domain. Pierre and Oughton (2007) have also observed that the affective domain is the gateway to learning. However, they wonder why over the years, the cognitive and psychomotor domains have taken precedence in classroom instruction.

STATEMENT OF THE PROBLEM

In the Nigerian educational system, little is done in the teaching and assessment of the affective characteristics of both trainee teachers and students. The situation has led to an unbalanced development of teachers and students alike. Research in the areas of teaching and learning have established clear linkages between affective traits/ dispositions and learning (Fraser, 1994; Ormrod, 1999; McMillan, 2004; Popham, 2009 and Agih & Jonah-Eteli, 2011). Students are more proficient at problem solving when they enjoy what they are doing. Also, students who are in a good mood and emotionally involved are more likely to pay attention to information, remember it, rehearse it meaningfully, and apply it. Teachers know that students who are confident about their ability to learn, who like the school subjects

they study, who have a positive attitude towards learning, who respect others, and who show concern for others are much more likely to be motivated and involved in learning (McMillan, 2004). However, what is interesting about students' affective dispositions is that, despite research evidence which shows positive relationship between the two, there is very little, if any, a systematic assessment of the affective domain in the classroom. In truth, few classroom teachers give explicit attention to influencing their students' attitudes and values. This paper therefore presents a theoretical perspective on the need to teach and assess the affective traits and dispositions of trainee teachers for effective service delivery in the system.

SIGNIFICANCE OF THE STUDY

This paper will be very relevant to all stakeholders in the education industry such as teachers, pupils/students, curriculum planners and the ministry of education. The recommendations of this paper, if implemented will help to build capacity for trainee teachers and students by way of enhancing effective teaching/ learning. More so, since education is an index of measuring development, the submissions of this paper will in the long run promote sustainable development in the education sector and national development in general. Finally, the study will also be useful to stimulate quality education which has the advantage of alleviating poverty.

The Domains of Learning

Bloom (1956/1976) introduced the taxonomy of instructional objectives in three domains (cognitive, affective and psychomotor) and emphasized the importance of the affective in the learning process. Woolfork (1998) expanded on the relationship among the cognitive, affective, and behavioural domains. Alexander (2003) reiterated the strong ties between cognitive / affective attributes of learners and how these attributes impact the acquisition and comprehension of knowledge and information. Further categorization of the three domains of learning is as follows:

1. Cognitive domain- relating to or involving intellectual activity
2. Affective domain- relating to or influencing emotions, feelings and attitudes.
3. Psychomotor domain- relating to motor action proceeding from mental activity

The domains of learning as shown are interdependent. This is more evident between the cognitive and affective domains. For this reason, according to Olatunji (2013), focusing on cognitive constructs to the exclusion of affective construct can only unavoidably lead to an incomplete educational experience for learners. And in his opinion, this has been the situation for some time.

The implication of this, among other things is that we have students with advanced knowledge of their specific fields and with great abilities but with little or no regard for their professions or the ethical standards that govern them.

Educators can only foster the desired positive change in learners' dispositions, attitudes, values and ethical perspectives by obtaining necessary information through a diligent and consistent assessment of the affective domain. Incidentally, this is the domain that has been mostly neglected over the years (Olatunji, 2013).

Taxonomy of Affective Traits and Dispositions

Krathwohl, Bloom and Masia (1964) categorized the five levels of affective domain as, "receiving, responding, valuing, organization and characterization" respectively. The receiving level is characterized as the learner becomes aware of the topic, stimuli, event or issue and is willing and ready to learn about it. This is achieved by attending relevant classes and concentration. The second level, "responding" ranges from compliance by voluntary response to having a sense of satisfaction in doing what is required through class participation and obedience to class rules and regulations. The third level, "valuing" is where learners voluntarily manifest behaviours that are consistent with certain beliefs- kindness, punctuality, obedience, respect and others. Students also demonstrate this trait when they consistently allocate time to meet academic obligations, when they practice safety habits while learning and so on. The fourth level, "organization" is shown when learners organize new information or experiences into existing value system. The last level, "characterization" is when students have fully internalized a set of values resulting in new and consistent attitudes, beliefs and behaviours.

Affective learning inculcates the values and virtues of honesty, enthusiasm, faith, discipline, patience, perseverance, tolerance, etc. to the learners. Accordingly, affective educational outcomes that focus on individual attitudes, feelings and positive dispositions must be acknowledged and integrated into the curriculum of education institutions. Evidence that such outcomes are lacking, but required, in education can be found in the soft skill shortage among employees in the workplace (Clark, 2005). According to him, soft skills are important to productivity, employee satisfaction, a healthy workplace, and ultimately, economic success for society. These skills include self-awareness, analytical thinking, leadership skills, team-building, flexibility, acceptance of diversity, the ability to communicate effectively, creativity, problem-solving skills, listening skills, diplomacy and change-readiness.

Enormous shortage of these skills has been observed to be prevalent in Nigeria within the public and private sectors. This is traceable to the near neglect in developing the affective domain of students in the education system.

Rationale for the Development of Affective Traits and Dispositions in Students

According to Stiggins (2005: 199-200), “motivation and desire represents the very foundation of learning. If students do not want to learn, there will be no learning. Desire and motivation are not academic achievement characteristics, they are affective characteristics”. If this is true, then the only avenue of working on learners’ desire and motivation has long been neglected in the educational system. Nolting (2007) pointed out that performance in Mathematics has almost as much to do with students’ attitudes and beliefs as it has to do with their mathematics knowledge. Mathematics and the sciences have for many years been seen as dreaded areas by many students and the situation is still the same. More often than not, the blame is on the “innocent” students while not many are ready to admit the fact that the curriculum is lopsided and the students’ negative attitude could also be due to this (Olatunji, 2013).

Popham (2011) argued that the reason why such affective variables like students’ attitudes, interest and values are important is because they typically influence future behaviour. Griffith and Nguyen (2006) precisely liken the cognitive domain when focused upon alone in the curriculum at the expense of the affective domain to a skeleton without the skin. Regrettably, that is what the education curriculum has been over the years.

Similarly, Agih and Jonah-Eteli (2011) had argued that the moral health and social progress of society will improve if the affective domain of school children is properly assessed. Accordingly, they advocated for the development of the affective domain of primary and secondary school students through adequate assessment of affective instruction. The prevalent cases of youth restiveness, cultism in schools, “boko haram” in the North East of Nigeria are all indications of poor handling of affective traits and dispositions in the school system. They further remarked that if governments and other relevant agencies spend more in developing the affective characteristics of children while in school, the benefit will be spending less in buying guns and security in the future.

Olatunji (2013) observed that education is meant to equip the learner for citizenship and citizenship precludes an individual who is not just able to read, write, carry out mathematical operations, think

critically, be an effective employee or employer, but also possess a general sense of social responsibility. However, looking at the products of the educational system, it is difficult to say whether the citizenship goal of the system has been achieved. This may be so because the only viable means of achieving this- the teaching and assessment of affective characteristics is not receiving the necessary attention it deserves in the system.

The affective domain is important to examine because Rimland (2013) asserted that proper assessment of the affective domain is as vital to increasing learning as assessment of the cognitive domain. She further reiterated that, “in fact, assessment of the affective domain may at times be more important than the cognitive; because it can help an instructor intervene with students who tend to ‘give up on themselves’ in the classroom”. This seems especially true when dealing with students who may have one type of anxiety or the other with respect to learning. Certain anxieties in learning have been observed to have threatened students’ ability to study and complete tasks successfully.

Other benefits include:

- ❖ Affective traits are essential for providing students with the life skills they need (faith, justice, gratitude, co-operation, tolerance, etc) as earlier stated in parts of this text;
- ❖ They are able to spur students to aspire higher in education and in life general (motivation, perseverance, patience, etc);
- ❖ They are the foundation of succeeding societies- According to Peale (1938), the world is built on moral foundations. Iheoma (1995) in Agih and Jonah-Eteli (2010) equally observed that what matters most to a nation’s well being is its spiritual and moral health. Everything else which a nation strives for depends on this: whether it is national integration, political stability, economic development or educational advancement.
- ❖ Society is usually developed by people with excellent character traits as clearly documented in history.
- ❖ If students imbibe these attributes early while in school, they are more likely to be guided by them in their work life and in other social engagements;
- ❖ They help to promote better leadership qualities in youths; and subsequently assist them to become better political, economic, religious, social, etc. leaders in the society.

Assessment of Affective Traits

McMillan (2004) identified three feasible methods of assessing affective traits and dispositions in the classroom. These methods are:

1. Teacher observation
2. Student self report and Peer ratings

He observed that because affective traits are not directly observable, they must be inferred from behaviour or what students say about themselves and others. However, there are some sophisticated psychological measures to assess many affective traits; they are not commonly used by classroom teachers. He gave three concerns to be considered while assessing affective traits: First, since emotions and feelings can change quickly, to obtain valid information will require several assessments over a length of time; the use of different approaches to measure the affective trait in question as much as possible; and to decide whether individual or group results is what is needed.

Consequences of Neglecting the Affective Traits in Learning

The consequences of not sufficiently developing the affective traits and dispositions of students are many. These include:

- i. Lack of life skills such as faith, justice, tolerance, hope, honesty and others (these traits are crucial for the sustainable development of society);
- ii. High incidence of indiscipline which manifest in impatience, selfishness, cultism in the society/school, youth restiveness and general children delinquency;
- iii. Hinders effective teaching and learning;
- iv. Lack of good health where anxiety, depression, discouragement, absence of faith (even for the church goers), ingratitude, worry, uncontrollable anger, etc hold sway;
- v. It leads to high proportion of adults with negative and disagreeable mental attitude-these group of people usually bred disharmony and lack of creativity in the work place and wherever they are found;
- vi. A grave consequence of neglecting this trait for the youths and elderly is that, it dampens enthusiasm, curtails initiative, overthrows self control, subdues imagination, undermines the desire for co-operation, and makes people intolerant and sullen, thereby leading to failure.

THE WAY FORWARD

Research has established clear linkages between affective traits/ dispositions and learning (Fraser, 1994 Ormrod, 1999; McMillan, 2004 and Agih & Jonah-Eteli, 2011). Students are more proficient at problem solving when they enjoy what they are doing. Also, students who are in a good mood and emotionally involved are more likely to pay attention to information, remember it, rehearse it meaningfully, and apply it. This

paper therefore advocates for the inclusion of relevant Courses in the curriculum of teacher education, both at the Colleges of Education and Faculties of Education in the Universities. This will develop the requisite knowledge and skills needed for a more inclusive and effective learning.

Similarly, affective traits should be considered in grading students' performance. This will require a disposition and affective checklist to be included in the assessment process and submitted for consideration as part of the admissions and general evaluation process in the education system.

In the opinion of Olatunji (2013), in restoring the balance between the affective and the cognitive domains in education, some learning and teaching activities can be used. These include problem based learning, group analysis of case studies, perspective sharing and reflection and the use of the multimedia to trigger response. These activities, if well handled and integrated by educators will go a long way in fostering the teaching and assessment of affective traits and dispositions.

Also, institutional administrators, educationists will need to work together and plan for regular workshops, conferences and seminars in the relevant areas to realize this goal. Research should be encouraged to further develop this important aspect of learning. Similarly, educational psychologists, evaluators and instructional designers should not use the affective domain only for a student's motivation to learn, but consider how to engage students in deeper learning through the use of this domain with appropriate pedagogy and evaluation methods.

Finally, more specialists should be engaged to develop the requisite capacity in teaching, measurement/ assessment and other areas of pedagogical development in teacher education. The relevant education agencies will need to provide in-service training to teachers and other means to increase the number of personnel needed to provide this aspect of education. Certain incentives for teachers should equally be considered to encourage the development of personnel in this area of affective education and affective assessment in the educational system.

CONCLUSION

To develop an intellectual understanding (cognitive), there is the need to develop emotional feeling (affective) in the phenomenon. This is typical of the overlap that exists in the teaching/ learning process. Similarly, the World Health Organization (WHO) had defined health as made up of mental (cognitive), physical

(psychomotor) and social health (affective) for anyone to be a healthy person. Thus, building capacity for student- teachers in this regard has become increasingly important for effective teaching and learning in the 21st Century. This important area of teacher training has been neglected over the years in the development of necessary affective traits and dispositions in trainee teachers.

In “Learning for an Unknown Future” Barnett (2004) argued that a being capable of thriving with uncertainty needs dispositions. Among such dispositions are carefulness, thoughtfulness, humility, resilience, confidence, patience, hope, courage and stillness. The reality of this submission can be seen in the common cases of graduates with certificates showing brilliant academic attainments, but who are found wanting in terms of acceptable character traits, and so cannot perform excellently as expected in the society. There is little doubt, therefore that the affective status of students should concern all educators. Educators should therefore be concerned that affective education is a necessary condition for effective education.

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THE ROLE OF HOME ECONOMICS EDUCATION IN ALLEVIATING POVERTY FOR SUSTAINABLE DEVELOPMENT AND HUMAN CAPACITY BUILDING IN NIGERIA

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ABSTRACT

The paper defines poverty as illiteracy, social exclusion and insufficient material means to improve family living condition. It stresses the importance of poverty alleviation in curbing the menace of poverty. However, the development of any nation hinges on the social and economic contribution of her citizens. The height at which poverty has reached across the six geo-political zones in Nigeria shown by literature cannot be over emphasized. The paper examines the various poverty alleviation programmes initiated by past and present governments. The study defines the concept of Home economics education, the role it can play in alleviating poverty with various career opportunity within the course content. Thereby preparing learners for entry into employment and advancement in a choosing career. This paper is based on a desk, literature review and a web based research. It concludes that education is indispensable to economic development and no country would experience any advancement without education. Recommendations were made based on findings.

KEYWORDS: home economics, education, poverty, poverty alleviation, human development

INTRODCUTION

The development of any nation hinges on the social and economic contributions of her citizens. All attributes of sustainable development are deprived by poverty. Poverty causes hunger it brings about poor/low education, low self-esteem, lack of adequate health facilities, housing, land and inability to cloth oneself/family. Abject poverty, wide spread hunger and illiteracy are the main problems which the Nigerian governments past & present has not been able to address. Various programmes were initiated and implemented by the governments, billions of Naira were spent on these programmes, yet Nigerians have been increasingly living in a sorry situation of poverty hunger and illiteracy.

However, the national policy on education places much emphasis on inculcation of National consciousness and unity in diversity on the acquisition of appropriate knowledge, ability, skills, competence and self-reliance.

To achieve these, focus must be shifted to families' development participation in sustainable capacity building which can be attained through Home Economics Education.

Home economics is a vocational subject that passes knowledge and skills from the grass root home/family. Molokwu (2007) stresses that the knowledge and skills which Homes Economics provides can be taught in school, formally organised or even in a non-formal

settings and skills, individuals involves in these skills acquisition can become self-reliant or employers of labour. Therefore sustainable human development can be achieved through home economics. Career opportunities available in home economics include teaching, textile design, fashion design, dietetic, nursery day-care management, interior design, clothing, food and beverage production and service.

STATEMENT OF PROBLEM

In Nigeria, In spite of government's alleviation programmes, National development plans and sessional papers, Poverty is still a dominant challenge. It has also been identified by all and sundry as a major threat to the very existence of Nigeria as a nation.

OBJECTIVES OF THE STUDY

Time immemorial, Education has remained the panacea for ignorance and its attaching problems. This study is set to bring fore and assess the contributions or the role Home Economics Education can play in alleviating poverty and stay relevant in sustainable development. The scope and emphasis of Home Economics Education have shifted from ordinary home making to paid employment in various entrepreneurial trade and business areas. This study is meant to be an eye opener to the Nigerian youths and adults especially Women and Girls who constitute huge population for the government to incorporate this type of course in its poverty alleviation programmes

POVERTY

The word poverty comes from old French poverty' (modern French *pauvrete'*) from Latin *paupestas* from *pauper* (poor). Poverty means illiteracy, social exclusion and insufficient lack of materials meant to improve family living condition. Wikipedia defines poverty as a general scarcity or dearth, or the state of one who lacks a certain amount of materials possession or money.

World Bank also defines poverty as pronounced deprivation in wellbeing, and inability to acquire the basic goods and services necessary for survival with dignity. Poverty also encompasses low levels of health and education, poor access to clean water and sanitation, in adequate physical security, lack of voice and insufficient capacity and opportunity to better one's life. World bank (2008) similarly Molokwo (2010) defines poverty as lack of job, poverty is hunger poor health, low education, low self-esteem, lack of adequate housing, land inability to cloth oneself Humanity low economics status.

Maduagwu 2007 posited that poverty creates frustration, loss of hope/prospect and value for life, loss of meaning for life and purpose of living. Shola (2012) asserted that poverty is the inability to attain a minimal standard of living measured in terms of basic consumption needs or income required to satisfy them.

International Federation for Home Economics (IFHE) 2003 stresses that 'poverty is not only inadequate income, it is also lack of access to basic service and amenities, the lack of security and exclusion from community life. The recommendation made by IFHE is to focus efforts to uproot the causes of poverty and to achieve the involvement of the poor themselves taking in the elaboration of policies which concern them'

The relationship between poverty, hunger, illiteracy and human development is very important. However, poverty, hunger and illiteracy are detrimental to human development. All the attributes of human development are denied by poverty. The success or failure of any government is measured by the degree of attainment of human development or the level of poverty prevalent among the people asserted Okafor (2014). Poverty is the inability to obtain the basic necessities of life (food, shelter, clothing, education and access to health facilities).

Adebayo (2007) opined that 40-45% of African population lives in absolute poverty and 30% belong to the extreme poor. Oyeookum observed that 70% of Nigerians live below poverty line and survive on less than 1dollar a day

In view of the above definitions, poverty is a major problem that should be reduced, alleviated or eradicated completely by any concerned government. Obasigie and Orumweuse (2009) opined that when the human and natural resources of a nation are not sufficiently developed, poverty becomes the order of the day.

Usman (2010) opined that Home economics aims at improving the quality of family life through effective development and utilization of human, material and natural resources of a society. Primarily this paper is set to relate the home economics education skills acquisition that can bring about limited resource utilization to certify the basic needs of life which include shelter, food, clothing and other aspects of lively living thereby reducing/alleviating poverty.

POVERTY ERADICATION POLICY

The issue of poverty and measures to tackle the incidence of poverty have remained at the fore front of government policies in the country. Government at different levels have introduced various poverty alleviation programmes. From independence (1960) to date, successive governments initiated different programs and policies. On virtually every aspect of the national life. Ukpong (1999) is of the view that the programmes were intended to ensure food self-sufficiency and provide necessary infrastructure to stimulate economic activities, enhance incomes and improve living condition of the poor.

The poverty eradication programmes introduced by the government include the following.

- Family support program and family economic advancement program 1993
- Poverty Alleviation program & micro credit scheme in 2000.
- National poverty eradication program (NAPEP) which replaced the previously failed poverty Alleviation program 2000.

The intentions of government in initiating the programmes have, however, only succeeded partially in improving the living conditions of some Nigerians. Thus the poor in the country are still widely considered worse off as many indicators, reflecting the ability to provide for physical subsistence for the upliftment of human dignity are below expectations Ogwumike (2001). These poverty reduction projects were initiated by governments to alleviate the effects of poverty in Nigeria. Fabusuyi (2012) is also of the view that poverty reduction strategies are actuated by government to reduce the effects of wants on the poor.

HOME ECONOMICS EDUCATION

You are no one until someone trains you:-

Formal education be it academic or technical is often presented as a guaranteed way to change the life of an individual. Education as an empowering tool would help people to change their living condition by taking action while having knowledge and skills of a trade that will make them become competitive in the productive field. Education is the best path to poverty eradication. Educated people are able to achieve their goals in a much better way.

Wikipedia defines education in general sense as a form of learning in which the knowledge, skills and habits of a group of people are transferred from one generation to the next through teaching training, or research. The best means of eradicating poverty among youth and adults in our country and improving sustainability is to create self-employment programmes such as skill acquisition, jobs. Education provides a foundation for eradicating poverty and fostering economics development .it is the groundwork on which much of economics and social wellbeing of the citizens is built omoniyi (2013)

However, the Home economics institute of Australia views Home economics education as the central focus of the wellbeing of people within the context of their personal, family communication & work roles. The institute also observed that Home economics education is about becoming independent connecting with others and taking action towards preferred future that support individuals and family wellbeing. It further states that through home economics education students become empowered, active and informed member of the society.

Furthermore the focal point of Home economics education is to equip young people and adults with sustainable skills, relevant knowledge and attitudes for work in chosen occupation and career opportunity. In 2004 the federal government of Nigeria in its national policy on education categorically spelt out the broad aims and objectives of home economics education under vocational and technical education to include: To give training and impart the necessary skills, teaching to the production of craftsmen, fashion design, interior decoration, event planning and other skilled personnel who will be enterprising and self-reliant.

IFHE defines Home economics as a field of study and a profession, situated in the human science that draws from a range of disciplines to achieve optimal and sustainable living for individuals, families, and communities. Home economics is concerned with empowerment and wellbeing of individuals, families and communities and facilitating the development of attributes for lifelong learning for paid, unpaid and

voluntary work, and living situation IFHE (2007). McGregor (2006) opined that Home economics is interdisciplinary, multi-disciplinary and trans-disciplinary. It is a field of knowledge with numerous marketable skills that make for self-reliance and self-employment. Osuala (2001) is also of the view that for greater emphasis on vocational education in which Home Economics is inclusive has its goal as the preparation of the learner for entry into employment and advancement in his/her career, meeting the manpower needs of the society increasing the option available to students, adults and also to enable learners to wisely select a career.

Ene-obong (2006) gave a more elaborate definition of home economics as a field of study evolved out of the concern for the family and raised by the condition of a society becoming increasingly dominated by commercial and industrial interest, Ene –obang further asserted that it is concerned with ways in which the quality and family life can be enhanced maximally through optimum utilization of its human and material resources. Home economics education /training can be said to be a means through which young people and adult may be led to a stronger growth and development, thereby enabling him/her to take responsibilities in the home, and the society at large.

THE ROLE OF HOME ECONOMICS EDUCATION IN ALLEVIATING POVERTY

Households and the individuals living in the society are the main focus of Home economics .Education and knowledge in Home economics empowers individuals to fulfil their fundamental needs and to manage everyday life scarce resources. Education in home economics skills, like resource management and household finances in combination with psychosocial stabilization of the family leads to productive and regeneration capacity of the otherwise poverty disenfranchised individual. The well-being and the regeneration of the private home is a basic social goal for a full use of one's potential for education and paid work. Home economics education provides knowledge in food production, poultry and animal rearing nutrition skills. Home economics education does not only ensures self-sufficiency for the individual, families and communities but also to income generating opportunities. By selling the excess food produced, animals reared, eggs and birds from poultry in the family setting from a sustainable income generation activity. Opportunity is opened for families and individuals. When the availability of food combined with nutritional and health skills then it leads to an adequate nutrition for the young ones and youth in the family which will make them physically fit and mentally sound to use educational opportunity at their disposal.

IFHE (2012) stated that Home economics education can improve skills and competencies of families and individuals in a changing world, education and best practice in home economics includes gender equality, safe sanitation and water use, generation skills, sustainable household production and resources management as well as food production, nutrition skills and health. Olaitan (1996) opined that organised vocational education is concerned with the development of skills and success in any useful occupation.

Home economics is a field of study that offers various occupations for individuals. It is a skill base course which has the capacity of equipping young people and adult with sustainable skills, for self-reliance, employment and wealth creation thereby reducing or eliminating poverty.

The knowledge and skills which home economics provides can be taught in school formally, organised apprenticeship and or even in a non-formal setting, individuals involved in these skills acquisition can become self-reliant and an employer of labour. Molokwo (2007).

Home economics education prepares students for the acquisition and development of skills, competencies and attributes which are necessary for efficiency of the economics systems. It makes individuals to be job providers rather than job seekers. Audu and Abdulkadir (2009)

Home economics education at all perimeters of life is aimed at improving and providing knowledge and skills to individuals for family living. The success of any nation is dependent on the happiness, health and comfort of its families. Roberts (2011) also assert that the primary determinant of a country's standard of living is how well it succeeds in developing, utilizing skills, furthering the health and educating the majority of its population.

In view of the above Nkwako (2004) opined that the basic mission of Home economics education is helping individuals and families to improve their lives through

- Training for necessary manpower in entrepreneurship
- Training and imparting of necessary skills to individuals who shall be self-reliant economically.
- Provision of technical knowledge and vocational skills necessary for national development of improved skills, capabilities, and utilization of workers employed in government and private sectors.

Education in general is indispensable to economic development and poverty eradication, no economic development is possible without education.

Audu and Abdulkadir (2009) observed educational goals as follows and come in live with the objectives of Home Education.

Helping the individual to appreciate the world around and contribute meaningfully to the socio-economics development of a nation.

Empowering individual with desirable skills knowledge and value to perform specific functions so as to become self-reliant.

Helping individuals to develop and build his/her capacity for meaningful decision making in all spheres of life.

Molokwo (2007) opined that poverty is the exact opposite of human development. Home economics education provides knowledge, skills and competencies that are directly opposite to poverty. This type of education emphasizes that after training, the trainee would be self-employed and self-reliant thereby producing goods and services for the benefits of the society.

CAREER OPPORTUNITIES AVAILABLE IN HOME ECONOMICS EDUCATION

Numerous business opportunities and entrepreneurial skills exist in Home economics education Lemechi (2005) and Uko-Ayima (2006) identified a catalogue of Home economics related business opportunities grouped under the following areas

FOOD AND NUTRITION

Under this group the following business related opportunities are available.

- Processed - flour- - from different source like Yam, Cassava, Plantain, Coin (maize) etc.
- Starch production for laundry
- Production species and condiments.
- Production Jam and jellies, Ice cream, Popcorn, Yoghurt
- Snack production like cave, pies, burns, doughnuts
- Outdoor catering services
- Nutrition and deities
- Event planning
- Poultry, fish and other animal rearing.

CLOTHING AND TEXTILES

The business opportunities could be found under this group.

- Tie and dye production

- Batik production
- Production of handmade embroidery materials.
- Toys production.
- Tailoring training services.
- Knitting and crocheting
- Laundry and dry cleaning services.
- Jewellery production

FAMILY AND CHILDCARE

The following business opportunity exist under this group

- Operation of day-care centres and nursery schools.
- Operation of teaching and learning aids.
- Operation of old people homes
- Operating nutritional advise centre for under or malnutrition children
- Handling children with disabilities

HOME MANAGEMENT/HOUSING AND FURNISHING RELATED BUSINESS

The following business opportunity exist under this group

- Interior decoration.
- Hall and venues decorations for events.
- Main Services
- Rental services.
- Production of artificial/natural flowers and soap making (shampoo, liquid soap, abrasive)
- Cream and pomade making

For any individual to be gainfully employed and fight poverty, he/she must acquire some skills, knowledge and relevant attribute. Home economics students who undergo a training in the field will find one more of the above skills if well interpreted in everyday life to be a remedy to poverty, unemployment and any other of life.

CONCLUSION

Education is indispensable to economic development and poverty alleviation. No country would experience economic development without education. Conclusively, this study emphasized on Home Economics education as an important tool for family survival and general towards acquisition of sustainable skills for human capacity building. This can only be achieved if young people and adult are exposed to the knowledge of technical and vocational training necessary for human development which accelerate job opportunities and alleviate poverty amongst Nigerians

RECOMMENDATION

Based on the foregoing discussion the following recommendation were made.

Corporate bodies and non-governmental organisation should adopt and implement Home economics training as part of their social responsibility program.

Government should establish more vocational centres across the county where informal instructions be given to those that could not afford formal education. To tackle poverty at all levels.

Graduates of Home economics should be given soft loan to enable them establish their own business.

Women should embrace the program/training as much of the program is more of women oriented course. This will make women self-employed thereby, making the country to accelerate its human development.

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STRATEGY FOR ENHANCING NATIONAL CAPACITY BUILDING IN SOCIAL STUDIES EDUCATION FOR SUSTAINABLE DEVELOPMENT: AN INQUIRY INTO FEDERAL COLLEGES OF EDUCATION IN NORTH-CENTRAL ZONE OF NIGERIA

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ABSTRACT

The study sought to find out strategies for enhancing national capacity building in Social Studies Education for sustainable development in Federal Colleges of Education in North-Central Zone of Nigeria. Fifteen Social Studies lecturers and 345 students drawn through a multi-stage sampling technique constituted the sample of the study. Eight - item structured questionnaire was the instrument used to seek information for the study. One research question was raised and one null hypothesis formulated for the study. The study employed the mean score and t-test statistic in analyzing the data. The findings revealed among others that the strategies for enhancing capacity building in Social Studies Education include training in proper utilization of ICT - aided instruction and other best pedagogy and incentive through improved funding of research. It therefore recommends that Social Studies teachers should be trained to be ICT compliant in their service delivery and the programme should be adequately funded and be made more attractive.

KEYWORDS: national capacity building, strategy, social studies education, sustainability, development

INTRODCUTION

The National Policy on Education (NPE) and the national philosophy for education in Nigeria recognizes the need for Social Studies Education in capacity building for young citizens for national development. The subject (Social Studies Education) was adopted in Nigeria about 52 years ago as a result of the quest for relevance in the Nigerian education system. Social Studies in several nations of the world are essentially introduced to meet certain specific needs and aspirations of the people. In Britain for instance, Social Studies was introduced into the school curriculum after the First and Second World Wars as panacea for social problems (Ediyang and Ubi, 2013).

The Nigerian society is not an exception. This however partly explains why Social Studies have been given a pride of place in Nigerian education industry. The corruption-free, humane, moral and integrated society which Nigeria is craving for cannot be achieved without a sound foundation as well as instruction in Social Studies. Social Studies as a unique discipline is committed to transmitting and forming the values of citizens in any society. Social Studies has come to be accepted as a course of study in most colleges of education in Nigeria that should assist NCE (Nigeria

Certificate in Education) graduates to acquire the basic knowledge, skills and positive attitudes needed to be responsible and reliable citizens which has over a period of time enhanced national capacity building (Alberta, 2000).

Social Studies Education touches on all aspects of societal development – political, economic, social, spiritual, cultural, technological or educational. In the Nigerian context, the goal of Social Studies curriculum is designed at building a sound and balanced mind as a foundation for functional social education towards the development of intelligent, responsible and self-directing citizens. Integrating and dispensing social knowledge through the instrumentality of Social Studies curriculum designed for NCE Undergraduate in Colleges of Education according to Garb, Yusuf and Saad (2012) is directed towards the following:

- i. Self – confidence and initiative;
- ii. Power of imagination and resourcefulness;
- iii. Desire for knowledge and continued learning;
- iv. Sense of compassion for the less fortunate;
- v. Social values and attitudes such as: cooperation, participation, interdependence, open-mindedness, honesty, integrity, trustworthiness, diligence and obedience;

- vi. Sense of respect for and tolerance of the opinion of others; and
- vii. A spirit of national consciousness and patriotism.

Capacity is the ability to understand or do something, and building is an increase in the amount of something over a period of time. Building capacity in Social Studies Education requires the conscious effort or attempt at upgrading, renovating and acquiring skills, abilities and strategies that must increase consistently over time and enable Social Studies teachers react appropriately to academic dynamics including professional training, lesson delivery, effective use of instructional materials, teachers communication skills, provision of effective role model, effective discipline and students' control, improved conditions of service and most importantly quality of classroom assessment to determine the needs of learners in the learning process.

The position of Social Studies Education in promoting sustainable national development is basic as it provides insights and critical thinking skills needed to combat poverty and destitutions, crime and disharmony, and pave the way for an egalitarian society. However, Opoh and Edinyang (2014: 145) have raised some fundamental questions which tend to assess how much the subject has fulfilled this onerous task thus:

- a) What has been happening to poverty?
- b) What has been happening to unemployment?
- c) What has been happening to inequality?
- d) What gave rise to high profile corruption in the society?
- e) Why the high rate of insecurity?
- f) Why such intimidating injustice in the society?
- g) Why corrupt public officials are not properly prosecuted?

The answers to these questions are bare to the face. Hence, Uduokpong (1998), and Opoh and Edinyang (2014) have rightly noted that an enormous gap exist between intended changes and actual practices in Social Studies Education in Nigeria; and that the country lacks a clear direction for the purpose, method and content of teaching the subject that would have addressed the nation's many developmental challenges. This study is therefore significant as it calls for reorientation and reorganization through a capacity building strategy in the training process and retention of trained personnel in Social Studies Education.

CONCEPTUAL FRAMEWORK

Social Studies Education

Social Studies as a discipline of offering in Nigeria's educational system have over the years been subjected to a variety of definitions which in most cases have been

quite restrictive in focus and content. For instance, majority of the earliest practitioners of the subject have defined it as an amalgamation of the arts and social sciences in terms of History, Geography, Political Science, and Sociology. This perspective of Social Studies has been seriously contended by recent scholars (Lawal, 1992; Utulu, 2010, and Ahmad, 2013). Again the varying professional backgrounds of those handling the subject before have equally affected the variety of definitions of the subject. Social studies is the study of man's mutual interaction with his physical, social, political, religious, economic, psychological and cultural environment (Adaralegbe (1980) in Ogundare, 2010). Social studies Education is a subject that deals with various kinds of social relationships needed for better understanding of social living. It is one of the school subjects directed at developing ways in which educational policies can help to create a better world, by contributing to sustainable human development, mutual understanding among peoples and a renewal of practical democracy (Arisi, 2013).

National Capacity Building

The term 'capacity' has been defined as the ability of individuals, organizations and systems to perform appropriate functions efficiently, effectively and sustainably. Thus, national capacity building mean the way individuals, groups, institutions and societies strengthen their abilities to, on one hand, perform core functions, solve problems and formulate and achieve objectives, and on the other hand, to understand and deal with their development needs in a broad context and in a sustainable manner (UNESCO, 2006). National capacity building in Social Studies Education therefore has to do with a process where individuals, groups, networks, organization within the Social Studies discipline and the wider social science community are encouraged and facilitated in enhancing their knowledge and skills so as to increase their ability to perform innovative and high quality social research.

Strategy

A strategy is a plan on how or ways of getting things done. It is a pattern of action over time. Strategy can also be described as a position or perspective that reflects decisions or direction to approach a particular task, a challenge or an issue.

Sustainable Development

Development is a term used to refer to event or incident that causes a situation to change or progress. It is a process of changing and becoming better. Development indicates a change from one state to another to the extent that the new state is different from the former in terms of characteristics (Enem, 2007). Development implies both qualitative and quantitative change.

Sustainable development ordinarily means economic development maintained within acceptable levels of global resource depletion and environmental pollution. Social Studies Education for sustainable national development therefore complements as well as incorporates quite a number of other fields ranging from environmental education, global and economic education, conservation education, to multicultural and global change education among others. In this wise, the Social Studies teacher makes considerable contribution to sustainable national development by the educational objectives emphasized when selecting the content and learning experiences for students to study. This is especially true in choosing contents that influences the areas of knowledge to be learnt, and the skills and attitudes to be developed.

The Problem

The NCE Social Studies is a programme designed to train and produce qualified teachers to dispense Social Studies curriculum at the pre-primary, lower and middle basic levels of education in Nigeria. Experience has shown that students' enrolment into the Social Studies Programme has continuously been on the increase. However, like other subject disciplines in Colleges of Education, Social Studies is offered as Single Major in combination with other school subjects such as History, Geography, Economics, the Religious Studies, and the Languages (very few offer it as Double Major). The resultant effect is brain drain whereby many NCE Graduates do not further their studies in Social Studies Education. Even when they proceed further, they are mostly found in other walks of life other than teaching. It is a wonder that with the monumental turn-out of NCE graduates in Social Studies, most teachers of Social Studies are from other subject disciplines. This study therefore seeks to determine strategies to develop national capacity building in the discipline, particularly in Colleges of Education in North-Central Nigeria.

PURPOSE OF THE STUDY

The main purpose of the study is to determine strategies for enhancing national capacity building in Social Studies Education for sustainable development in Nigeria. It therefore seeks to answer the following question:

RESEARCH QUESTION

1. What strategies can be adopted to enhance national capacity building in Social Studies Education in Federal Colleges of Education in North-Central Nigeria?

HYPOTHESIS

1. There is no significant difference between the mean ratings of students of Social Studies and those of

Social Studies lecturers on the strategies for enhancing national capacity building in Social Studies Education in Federal Colleges of Education in North-Central Nigeria.

METHODOLOGY

The study adopted a descriptive survey research design. It is taken to be appropriate for this study because Osuala (2005) saw it as a design, which studies a population through a sample in order to determine the status of a given phenomenon. The population of the study comprised of the four Federal Colleges of Education (FCE) in the zone which include all the Social Studies lecturers and their students.

Through a multi-stage sampling technique, two FCEs were randomly selected, out of which fifteen lecturers and three hundred and forty-five students constituted the sample for the study.

The instrument for data collection was a researcher developed questionnaire titled "Strategies for Enhancing National Capacity Building in Social Studies Education in Nigeria Questionnaire (SENCBSSNQ)". The instrument was made up of two sections. Section A sought demographic data regarding respondents' name of school and level of qualification. Section B consists of eight items on which the respondents were asked to indicate the extent of their opinion on a four-point Likert scale of Strongly Agree (Very High (VH) - 4 points; Agree (High (H) - 3 points; Disagree (Low (L) - 2 points; and Strongly Disagree (Very Low (L) - 1 point.

The instrument was face validated by three experts in School of Arts and Social Sciences, FCT, COE, Zuba. For reliability, a pilot test was carried out using three lectures and forty students drawn from those not included in the sample. A Cronbach Alfa reliability test for internal consistency of the items yielded a coefficient of 0.73.

The questionnaire was personally administered to the respondents by the researcher with the help of two research assistants who are also colleagues. In analyzing the generated data, mean and standard deviation was used to analyze the two research questions, while t-test was used to test the stated hypotheses at the 0.05 level of significance.

RESULTS

Research Question 1: What strategies can be adopted to enhance national capacity building in Social Studies Education in Federal Colleges of Education in North-Central Nigeria?

Table 1: Mean ratings of the respondents' opinion on strategies for enhancing national capacity building in Social Studies Education.

S/N	Items	Lecturers (N = 15)			Students (N = 345)		
		X	SD	Deci	X	SD	Deci
1.	Implementation of Social Studies curriculum in senior secondary schools will enhance National capacity building in Social Studies Education in Nigeria.	2.20	0.86	L	2.74	1.77	H
2.	Continuous research orientation will enhance capacity building in Social Studies Education in Nigeria.	2.01	0.70	VL	2.00	0.77	VL
3.	Professional growth encouraged through training and retraining workshops and seminars will enhance capacity building in Social Studies Education in Nigeria.	2.00	0.93	VL	2.00	0.77	VL
4.	A national policy framework to ensure that only Social Studies trained professionals teach Civic and Social Studies Education will enhance national capacity building in Social Studies Education in Nigeria.	1.87	0.64	VL	3.02	0.15	H
5.	Incentive through Improved funding of research will enhance capacity building in Social Studies Education. Training in proper utilization of ICT aided instruction and other best pedagogy will enhance capacity building in Social Studies in Nigeria.	3.47	0.52	VH	2.68	0.65	H
6.	Curbing all forms of examination malpractices in the Colleges will enhance capacity building in Social Studies Education in Nigeria.	3.07	0.59	VH	3.02	0.15	VH
7.	Encouraging publishing of Social Studies textbooks by professionals via grants and interventions will enhance capacity building in Social Studies Education in Nigeria.	1.66	0.72	VL	1.96	0.41	VL
8.		1.47	0.74	VL	1.94	0.41	VL

Source: Field survey (2014)

The data on table 1 indicates that items 2, 3, 7, and 8 were rated low by both lecturers and students. Items 5 and 6 were rated high by both categories of respondents. The only observed point of divergence or disagreement is in items 1 and 4 with mean scores of 2.20 and 1.87 for lecturers disagreeing that implementation of Social Studies curriculum in senior secondary schools will enhance National capacity building in Social Studies Education in Nigeria and a national policy framework to ensure that only Social Studies trained professionals teach Civic and Social Studies Education will enhance national capacity building in Social Studies Education

in Nigeria respectively. The students on the other hand agree on this with the mean scores of 2.74 and 3.02. However, the measure of variability for both respondents is minimal and so also is the difference in inter-individual opinion implying that the respondents holds similar opinion in each group.

Table 2: T-test analysis of the difference between the mean score of students and lecturers on the factors affecting national capacity building in Social Studies Education in Nigeria

Groups	N	X	SD	Df	Level of significance	Calculated value	Critical t-value	Decision
Students	345	2.36	0.49	358	0.05	1.29	1.96	Ho is accepted
Lecturers	15	2.14	0.70					

Table 3 shows that the calculated value of 1.29 is less than the table value of 1.96 at 358 degree of freedom and 0.05 level of significance. This indicates that there is no significant difference in the opinions of the two groups. Thus, the null hypothesis is accepted.

DISCUSSION

The data presented has revealed that both students and lecturers hold the views that continuous research orientation training and retraining workshops and seminars is not the main strategies to enhance national

capacity building in Social Studies Education in Nigeria. However, they are of the opinion that incentive through improved funding of research and training in proper utilization of ICT - aided instruction and other best pedagogy will enhance capacity in Social Studies Education in the zone. This finding is in-line with Mezieobi (2007: 135) when he noted that it is the primary essential challenge of university (colleges of education) lecturers to update the image of Social Studies through credible, worthy research efforts and the institutionalization of continuous published journals and researches in line with modern societal needs and aspirations, in this global information communication technologies (ICTs) era. This view is further buttressed by Nwachukwu (2004) that there is need for a continuous revision of Social Studies curriculum of our universities (colleges) in a radical form to educate their products to be able to cope with the trends and demands of the information society.

There is also an observed discrepancy between lecturers and students' opinion on the implementation of Social Studies curriculum in senior secondary schools and providing a national policy framework to ensure that only Social Studies trained professionals teach Social Studies and Civic Education as strategies to enhance national capacity building in Social Studies Education in Nigeria. This perhaps may be due to a feature of Social Studies historical background in which many of the experts have their initial training in other social science disciplines (Philip-Ogoh and Abdus-Salam, 2014). In other words, the lecturers (who are mostly non-Social Studies Specialists) would rather maintain the status-quo as opposed to the up-coming undergraduate who are purely Social Studies Specialists.

Also the low opinion expressed by both lecturers and students on other strategies suggested such as continuous research orientation; professional growth encouraged through training and retraining workshops and seminars; curbing all forms of examination malpractices in the Colleges; and encouraging publishing of Social Studies textbooks by professionals via grants and interventions explains respondents' priority needs reflects the fact that these issues are not less important but the most important of them is funding and training in information and communications technologies. Training in ICTs – aided instruction is considered a better strategy perhaps because of the population of student enrolment in Social Studies which is usually very high (Udoh, 1981; Mezieobi, 1991; and Ker, 2006).

A very salient point which the findings have revealed, one which cannot be ignored, is the desire of student –

teachers to see Social Studies curriculum being implemented in secondary schools in Nigeria. This tends to agree with views expressed by Opoh, Edinyang and Ogbaji (2014) that as useful as the subject is to the moral and intellectual development of the child as well as the acquisition of necessary skills for nation building, there has been a gap in the Nigeria Social Studies curriculum. The subject is offered in the primary and junior secondary schools but not offered at the senior secondary level, making it difficult for proper shift from the secondary to the tertiary level of education. This perhaps explains the recent implementation of Civic Education at senior secondary level of education in the country.

IMPLICATION OF THE FINDINGS

The study has revealed the need to improve funding of research in Social Studies. It also goes to show that there is need to integrate ICT programme in Social Studies Education programmes of Colleges of Education, such that students are equipped with skills of information location, research and capability of maintenance of Information Communication Technologies (ICTs) material and thereby enhance capacity building in the subject. Another implication is that it reveals the need to professionalize the subject discipline of Social Studies in order to minimize the porosity of entry point (admission and recruitment).

CONCLUSION AND RECOMMENDATIONS

Social Studies Education has been identified as a veritable tool that has facilitated the attainment of sustainable development goals and poverty alleviation through the production of responsible citizens armed with the necessary skills and capabilities, attitudes and values and contributing maximally to national growth. Although there have been observed gaps between intended changes and the actual practice thereby making the attainment of the objectives optimally somewhat elusive. However, evolving national capacity building strategies (as revealed has shown) in the subject would ensure sustainable development and alleviate poverty in the country.

Based on the discussion, implications and conclusion, the following recommendations are made:

1. The government should fund research in Social Studies Education so that new frontiers for national development and growth and poverty alleviation may be discovered.
2. Information and communications technologies (ICTs) instructional methods should be integrated into Social Studies curriculum and lecturers should be trained on the effective utilization of ICT in their classroom interaction for sustainable development and ameliorate the poverty level Nigeria.

3. Government and indeed stakeholders in the field should review the entry requirements for admission into tertiary Social Studies as well as recruitment of its teachers in such a way that it would be subject-specific like other social science disciplines. This way the subject would be implemented bearing in mind its goals and objectives especially for sustainable development and poverty alleviation.
4. All observed gaps in the implementation of Social Studies Education should be filled through the necessary political, administrative and professional goodwill and commitment (Jekayinfa, 2005).

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DEVELOPING CAPACITY FOR THE ACADEMIC STAFF OF NIGER DELTA UNIVERSITY THROUGH ETHICAL UNDERSTANDING AND PRACTICE

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ABSTRACT

This study was on developing capacity for the academic staff of Niger Delta University through ethical understanding and practice. The need for the study arose because of issues of professional misconduct that were observed among some category of staff. The study adopted the descriptive survey design with a population of all the academic staff of the University. This gave the total figure of 767. A sample of 326 was drawn using the purposive sampling technique. A questionnaire titled: Level of Ethical Understanding and Practice Assessment Questionnaire (LEUPAQ) was used to elicit data for the study. Descriptive statistics was used to analyze the data collected. Findings revealed that the lower category of academic staff in the University have poor understanding and practice of the ethics guiding teaching in the institution. However, the senior category exhibit better understanding and practice of ethics in teaching. Based on the findings, some recommendations were made to build capacity of academic staff and improve the understanding and practice of ethical principles as they relate to teaching in the University.

KEYWORDS: developing capacity, academic staff, university teaching, ethical, understanding and practice

INTRODUCTION

Virtually all interest groups of education have come to agree that teaching is a profession in Nigeria. This understanding came as a result of the establishment of the Teachers' Registration Council of Nigeria (TRCN) Act No. 31 of 1993. Accordingly, before 1993 teaching was an all-comers job in Nigeria. This was because there was no regulatory agency for membership and practice as the Legal Council does for Lawyers, Council for the Regulation of Engineers (COREN) for engineers and the Nigerian Medical Association for Medical Doctors. This development was brought about by a rapid transformation of the teaching profession to the highest standard possible. This is particularly with respect to the quality of teacher education programmes, registration and licensing, professional conduct and the overall status of teachers at all levels of the education system.

Fostering ethical understanding and practice in teaching is an integral aspect of the teaching profession, especially at the tertiary level. The Association for Educational Communication and Technology (AECT, 1977) has one of the characteristics of the teaching

profession as, a series of standard and statement of ethics which is enforced, amongst others.

From the foregoing, it is expected that the teaching profession must be guided by certain ethical principles as required by law. Ethical principles or code of ethics are conceptualized here as general guidelines, ideals or expectations that need to be taken into account, along with other relevant conditions and circumstances, in the design and analysis of teaching. They contain detailed provisions for preventing one teacher from undermining another and for preventing conflicts among them. It also contains areas of conflicts between teachers and students. The goal is to promote mutual beneficial relationship among teachers and between the teachers and students, and for the development of the profession.

BRIEF REVIEW OF RELATED LITERATURE

Given the professional status of the teaching profession, the TRCN (2005) has developed a Teachers' Code of Conduct to guide members. The document has the following objectives:

- (a) To re-awaken the sense of self-esteem, quality, honour, selfless service and moral rectitude in the teacher.

- (b) Protect the teacher's age long position of nobility and leadership in the social, moral and intellectual world.
- (c) Build a strong moral foundation for the actualization of an educational system that can compete favourably in the global community; amongst others.

Similarly, there are ethical principles in University teaching as developed by the Society for Teaching and Learning in Higher Education and endorsed by the winners of the National 3M Teaching Award (Murray, Gillese, Lennon, Mercer and Robinson, 2002). Consequently, the teaching profession in the university system has its dos and don'ts; general guidelines to guide professional conduct of members. These guidelines are basically ethical principles that define the professional responsibilities of University Lecturers in their roles as teachers.

Accordingly, the first principle as contained in the document is content competence. A university teacher maintains a high level of subject matter and ensures that course content is current, accurate, representative and appropriate to the position of the course within the students' programme of studies. This principle means that a teacher is responsible for maintaining (or acquiring) subject matter competence not only in areas of personal interest but in all areas relevant to course goals or objectives. Achievement of content competence requires that the teacher takes active steps to be up-to-date in content areas relevant to his or her courses; to be informed of the content of prerequisite courses and of courses for which the teacher's course is prerequisite and to provide adequate representation of important topic areas and points of view (Murray, Gillese, Lennon, Mercer and Robinson, 2002)..

It is for this reason that Awotua-Efebo (1999), Nwifo (2004), Oluwo and Abraham (2006) remarked that teachers should be adequately trained to gain sufficient competency in their various disciplines. In the opinion of most educationists, a teacher without adequate competent knowledge should not be allowed to teach for whatever reason.

Pedagogical Competence: According to Murray, Gillese, Lennon, Mercer and Robinson (2002), a pedagogically competent teacher communicates the objectives of the course to students, is aware of alternative instructional methods or strategies, and selects methods of instruction that, according to research evidence (including personal or self-reflective research), are effective in helping students to achieve the course objectives. Accordingly, to Awotua-Efebo (1999), a teacher is only effective when he/she has

pedagogical competence. Also, if learning styles differ significantly for different students or groups of students, the teacher is aware of these differences and if feasible vary his or her style of teaching accordingly (Murray, Gillese, Lennon, Mercer and Robinson, 2002).

Dealing with Sensitive Topics: In the opinion of the authors, topics that students are likely to find sensitive or discomfoting are dealt with in an open honest and positive way. Among other things, these principles mean that the teacher acknowledges from the outset that a particular topic is sensitive and explains why it is necessary to include it in the course content.

Student Development: The ethical principles in university teaching philosophy believes that the overriding responsibility of the teacher is to contribute to the intellectual development of the student, at least in the context of the teacher's own area of expertise, and to avoid actions such as exploitation and discrimination that detract from student development. According to this principle, the teacher's most basic responsibility is to design instruction that facilitates learning and encourages autonomy and independent thinking in students, to treat students with respect and dignity, and to avoid actions that detract unjustifiably from student development. Failure to take responsibility for student development occurs when a teacher comes to class under-prepared, fails to design effective instruction, coerces students to adopt a particular value or point of view or fails to discuss alternative theoretical interpretations.

Dual Relationships with Students: Any relationship other than for the purposes of teaching and learning is to be avoided. The reason is avoid conflict of interest, favouritism and poor student development. This principles means that it is the responsibility of the teacher to keep relationships with students focused on pedagogical goals and academic requirements. The most obvious examples of a dual relationship that is likely to impair teacher objectivity and/or detract from student development is any form of sexual or close personal relationship with a current student. The Socratic Oath as modified by Stewart (1966) and cited by Awotua-Efebo (1999), TRCN (1993), COREN and other regulatory agencies all caution their members against all these acts of misconduct in their various professions.

Confidentiality: This principle holds that, for effective student development, student grades, attendance records and private communications are treated as confidential materials and are released only with student consent, or for legitimate academic purposes, or if there are reasonable grounds for believing that releasing such information will be beneficial to the student or will

prevent harm to others. This principle suggests that students are entitled to the same level of confidentiality in their relationships with teachers as would exist in a lawyer-client or doctor-patient relationship. Violation of confidentiality in the teacher-student relationship can cause students to distrust teachers and to show decreased academic motivation. Whatever rules or policies are followed with respect to confidentiality of student records, these should be disclosed in full to students at the beginning of the academic term (Murray, Gillese, Lennon, Mercer and Robinson, 2002).

In the opinions of Igwe (1990) and Okeke (2006), students respect and value teachers who are able to obey this professional rule. Again, those teachers without regard for students' confidential matters are a misnomer for the profession.

Respect for Colleagues: It is expedient for university teachers to cultivate and practice exemplary cordial relationships in the work place. According to Okeke (2006), respect for oneself and others is a sign of maturity and discipline, which are both needed for professional growth. A university teacher respects the dignity of her or his colleagues and works cooperatively with colleagues in the interest of fostering student development. This principle means that in interactions among colleagues with respect to teaching, the overriding concern is the development of students. Disagreement between colleagues relating to teaching are settled privately, if a teacher suspects that a colleague has shown incompetence or ethical violations in teaching, the teacher takes responsibility for investigating the matter thoroughly and consulting privately with the colleague before taking further action.

Valid Assessment of Students: Student assessment is used for grading and promotion, hence the importance of assessment of student performance in university system cannot be overemphasized. Accordingly, assessment must be objective, valid, open and fair. This principle means that the teacher is aware of research (including personal or self reflective research) on the advantages and disadvantages of alternative methods of assessment and based on this knowledge, the teacher selects assessment techniques that are consistent with the objectives of the course and valid.

Awotua-Efebo (1999) and Igwe (1990) asserted that valid assessment of students' class and examination performances are crucial to the academic development of the students. They advised that all the conditions for assessing students' academic and extra-curricular activities be met while evaluating students.

Respect for Institution: This last principle is key for the overall development of the students, institution and advancement of staff. Thus, according to Murray, Gillese, Lennon, Mercer and Robinson (2002), it is in the interest of student development that a university teacher should be aware of, and respect the educational goals, policies and standard of the institution in which he or she teaches. This principle implies that a teacher shares a collective responsibility to work for the good of the university as a whole to uphold the educational goals and standards of the university, and to abide by university policies and regulations pertaining to the education of students.

Igwe (1990), Ukeje (1992) and Okeke (2006) have all observed that the conduct of most teachers in the education system does not conform to this principle. This raises questions on their compliance to ethical issues in the profession. However, this assumption and those of others made in the review lack factual findings. It is this gap that this study was designed to fill.

STATEMENT OF PROBLEM

In the Niger Delta University, issues of professional misconduct have been observed among certain category of staff. This study was therefore conducted to find out the extent of University Lecturers' understanding and practice of the ethical principles in University Teaching as developed by the Society for Teaching and Learning in Higher Education with particular reference to the nine principles as contained in the document. The assessment/ethical principles are: Content competence; pedagogical competence; dealing with sensitive topics; student development; dual relationship with students; confidentiality; respect for colleagues; valid assessment of students; and respect for institution.

The need to build capacity for staff to develop the required ethical principles and values is critical if there are observed lapses in the system. This will instill the required fundamental change in the competence, values, ideals, orientation and practices as required by the teaching profession to engender the desired transformation of higher education in the society and country in general.

RESEARCH QUESTIONS

Three research questions were raised to guide the study:

1. What are the ethical principles for the academic staff in the Niger Delta University?
2. How familiar are the Lecturers with the ethical principles in University teaching?
3. How well do the lecturers practice the ethical principles in University teaching?

METHODOLOGY

The study adopted the descriptive survey. This method enabled the study to examine the level of Lecturers' understanding and practice of the ethics of the teaching profession as it is applicable in the Niger Delta University. The population of the study consisted of all the 93 Professors, 24 Readers (Associate Professors), 126 Senior Lecturers, 176 Lecturers 1, 189 Lecturers II, 98 Assistant Lecturers and 61 Graduate Assistant Lecturers in the University (Academic Planning Unit, 2015). The total population was therefore 767. Out of this number, 326 participants were sampled for the study. This was made up of 24 Readers (Associate Professors), 126 Senior Lecturers and 176 Lecturers 1 in the University. The method that was adopted was the purposive sampling technique. A modified instrument of the Society for Teaching and Learning in Higher Education and endorsed by the winners of the National 3M teaching award as developed by Murray, Gillese, Lennon, Mercer and Robinson (2002) on the nine ethical principles of university teaching titled, "Level of Ethical Understanding and Practice Assessment Questionnaire (LEUPAQ)" was used to obtain data from the respondents. Data was analyzed using descriptive statistics.

RESULTS OF FINDINGS

Research Question One:

What are the ethical principles for the academic staff in the Niger Delta University?

The nine ethical principles of teaching in the University as developed by the Society for Teaching and Learning in Higher Education and used for this study are: Content competence; pedagogical competence; dealing with sensitive topics; student development; dual relationship with students; confidentiality; respect for colleagues; valid assessment of students and respect for institution as listed in Table 1. The principles are the same ethical issues guiding teaching in the Niger Delta University.

Research Question Two:

How familiar are the Lecturers with the ethical principles in university teaching?

Table 1 and figure 1 as presented below illustrate the level of familiarity with the ethical principles by the various Lecturers involved in the study.

Table 1: Level of Familiarity and Understanding of Ethical Principles of Teaching in the University

S/N	Ethical Principles Indicators	Level of Familiarity/ Understanding (No. & %)					
		Reader (Ass. Prof)		Senior Lecturer		Lecturer 1	
		No	%	No	%	No.	%
1.	Content competence	24	100	120	95.2	150	85.2
2.	Pedagogical competence	20	83.3	110	87.3	94	53.4
3.	Dealing with sensitive topics	21	87.5	98	77.8	102	58.0
4.	Student development	24	100	124	98.4	170	96.6
5.	Dual relationship with students	24	100	126	100	176	100
6.	Confidentiality	22	91.7	124	98.4	150	85.2
7.	Respect for colleagues	20	83.3	123	97.6	164	93.1
8.	Valid assessment of students	24	100	122	96.8	151	85.8
9.	Respect for institution	22	91.7	116	92.1	141	80.1

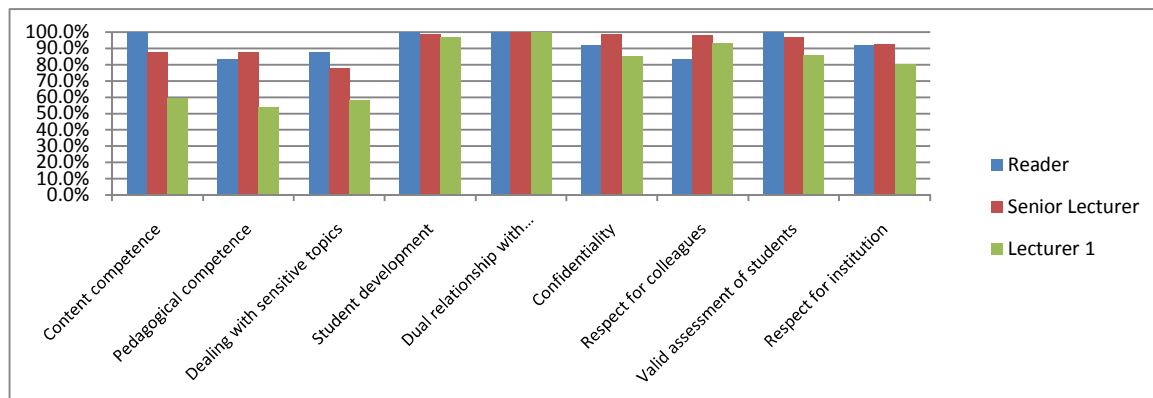


Figure 1: Percentage Responses on Level of Familiarity/ Understanding of Ethical Principles by University Lecturers

Data analyzed and presented in Table 1 and figure 1 indicate that Readers (Associate Professors) in the University displayed 93% familiarity with the ethical principles guiding teaching in the institution. The Senior Lecturers responses indicated 94% familiarity with the ethical principles, while Lecturers 1 responses revealed 81% familiarity with the ethical principles.

Research Question Three

How well do the Lecturers practice the ethical principles in university teaching?

Table 2 and figure 2 as presented below illustrate the level University Lecturers' practice the ethics of the profession.

Table 2: Level of Practice of Ethical Principles of Teaching in the University

S/N	Ethical Principles Indicators	Level of Compliance/ Practice (No. & %)					
		Reader (Ass. Prof)		Senior Lecturer		Lecturer 1	
		No	%	No	%	No.	%
1.	Content competence	24	100	110	87.3	105	59.7
2.	Pedagogical competence	19	79.2	96	76.2	94	53.4
3.	Dealing with sensitive topics	22	91.7	97	77.0	82	46.6
4.	Student development	22	91.7	121	96.0	99	56.3
5.	Dual relationship with students	18	75.0	52	41.3	45	25.6
6.	Confidentiality	20	83.3	47	37.3	52	30.0
7.	Respect for colleagues	20	83.3	52	41.3	48	27.3
8.	Valid assessment of students	21	87.5	100	79.4	73	41.5
9.	Respect for institution	19	79.2	102	57.9	68	38.6

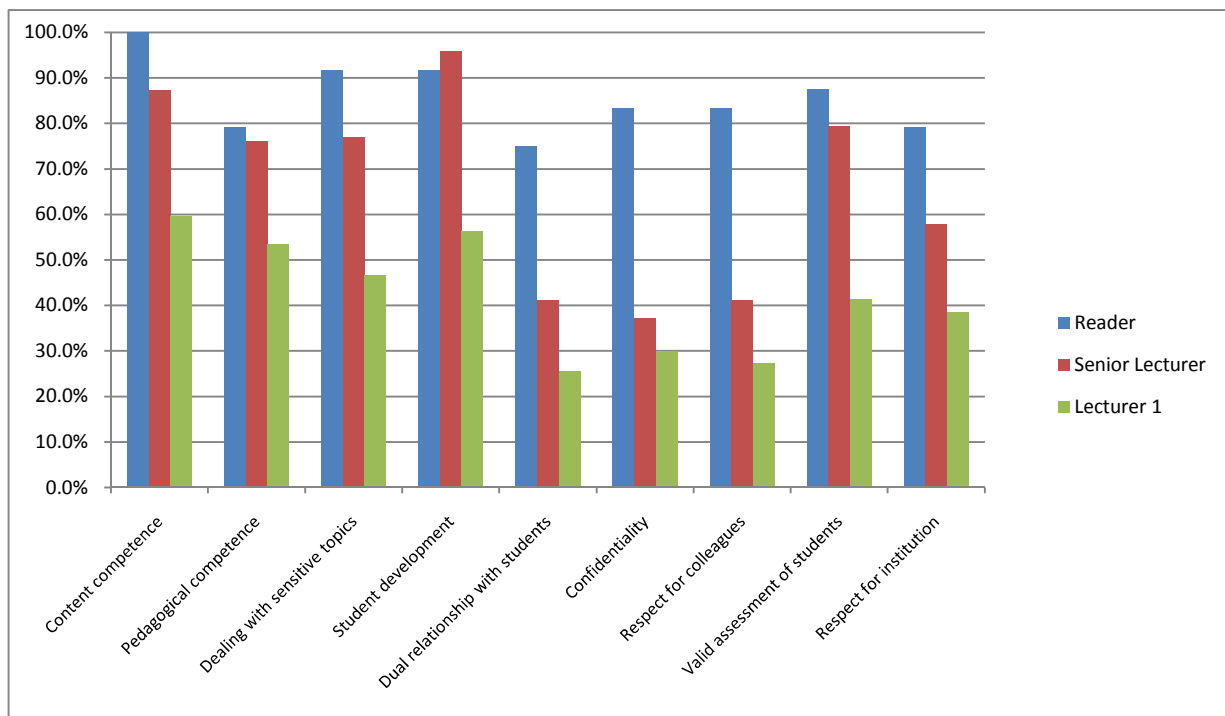


Figure 2: Percentage Responses on Level of Practice of Ethical Principles by University Lecturers

Table 2 and figure 2 indicate the compliance level of the three categories of staff studied. Lecturers of the rank of Readers (Associate Professors) exhibited 85% level of practice or compliance with the ethical principles guiding teaching in the institution. Senior Lecturers have 65% compliance level, and Lecturers1 showed dismal compliance with only 41% with the ethics of the profession.

DISCUSSION OF FINDINGS

Ethical Principles in University Teaching

The study found that there exist certain ethical principles (code of conduct) that govern teaching in the university, just like those in other professions such as Engineering, Law, Medical Science and others. The reason for this is simply that teaching, whether in the university or lower levels of education is a profession.

AECT (1977), Anderson (1989), Clark (1995) and Awotua-Efebo (1999) have all recognized teaching as a profession in most of their expositions.

Similarly, the Nigerian National Policy on Education (2004) has clearly recognized teaching as a profession.

From the foregoing, it is expected that the teaching profession must be guided by certain ethical principles as required by law. In university education, the nine ethical principles as developed by the society for Teaching and Learning in Higher Education have been recognized as the dos and don'ts (code of conduct) of the profession.

The second research question sought to find out whether Lecturers in the university were familiar with and understand the ethical principles. The study revealed that Readers (Associate Professors) and Senior Lecturers were quite familiar with the ethical principles with 94% and 93% responses respectively. Lecturers 1 displayed 81% familiarity with the ethics of the profession.

The reasons for these findings are quite obvious. The Readers (Associate Professors) and Senior Lecturers have been in the teaching profession for quite some time. It is expected that through experience, they must have acquired the necessary skills of the profession. However, the Lecturers 1 have not gained sufficient experience in the area of teaching and learning. They may not have spent the same amount of time teaching like their counterparts.

The finding supports Nwifo (2004), Oluwo and Abraham (2006), where they observed that content and pedagogical competence are a function of experience in teaching. Accordingly, the Readers (Associate Professors) and Senior Lecturers are more familiar and understand the ethical issues guiding the profession as a result of the period they have been teaching. It is expected that Lecturers 1 may equally gain similar level of familiarity and understanding with experience.

The last research question was designed to find out the level of compliance with the ethics of the profession by Lecturers in the university. Findings revealed that the Readers (Associate Professors) showed significant compliance with 85%; Senior Lecturers with 65% and Lecturers 1 with a dismal 41% compliance level.

Similar reasons given for the findings to research question two may apply here. Naturally, as one matures in a particular profession, he/she gains more experience in that trade and performs better. The Readers (Associate Professors) and Senior Lecturers are aspiring

to the peak of the profession after being in service for some considerable number of years. The same may not be true for the Lecturers 1 who are new entrants with less exposure and experience.

This finding corroborates with Okeke (2006), Clark (1995) and Anderson (1994). Experience, according to them has shown that practice makes perfect, especially in teaching and learning. Consequently, the senior academics like the Readers (Associate Professors) and the Senior Lecturers have gained sufficient experiences, and are not wanting in any of the ethical issues. However, the same is not true for those in Lecturers 1 category. This may explain the poor manner they handle students' matters, especially with regard to dual relationship with students.

Similarly, most staff in this category have been linked with unethical conduct such as sale of text books, handouts and other reading materials which were found to be exploitative for students. It is equally possible that this category of staff may not have the competence in developing students, keeping students' information confidential and effective handling of sensitive matters in class instruction. This may also account for the poor quality of the graduates of the system.

The findings of this study equally go to show that the moral character of most university lecturers is quite low. This is a truism because ethical principles are basically moral guides for professional conduct. With such low moral standards, it is difficult for the students of the system to behave differently. Ironically, graduates are supposed to be found worthy in character before learning.

CONCLUSION

The literature and findings of this study revealed that academic staff of the Niger Delta University are familiar and comply with ethics of the teaching profession. However, most lecturers, especially the junior cadre do not comply with most of the ethical principles of the profession. This has been explained to have serious implications for institutional, student and character development.

RECOMMENDATIONS

Based on the findings and conclusions of this study, the following recommendations are hereby made to help build capacity to improve the system:

1. The University should as a matter of necessity widely publicize the ethical principles guiding the conduct of the various professions through their designated bodies. This will improve understanding and practice by the teaching staff in the institution.

2. Lecturers in the University should be encouraged to properly identify with their professional bodies as well as registration with TRCN.
3. Seminars and workshops on professional conduct and procedures in the university should be organized regularly to keep members abreast with current issues in their various professions.
4. University lecturers should endeavour to take responsibility and abide by the ethics of the teaching profession.

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E-FRAUD IN EDUCATION PUBLISHING: A THREAT TO THE NIGERIAN EDUCATION SYSTEM

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ABSTRACT

This study was on developing capacity for the academic staff of Niger Delta University through ethical understanding and practice. The need for the study arose because of issues of professional misconduct that were observed among some category of staff. The study adopted the descriptive survey design with a population of all the academic staff of the University. This gave the total figure of 767. A sample of 326 was drawn using the purposive sampling technique. A questionnaire titled: Level of Ethical Understanding and Practice Assessment Questionnaire (LEUPAQ) was used to elicit data for the study. Descriptive statistics was used to analyze the data collected. Findings revealed that the lower category of academic staff in the University have poor understanding and practice of the ethics guiding teaching in the institution. However, the senior category exhibit better understanding and practice of ethics in teaching. Based on the findings, some recommendations were made to build capacity of academic staff and improve the understanding and practice of ethical principles as they relate to teaching in the University.

KEYWORDS: E-fraud, academic publishing, Nigerian, education system and threat

INTRODCUTION

Our growing independence on the internet is evident all around us. From smart phones and online banking to electronic health records and social networking. Our nation increasingly relies on cyber space. The need for a safe and secure cyberspace has never been more important. While there is no doubt that technology has changed the way we live, work and play. There are very real threats associated with the increased use of technology and our growing dependence in cyberspace. Together with E-fraud prevention, we will make live more secure. Education can prepare everyone to identify and avoid risks both in cyber-space and in the real world. In partnership with our financial, retail, government and collegiate partners, we are making a difference in the future of fraud prevention in Nigeria.

Education is a process of receiving of giving systematic instruction, especially at a school or University. It can also be defined as form of learning in which the knowledge, skills, values, beliefs and habits of a group of people are transferred from one generation to the next

through storytelling, discussion, teaching, training and research, Visiviva (2014).

CONCEPTUALIZING UNIVERSITY EDUCATION IN THE NIGERIAN CONTEXT

The aims of establishing higher institutions of learning in Nigeria have been elaborately spelt out in the National Policy on Education by the Federal Government of Nigeria (2012) to include:

1. The acquisition, development and inculcation of the proper value orientation for the survival of the individual and the Nigerian society;
2. The development of the intellectual capacities of individuals to understand and appreciate their environments;
3. The acquisition of both physical and intellectual skills, which will enable individuals to develop into useful members of the community; and
4. The acquisition of an objective view of the local and external environment.

These goals were to be pursued through: teaching, research, dissemination of existing and new information (put simply, publications), the pursuit of service to the community, and being a store house of knowledge. University education being a main component of higher education, was to develop the whole of man physically, mentally, morally and technologically, so as to be able to function effectively in any environment he/she may find himself/herself, in order to become more productive, self-fulfilling and attain self-actualization (Aluede, 2009; Tawari, 1986).

EDUCATION FOR SUSTAINABLE DEVELOPMENT

Development is concerned with the transformation of the individuals, households, communities, private as well as public institutions through building of human capacities to ensure that available resources are properly managed and directed towards societal and ecological improvements (adapted from Babalola, 2010). Stiglitz (1998) introduces the concept of structural transformation to the definition of development by saying that Development represents a transformation of society, a movement from traditional relations, traditional ways of thinking, traditional ways of dealing with health and education, traditional methods of production, to more “modern” ways. The changes that are associated with development (that) provide societies with more control over their own destiny..... (and that) enriches the lives of individuals.

Sustainable development connotes the ability to keep up the progress made in the social, economic and ecological segments of the society without making the future generation worse off. Development is sustainable if it “meets the needs of the present without compromising the ability of future generations to meet their own needs”. Among all other definitions, that of Soubbotina appears most comprehensive. To Soubbotina (2004) for development to be sustainable, it should balance the interests of different groups of people, within the same generation and among generations, and do so simultaneously in the economic, social and the environmental dimensions of life.

CAPACITY BUILDING IN NIGERIAN UNIVERSITIES

In the context of this paper, capacity building in Nigerian universities shall be referred to as the overall process of training, and whereby the quality of the products is highly assured. In this regard, every graduate of any Nigerian universities would have been successfully empowered through quality teaching, learning and experiences, to take control over his/her own life and the overall environment. Such empowerment would necessarily help any individual to

think more clearly and also be able to examine the possible alternative causes of actions or realities. This would expectedly create an understanding that all change, if possible, and the knowledge of alternatives, no doubt, would certainly lead to the desired change. Thus, drawing from the words of Kassam (1988), the graduate of any Nigerian Universities would have been successfully empowered through quality teaching, learning and experiences, to take control over his/her own life and the overall environment. Such empowerment would necessarily help any individual to think more clearly, and also be able to examine the possible alternative causes of actions or realities. This would expectedly create an understanding that all change, if possible, and the knowledge of alternatives, no doubt, would certainly lead to the desired change. Thus, drawing from the words of Kassam (1988), the graduate of any Nigerian University would be:

1. One who is considerably playing his/her full roles in the economic development of the country;
2. One who participates fully and meaningfully in the social, civil, political and cultural activities of the community
3. One who lives a self-fulfilling and optimal lifestyle
4. One who is highly resistant to any form of oppression, exploitation and corruption
5. One who achieves his/her personal liberation and thus attain self-actualizing goals
6. One who is empowered to address his/her present pressing problems. In Nigeria, these problems include, combating poverty, raising productivity level, minimizing incidents of electoral malpractices, corruption and cultism (Aluede, 2004).

Ultimately, academic dishonesty undermines the academic world; since, it interferes with the mission of education; the transfer of knowledge by allowing students to get by without having to master this type of knowledge. The aim of this paper therefore, is to advance e-fraud prevention in academic publishing in higher institution through awareness and thus make a difference. Since education can be a powerful force in the fight against fraud and fraud prevention such as using our existing website to educate along mobile sites, social media, flyers and brochures. This help to educate everyone and show them how to protect themselves against this act.

This paper contributes to knowledge, in that it helps to identify risks early and one has a chance to fix the problem before becoming a victim of fraud.

Secondly, strong fraud prevention bolster the confidence of investors, regulators, members and the general public to have integrity of one's instrumental reports and this will help attract and retain capital.

According to Kigotho (2013), University Education in Africa is regarded as key to a better future and has the potential to provide the tools that people need to improve livelihoods of live with dignity. But according to transparency International, systematic corruption is eroding benefits that could be accrued from higher education In Global Corruption Report: Education, published on 1st October, Transparency International - an NGO that monitors and publicizes corporate and political corruption – highlights how corruption in education is widespread across Africa. From Morocco to South Africa and from Kenya to Nigeria, corruption afflicts higher education. “It cuts across societies, states and culture and diverts funding from State budgets that should be dedicated to bring hope to many young people”, says Navamehem Pillay, the United Nations Higher Commissioner for Human Rights. The real question is why has the task of capacity building so difficult in Nigeria and the fruits so patchy, despite our enormous human and natural resources? For the purpose of this paper, the researchers shall look for the answer in a critical area of threat and challenges posed by the institutional environment for capacity building. We need to understand the institutional environment for capacity building in Nigeria so that we can identify our strength and problems.

These includes building the institutions and values which sustain the collective community in these modern times. Capacity building is always a working progress; a dynamic process in constant need of nurturing and re-invention, capacity building never stops and true capacity builders never rest because all nations are constantly facing up to new challenges. (Gambari 2008).

It has been observed that Education Corruption in higher education is also embedded in political and corporate undue influence in research, plagiarism and ghost authorship of academic papers. Commenting on the situation in Nigeria, Dr. Shola Omotola, a senior lecturer at Redeemers University, highlighted that whereas rules for academic promotion are clear, there is a divide between the rules and practices of advancement in academia. In a study on corruption in the academic career, Omotola revealed how faculty members often pay a journal to publish articles without peer review. “I have witnessed instances when letters of acceptance were issued for imaginary papers that were never written in order to ensure the promotion of favoured academics”. And most of this academic corruption is

also carried out online. A similar situation is prevalent in some Universities where lecturers pay emerging online journals to publish papers that have not been peer reviewed. Quite often, names of academics who did not do any work are added, provided that they contribute towards payment. There are also cases where academic contract pseudo researchers to write papers and have them published on their behalf. In extreme cases, candidates for promotion to senior positions present, as their own, plagiarized research from reputable journals. In support of this, Omotola asserts that, “although software that can detect various forms of plagiarism is available, few board members of interview committees in Universities apply the technology” (Kigotho 2013).

DEFINING E-FRAUD, E-CRIME AND CYBER CRIME

At this juncture it is important to attempt to define the concepts of e-fraud and cyber-crime. The terms “E-Crime”, “cyber-crime,” “computer crime”, “Information Technology crime,” and “high-tech crime” are often used interchangeably. No universally uniform or accepted definition of cyber-crime exists, partly due to the many guises of cyber-crimes (Groebel, 2001). Cyber-crimes can range from economic offences (fraud, theft, industrial espionage, sabotage and extortion, product piracy, etc.) to infringements on privacy, propagation of illegal and harmful content, facilitation of prostitution and other moral offences, as well as organized crime. At its most severe cyber-crime borders on terrorism, encompassing attacks on human life and against national security establishments, critical infrastructure and other vital elements of society. The UN Manual on the prevention and control of computer-related crime provides the following definition of cyber-crime: “Computer crime can involve activities that are traditional in nature, such as theft, fraud, forgery and mischief, all of which are generally subject everywhere to criminal sanctions. The computer has also created a host of potentially new misuses or abuses that may, or should, be criminal as well” (UN, 1994). Cyber-crime can also be: “A criminal offence that has been created or made possible by the advent of computer technology, or a traditional crime which has been so transformed by the use of a computer that law enforcement investigators need a basic understanding of computers in order to investigate the crime.” Broadly, this definition generally refers to two types of offences: Crimes against computers or information on computers (e.g. attacks on network confidentiality, integrity and/or availability i.e. infringements on privacy, unauthorized access to and illicit tampering with systems, programs or data). Traditional crimes that are committed with the use of computers or some form of information and communication technology (e.g. industrial espionage, theft, forgery, extortion, propagation of illegal and

harmful content, facilitation of prostitution, etc.). On a global scale, society's dependence on technology is increasing exponentially. The use of computers and computer technology has proliferated in all spheres of life and it plays a central role in such diverse activities as banking, transport systems, the financial markets, hospitals and telecommunications today. In this respect technology affects all of us on a daily basis in ways that we do not necessarily take into account. Our dependence on technology, combined with the cyber criminal's perceived low risk of arrest and prosecution and the fact that legislation is not always adequate to facilitate the prosecution of trans-national cyber criminals, exponentially increases the risk posed by cyber criminals on society today (Groebel, 2001).

In the USA, the average damage suffered by a physical bank robbery is US \$3 200, compared to US \$23 000 for the average swindle and damage of US \$500 000 caused by the average computer crime (Belousov, cited in Groebel, 2003). In the physical environment, fraud was traditionally paper-based. The use of Internet services or software with Internet access to defraud victims or to otherwise take advantage of them; for example, by stealing personal information, which can even lead to identity theft. A very common form of Internet fraud is the distribution of rogue security software. Internet services can be used to present fraudulent solicitations to prospective victims, to conduct fraudulent transactions, or to transmit the proceeds of fraud to financial institutions or to others connected with the scheme.

There is no doubt that e-crime is an image trauma for Nigeria. Cyber-crime is a source of concern and embarrassment for the nation. The Internet creates unlimited opportunities for commercial social and educational activities. Especially, with the introduction and expansion of the use technological tool like the computer system for data processing and online transaction. Categories of cyber-crime prevails in the following ways in Nigeria.

ACADEMIC DISHONESTY

Academic dishonesty or academic misconduct is any type of cheating that occurs in relation to a formal academic exercise. It can include:

- Plagiarism: The adoption or reproduction of original creations of another author (person, collective, organization, community or other type of author, including anonymous authors) without due acknowledgment.
- Fabrication: The falsification of data, information, or citations in any formal academic exercise.

- Deception: Providing false information to an instructor concerning a formal academic exercise e.g., giving a false excuse for missing a deadline or falsely claiming to have submitted work.
- Cheating: Any attempt to give or obtain assistance in a formal academic exercise (like an examination) without due acknowledgment.
- Bribery or paid services. Giving assignment answers or test answers for money.
- Sabotage: Acting to prevent others from completing their work. This includes cutting pages out of library books or willfully disrupting the experiments of others.
- Professorial misconduct: Professorial acts that are academically fraudulent equate to academic fraud and/or grade fraud.
- Impersonation: assuming a student's identity with intent to provide an advantage for the student.

Academic dishonesty has been documented in most every type of educational setting from elementary school to graduate school. Throughout history this type of dishonesty has been met with varying degrees of approbation. While research on academic dishonesty in other countries is less extensive, anecdotal evidence suggests cheating could be even more common in countries like Japan. (kperogi, 2011). But for the purpose of this paper, we shall restrict ourselves to a few of them. Viz:

PLAGIARISM

Plagiarism as defined in the 1995 Random House Compact Unabridged Dictionary, is the "use or close limitation of the language and thoughts of another author and the representation of them as one's original work". In academia, it is seen more broadly as the adoption or reproduction of original intellectual creations (such as concepts, ideas, methods, pieces of information or expressions, etc.) of another author (person, collective, organization, community or other type of author, including anonymous authors) without due acknowledgement, in contexts where originality is acknowledged and rewarded. This can range from borrowing without attribution a particularly apt phrase, to paraphrasing someone else's original ideal without citation, to wholesale contract cheating. The modern concept of plagiarism as immoral and originality as an ideal emerged in Europe only in the 18th century, while in the previous centuries authors and artists were encouraged to "copy the masters as closely as possible" and avoid "unnecessary invention". The 18th century new morals have been institutionalized and enforced prominently in the sectors of academia (including

academic science, education, engineering etc.) and journalism, where plagiarism is now considered academic dishonesty and a breach of journalistic ethics, subject to sanctions like expulsion and other severe career damages. Not so in the arts, which have resisted in their long-established tradition of copying as a fundamental practice of the creative process, with plagiarism being still hugely tolerated by 21st-century artists. Law making is a professional field which is not structured around the concept of originality and for which plagiarism is less relevant. (Kenneth, Davy and Easterling, 2004).

Plagiarism is not a crime but is disapproved more on the grounds of moral offence. It may be a case for civil law. If it is so substantial to constitute copyright infringement.

FABRICATION

Fabrication is the falsification of data, information, or citations in any formal academic exercise. This includes making up citations to back up arguments or inventing quotations. Fabrication predominates in the natural sciences, where students sometimes falsify data to make experiments "work". It includes data falsification, in which false claims are made about research performed, including selective submitting of results to exclude inconvenient data to generating bogus data.

Bibliographical references are often fabricated, especially when a certain minimum number of references is required or considered sufficient for the particular kind of paper. This type of fabrication can range from referring to works whose titles look relevant but which the student did not read, to making up bogus titles and authors.

INCENTIVES TO CHEAT

Some scholars contend that there are students who have a pathological urge to cheat. Thomas Mallon noted that many scholars had found plagiarism in Literature (Samuel Taylor Coleridge and Charles Reade being two notable examples) to often be perpetrated in a way similar to kleptomania. That is, a psychological disease associated with uncontrollable stealing, even when it is against the interests of the thief. On the other hand, Mallon concludes it is probable that most "cheaters" make a rational choice to commit academic misconduct.

In another study, he showed that students given an unexpected opportunity to cheat did not improve their grades significantly from the control group. Another study showed that students who were allowed to bring cheat sheets to a test did not improve their grades. While this may conflict with the common perception of cheating (one survey found only 13% of males and 46%

of females think that cheating does not help grades, it is often apparent to professors and members of academic conduct committees when a paper has been plagiarized by its inferior quality.

At the University of Virginia for instance, there are no lesser penalties than dismissal for breaches of the honor code. In rare instances, college professors have been fired when it was discovered that they plagiarized during college or graduate school. All parties involved in the dishonesty—not just the individual whose grade is increased by it—can be punished. (Richard, Metzger, Scofield, Hoogkamp, Reyes, and Gary, 2004).

There are limitations to relying on the faculty to police academic dishonesty. One study found that up to 21% of professors have ignored at least one clear cut case of cheating. Another study revealed that 40% of professors "never" report cheating, 54% "seldom" report cheating, and that a mere 6% act on all cases of academic misconduct that confront them. A third survey of professors found that while 79% had observed cheating, only 9% had penalized the student. According to a manual for professors on cheating, the reasons for this lack of action include unwillingness to devote time and energy to the issue, reluctance to undergo an emotional confrontation and fear of retaliation by the student, of losing students, of being accused of harassment or discrimination and even of being sued for these offenses and/or defamation of character (Kenneth, Davy and Easterling, 2004).

PREDATORY JOURNALS

Another issue is the rise of so-called "predatory open-access journals". These are academic publications, at least in appearance, which actively tout for business. Researchers – young and ambitious, or estranged from mainstream publications by reason of geography or language – often fall prey to the enthusiasm of these publishers, who promise proper peer review combined with rapid publication in return for large amounts of money. The offer, of course, is too good to be true. The peer review process – critical to academic credibility – is usually perfunctory, or even non-existent. The industry, however, is massive. University of Colorado academic librarian Jeffrey Beall maintains a growing list of scholarly scammers. He has so far identified 242 predatory publishing concerns, most putting out multiple journals. "It's clearly an opportunistic business model," says Anne-Wil Harzing, professor in international management at the University of Melbourne. "It's a window through which to make money from naïve academics". This was spectacularly demonstrated in October this year when a United States science journalist, John Bohannon, concocted a bogus research paper and submitted it (using a false name and

claiming tenure at a non-existent institution) to 304 suspect open access publications. Within weeks, 157 had agreed to publish it, even though the most cursory peer review would have turned up fatal errors. But Bohannon's prank, while graphic, came as no surprise to Brooks, who this year won a prestigious Eureka Prize for promoting understanding of Australian science research. "As an academic, you get spammed by journals several times a week," he says. "The problem with [Bohannon's] science story is that most academics, I think, could have told you that would happen". In the old days you knew who the good guys were because they were journals published by reputable societies, or big established publishing houses. There's an upheaval happening now, but it doesn't signify the complete devaluation of the publishing product".

This study is significant to controllers and corporate managers, Governance, risk management and compliance officers, Loss prevention and security professionals, Business professionals, educators and students interested in the anti-fraud field, certified Fraud Examiners and other anti-fraud professionals. Among ambitious academics, the urge to see one's name in print is strong indeed. 'Publish or perish' is the governing dictum. Each piece of diligent research – written, submitted, fact-checked, reviewed, reviewed again and published in a scholarly journal – helps ensure the next grant, the continuation of tenure, the juicy job offer (Kperogi, 2011). "The industry is under pressure", says one senior Australian academic. "It always has been, but now it is worse"

EFFECTS OF CYBER CRIME (CHEATING)

Justin (2007) attributes effects of cheating or fraud to include:

- Cheating causes underproduction of knowledge. Cheating also undermines academia when students researchers still leads because ideas are professional authors "capital and identity"
- Lacks Continuity and sustainability.
- Engage in neutralization to justify cheating are most likely to engage in cheating the future. In fact dishonest students are also more likely to engage in fraud and theft on the job.
- Financial loss: Cyber criminals are like terrorists or metal thieves in that their activities impose disproportionate costs on society and individuals

FRAUD PREVENTION

Virtually every entity suffers from fraud. With fraud costing entities an estimated 5 percent of preventing many frauds and how to combat fraud more effectively and economically. One will be doing him or herself good to prevent it. Over time, one will discover that one's involvement has made a difference. Together with

E-fraud prevention, we will be doing your best to prevent all types of fraud by helping everyone better understand what they know and what they need to know.

This includes reaching out through the following means;

- **Education:** We need to educate citizens, that if they are going to use the internet, they need to continually maintain and update the security on their systems e.g. sending automated updates to all computers and servers on the internal network.
- **Cyber Ethics and Cyber Legislation Laws:** Cyber ethics and cyber laws should be formulated to stop cyber-crimes. It is the responsibility of every individual to follow cyber ethics and cyber laws so that the increasing cyber-crime will reduce.
- **Firewalls:** A firewall protects a computer network from unauthorized access. Network firewalls may be hardware devices, software programs, or a combination of two. A network firewall typically guards an internal computer network against malicious access from outside the network.
- **Honesty:** Academic staff should learn to be honest and original in all they do with special reference to publishing of articles and other academic works.

CONCLUSION

As the general population becomes increasingly refined in their understanding and use of computers and as the technologies associated with computing become more powerful, there is a strong possibility that cyber-crimes will become more common. As also have been revealed by this paper, that there has been incidences of crime rate in Nigeria, which pose threat to the educational system as this hampers sustainable development. Therefore, cyber security must be addressed seriously as it is affecting the image of the country and in the outside world. Bearing in mind that information theft has often lead to the compromise of intellectual property, identity theft and a host of other negative consequences and considering, the fact that electronic theft or cyber-crime affects individuals, higher institutions of learning, with special reference to academic publishing, corporations and government entities. Now, there is also need to emphasize for enhanced capacity-building for sustainable development, in terms of human resource development, in the exchange of experiences and expertise, knowledge transfer for capacity-building, which involves strengthening institutional capacity. Based on this, some recommendations were proffered:

RECOMMENDATION

1. It is recommended to have adequate control in places such as fraud preventive check-up.

2. There is need to create a security-aware culture involving the public, the ISPs, cybercafés, government, security agencies and internet users.
3. Universities must adopt rigorous and transparent procedures for the promotion of members of staff.
4. There is need to establish and maintain clear benchmarks on the system of promotion and reprimand. For instance, firing of academic staff if the issue of plagiarism is discovered.
5. Elevation of academic staff should be based on merit and not on a staff member ability to manufacture non-existing research papers and other academic achievements designed by University promotion committees.
6. Involvement of scrutiny of all claims made by academic staff about innovative teaching practices, research track record, quality of publications, the class of journals in which they publish (using criteria such as impact factors, rejection rates etc.) and their record of successful supervision of higher degree researches such as Ph.D. etc.

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HEALTH EDUCATION AS A TOOL FOR EFFECTIVE PRIMARY HEALTH CARE SERVICES IN NIGERIA

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ABSTRACT

Quality health is a fundamental right of all Nigerian citizens. This can only be achieved through effective health care services. The purpose of this study is to examine the role of health education as tool for effective primary health care services in Nigeria. The paper discussed the concept of health education, challenges of effective primary health care services in Nigeria, components of primary health care and the need for health education in the primary health care system. In conclusion, the practice of primary health care services cannot be effective without proper implementation of health education. It therefore, recommended that government at all levels should ensure that health education and well trained health educators should form part of medical team for effective PHC services in Nigeria.

KEYWORDS: health, health education, effective, primary health care services

INTRODCUTION

Health is an important aspect of human life. It encompasses all activities aimed at ensuring the protection of the body from diseases and promoting good habit. According to World Health Organisation (WHO, 1947), Health is defined as a state of complete physical, mental and social well being of individual and not the mere absence of diseases or infirmities. To achieve all these variables to make individuals health, health education has an important role to play.

Health education is defined as any combination of learning experiences designed to help individuals and communities improve their health, by increasing their knowledge or influencing their attitudes (WHO, 2008; Johnson, 2010). The goal of primary health care (PHC) was to provide accessible health for all by the year 2000 and beyond, unfortunately, this is yet to be achieved in Nigeria and seems to be unrealistic in the next decade (Abdulraheem, Oladipo & Amodu, 2011). The PHC aims at providing people of the world with the basic health services. Though PHC centers were established in both rural and urban areas in Nigeria with the intention of equity and easy access, regrettably, the rural populations in Nigeria under utilized the PHC unlike their urban counterparts (Mike, 2010). PHC is a new approach to health care which helps in improving the health status of the community.

According to WHO (2008), primary health care is described as an essential health care system based on practical, scientifically sound and socially acceptable method and technology, made universally accessible to

individuals and families in the community, through their full participation and at a cost that the community can afford at every stage of their development in the spirit of self reliance and self determination. The goal of the National Health Policy (1987) is to bring a comprehensive health care system based on primary health care that is promotive, protective, preventive, restorative and rehabilitative to all citizens within the available resources so that individuals and communities are assured of productivity, social well-being and enjoyment of living. The health services, based on PHC among other things are; education concerning prevailing health problems and the methods of preventing and controlling them, promotion of food supply and proper nutrition, maternal and child care, including family planning, immunization against the major infectious diseases, prevention and control of locally endemic and epidemic diseases and provision of essential drugs and supplies (Adeyemo, 2005).

Despite, all the effort of the Federal Government through the state Government to the local government to achieve the Millennium Development Goals (MDGs 2011), there are still enough cases of maternal mortality (Oyewole, 1999), high mortality rate due to malaria, typhoid, cholera and other infectious diseases (Abiodun, 2010) at the primary level as a result of ineffective primary health care system. Health Education is the profession of educating people so as to make an informed decision about their health. Health education can serve as a tool to mobilize people and educate

people on simple ways to prevent themselves against the invasion of micro-organism which cause infection. Therefore, the purpose of this paper is to examine the influence of health education on effective primary health care services in Nigeria.

STATEMENT OF THE PROBLEM

Government and other stakeholders on health has made tremendous efforts in improving the life and health of its citizens in Nigeria by creating health facilities such as provision of portable water supply, good sanitary and waste disposal, good roads network and provision of primary health services which are mostly equipped with health personnel such as physicians, nurses, lab attendant, nutritionist. All these provisions are more effective in the urban areas than its rural counterpart as a result of health education provided via audio, visual and audio visual media which makes the urban dwellers to have more information about the usefulness of these facilities.

In the rural communities which this research focuses more on, as a result of inadequate provision of electricity which debar them from listening to radio, watching televisions where they can get information so as to make informed decisions is lacking and often leads to low patronage of primary health care services in the rural. Health education can be used as tool for effective primary health care services. Health educators should form part of the health team in primary health care centers in which his/her services will not be limited to the confine of the PHC but also going out and giving health talks to the general usefulness of this PHC and ways in which people can live in healthy ways

Concept of Health Education

Health Education plays a crucial role in the development of healthy, inclusive and equitable social, psychological and physical environment. It reflects current best practice, using an empowering, multi-dimensional, multi professional approach which relates to all setting, organizations, including the community, schools, health services and the workplace (Gordon, 2008). Health Education helps provide health knowledge, enhance wellness behaviours, promote health situations, facilitate healthful relationship and enables community members make responsible decisions. The Joint Committee on Health Education and Promotion Terminology (2001) defined Health Education as any combination of planned learning experiences based on sound theories that provide individuals, groups, and communities the opportunity to acquire information and the skills needed to make quality health decisions.

Health Education at the Primary Health Care (PHC) level help to address issues related to disease prevention; consumer health, environmental, emotional, sexual health, first aid, safety and disaster preparedness, substance abuse prevention, human growth and development (Tochete & Fitch, 2005). They further asserted that, in the PHC, health education serves as a tool to coordinate health workers in counseling as well as education services such as health risk appraisals and health screenings.

Challenges of Effective Primary Health Care Services in Nigeria

The Nigerian government is committed to quality and accessible public health services through provision of primary health care in rural areas as well as provision of preventive and curative services (Nigeria constitution, 1999). PHC is provided by local government authority through health centers and health posts and they are staffed by nurses, midwives, community health officers, health technicians, community health extension workers and with physicians.

The essence of health care to the local government is to make the management of PHC services more effective and closer to the grassroots. One of the hindrances primary health care services in Nigeria has to do with insufficient number of health workers as well, as their uneven distribution, this makes the health care services system ineffective and make the community seek for health services else where such as herbs and other local health facilities and sometimes patronize quacks in the process (Adedeji, 2008); Omoleke, 2005).

Other challenges facing effective primary health care services in Nigeria are lack of health education in the rural communities, poor facilities and equipment such as bad or inadequate vehicles for transporting the health workers for immunization services, inadequate finances for day to day running of PHC services because most of the internally generated revenue of local government is meager and insufficient for effective PHC services (Adeyemo, 2005).

Components of Primary Health Care

The essential components of primary health care observed by WHO (1987) are; health education concerning, prevailing health problems and the methods of preventing and controlling them; promotion of food supply and proper nutrition; adequate supply of safe water and basic sanitation; maternal and child health care, including, family planning; immunization against major infections diseases, prevention and control of local endemic and epidemic diseases, appropriate treatment of common diseases and injuries; and provision of essential drugs and supplies.

Health Education as a Tool for Effective PHC Services

Health education is the process of persuading people to accept measures which will improve their health and to reject those that will have an adverse effect (Brian, 2008). All the various components of primary health care services can only succeed if they are widely accepted by the individual and the community. Health education is of more significant tool in primary health care services because individual behaviour now has a greater effect on his health.

In Nigeria, the methods of disseminating health education to the people can be described as still very low especially to the mostly affected areas which are the rural areas where there are poor electric supplies and make it difficult to listen or watch health information on electronic media.

The role of health education is to convince the community and individuals of the importance of health and services rendered by the PHC. One of the best ways to achieve effective PHC is to ensure that the educating role becomes spread out and the end effect will be equally widespread throughout the population.

Need for Health Education in the Primary Health Care System

WHO, 2008 identified five major needs for health education in PHC and these needs include the following:

- **Improved Health:** Health education helps people improve their health in all stages of life. This health educator do by visiting communities to give health talks as well as voluntary counseling on how to improve health and live a disease free life.
- **Improve Decision-Making:** It helps people make better health decisions. To do so, the health educator often tailors their message to the group they are educating. It explains the risks of unhealthy habits like smoking, excessive alcohol consumption and unprotected sex.
- **Fight Diseases:** The goal of health education at the primary health care system is to minimize the occurrence of life-threatening illnesses. For example, the risk of diabetes and heart diseases can be lessened with proper diet and exercise.
- **Fight Misconception:** Health education helps to correct some misconception that affect people's health. For example, in the Northern part of Nigeria, where people believed that immunization is a means of putting an end to child bearing (Family planning) can be corrected through health education.
- **Provide Resources:** Health Educators provide educational resources in the form of fliers carrying

health messages, posters and pamphlet. It also creates awareness on health services that are available for free or at minimal cost.

Role of Health Education in Primary Health Care Services

Health education plays the following vital roles in the implementation of primary health care components. Johnson (2010), identified the roles as; immunization, maternity services, child health, communicable diseases control, environmental health, nutrition, school health services, first and services, drug education, accident prevention and emergency services, aid family life education.

CONCLUSION

The practice of primary health care services cannot be effective without the inculcation of health education. Involvement of trained health educators in the planning and implementation of primary health care system will help to remove obstacles to the effectiveness of PHC in Nigeria. There is need for a national approach to health educator to enhance behavioral change. The unit within the PHC responsible for health promotion and education needs to be supported and strengthened to discharge her responsibilities effectively. Health education will help to create awareness of health problems and solution which will in turn create more accessibility and participation in PHC programmes.

RECOMMENDATION

Having identified the importance of health education as a tool for effective PHC system in Nigeria, the following recommendations are suggested;

1. Government at all levels should ensure that health education and well trained health educators should form part of the medical team in the PHC centers.
2. There is the need for maintenance of minimum health standard, improved housing condition, adequate potable water supply, environmental sanitation and food supply for the sustenance of good health condition.
3. Health education should be provided for the community members so as to make informed health decisions and also ways of preventing communicable diseases

CONTRIBUTION TO KNOWLEDGE

In line with the theme of the International Conference which focuses on National Capacity Building Strategy for Sustainable Development and Poverty Alleviation, this paper will contribute to knowledge in the following capacities;

1. It improves the health of the community dwellers and alleviate their poverty by

educating them on the usefulness of PHC giving a sound mind in a sound body and health serves as an integral part of overall development.

2. It gives priority to improved living condition of the people beyond the present poverty level, so as to enhance better healthy living. To this end, intensive and effective health education of the public must be of necessity, be reinforced in other to eliminate diseases such as malaria, typhoid, cholera and other infectious diseases which still ravage our community.

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STRENGTHENING THE HUMAN CAPACITY OF THE MUSLIM YOUTH THROUGH THE *MAKARANTAR ALLO* (ELEMENTARY STAGE OF ISLAMIC EDUCATION) FOR SELF-RELIANCE, POVERTY ALLEVIATION AND NATIONAL DEVELOPMENT

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ABSTRACT

National development is an important issue that requires the participation of each and every member of the society. But the participation of each is determined by his level of education and human capacity, so it is expected that, each and every member should be fully educated, and his capacity be fully developed for self-reliance, poverty reduction and national development. While it is a well known fact that, the Makarantar allo and its graduates in the pre-colonial era had made tremendous contributions to the development of the community, that is not the case today. Today, the graduates of such schools cannot contribute fully to national development for a number of reasons. The paper intends to unveil the reasons for their lack of participation to national development, and also intends to emphasize on the need to review the curriculum of the makarantar allo to integrate human capacity development programmes in the learning process for a robust and relevant curriculum. This, it is believed, will help towards graduating students that are self reliant, and can equally render meaningful contributions to poverty reduction as well as national development.

KEYWORDS: national development, human capacity, poverty alleviation, islamic education, *makarantar allo*

INTRODUCTION

There is no gainsaying the fact that, no human society can attain development of any kind without the contributions of all its citizens irrespective of age, sex or class. Allah created men and women as complimentary partners in progress and the contributions, efforts and commitments of each are highly needed as far as national development is concerned. The term development is very broad and has been interpreted differently by different scholars. It has been defined in Wikipedia (2014) as, “a deliberately planned effort to increase the effectiveness and/or help towards the achievement of a strategic goal”. It has also been defined in WordNet Dictionary (2014) as, “an act of improving by expanding or enlarging or refining”. What is interesting in these definitions is that, all agree that development connotes a positive change that is engineered by an individual, organization or government with the participation of the inhabitants of the area to be developed. And the participation of the inhabitants is largely determined by their level of education and human capacity (Adedeji, 2012).

Education is the bedrock upon which the development of any nation is built. That was why the United Nations listed it as the second Millennium Development Goal (MDG) to be attained by 2015. The UN considers education as a catalyst for achieving all other goals. Thus, it is considered as the most important ingredient for poverty reduction and sustainable development of

any nation and in any sphere, whether economic, political, sociological or human resources. As such, each and every member of the society should be well educated, whether through the Islamic system of education or western secular education for self-reliance, poverty alleviation and sustainable national development. The education of the youth should however, be given much importance and priority as it plays a very significant and crucial role in the development of a nation, considering the fact that, they are the future leaders of tomorrow.

Similarly, it is also believed that, the best form of development is building human capacity as the people so developed will contribute to the development of their communities and nations. Without human capital formation the goal of development or poverty alleviation is futile. Acquiring skills does not only increase the probability of being employed, whether self-employed or otherwise, but it is also a very important means of reducing the poverty of a given nation. According to Schultz (1971), capacity development has been recognized to be at the centre of poverty alleviation and development and that, without it, no development is possible and even past achievements could be reversed.

Islamic Education, Capacity Building and the Muslim Youth

Even though youth education plays a very significant and crucial role in the development of a nation, the status and standard of western secular education is at its lowest ebb in most of the Muslim countries. Thousands of youth who are intelligent and capable enough to get education, are deprived of it, because of multifarious socio-cultural and economic reasons. Most Muslim parents refuse to send their children to secular schools, particularly those in the rural areas, for a number of reasons, which may include apathy to western education, the environment of such schools not being suitable for the children, or the western secular schools being too expensive. For these reasons, many lower-middle class Muslim parents do not allow their children to attend western secular schools, but feel more comfortable in sending them to Islamic schools. Studies have shown that, the Muslim students' enrolment in Islamic oriented schools has exceeded that in the secular schools (Habib, 2007). But unfortunately, the Islamic schools, especially the elementary level known as the *Makarantar Allo* which is being patronized by almost all Muslims, do not offer capacity building programmes, and hence, its graduates are unable to play the active role expected of them in the development of themselves and their society. There is therefore the need to integrate human capacity development in the *Makarantar Allo* curriculum so that Muslims particularly Muslim youth who do not attend secular schools, can be self-reliant, thereby reducing poverty as well as being able to participate fully in the nations' development.

Makarantar Allo and How it Works

Makaranta in Hausa Language literally means a school, while *allo* refers to a slate. Put together, *makarantar allo* literally means 'a school of slate'. This name refers to a school of the elementary stage of Islamic education, and it has many names in different Muslim communities. For instance, it is called the *Kuttub* in Egypt, the *Madrasah* in Pakistan, and the *Tsangaya* in the olden Kanem-Borno Empire. The Hausas call it so, because slate is the main apparatus or teaching equipment being used in such schools. This kind of school is considered as the centre of Islamic education, and in virtually all the Muslim communities, every child is expected to start his education with this type of school. Its main objective and priority is teaching the recitation of the Qur'an to the children, and it is expected that, every Muslim child must learn the sacred text or some parts of it by heart. Importance is therefore given to the recitation, writing and memorization of the Qur'an. According to Canham, (1978) "the complete possible exposure of the child (boy or girl) to the life-giving words of the Koran (sic), without which the child would have no hope of happiness in this world or of

salvation in the next", is the purpose of establishing such schools.

The structure of the *makarantar allo* differs radically from the present day *Islamiyya* and the western secular schools, as its schedule is very flexible with no clear cut classes or examinations. This allows a child to progress at his or her own pace. Thus the length of time it takes for an individual to memorize the whole Qur'an depends on his intelligence and commitment. Canham, (1978) sums it all when he says,

The structure of the Islamic education (*makarantar allo*) differs from the present day *Islamiyya* and secular schools. There is no clear cut division into primary or secondary levels. There is no progression from one class to another and from one level to another, with examination barriers erected all along the line. There is no age limit, and there is no rigid time-table with neatly timed period for subjects. What we have instead is a structure of utmost simplicity.

The *Makarantar allo* is expected to end with the complete memorization of the Qur'an, and a graduation ceremony is organized for the graduates. From thereon, the graduates may then move to the *Makarantar ilmi* for advanced Islamic education where other branches of knowledge such as *tafsir*, *fiqh*, *tawhid*, *mantiq*, *sirah*, *sarf*, *balagah*, *tasawwuf* and so on are being taught.

During the pre-colonial era, the *makarantar allo* was established as an organized and comprehensive system of learning, and was under the patronage and control of the emirs of the traditional system of government. The schools were funded by the state treasury, the *zakah* funds as well as the members of the community who readily supported these pupils most of whom came from faraway places. The system in return produced the judges, clerks, teachers, and so on needed in the community. However, when the British invaded and colonized the northern Nigeria, they killed some of the emirs and disposed others for their resistance to the foreign rule. Even those that were spared lost control of their territories and accepted their roles as mere traditional rulers used only for the indirect rule. This eventually means the patronage and the financial assistance of funds from the state treasury to the schools was withdrawn. The responsibility of the pupils was then taken over by the respective *malams* (teachers) who deemed it a moral and religious obligation to educate these pupils for the sake of Allah. But with the increasing level of poverty in the country, it became more and more difficult for the teachers to cater for their

needs as well as their pupils'. The teachers had no option but to send these children out to beg from the good will of the society. You find these children roaming the street tattered, bare footed with no bearing, moving from house to house, city to city begging for crumbs to survive and thus leading a vagabond life! With no skills acquired, since they have not been taught any, these children eventually face a bleak future. At the end of it all, they end up being petty traders or resort to menial jobs such as wheelbarrow pushing, touting and so on. Worse still, these children develop all kinds of mischievous and irresponsible traits as a result of their interaction with bad members of the community and may even end up being in bad company, thereby ending up as the armed robbers and fraudsters members of the society. So instead of becoming active members that can contribute to the development of themselves and the nation, they end up becoming a burden as well as nuisance to the nation.

Islam and Human Capacity Development

Islamic education plays a significant role towards enhancing the human capacity of individuals. This is because the religion of Islam and serves as a veritable tool for achieving meaningful development. In Islam, human development has been given a unique and important position as man is regarded as the vicegerent of Allah on earth who has the responsibility of safe guarding this which belongs to Allah (Q2: 30) And the main objective of education in Islam is developing the potentials of individuals in a holistic and integrated manner, so as to enhance the spiritual, intellectual, imaginative, physical, scientific and linguistic growth of man for the sole purpose of a positive relationship with Allah, which becomes manifest in serving Allah, doing righteous deeds and discharging duties towards fellow creatures. These objectives can only be actualized through resourceful and proficient human capital. This is because, the job of planning, organizing, controlling and producing, which is vital for economic growth and social development, is achievable only through multi faceted and resourceful professionals. In various occasions, the Prophet of Islam (S.A.W) insists that, "*al-mu'min al qawi khayr wa ahabba ila Allah min al-mu'min al dha'if*", meaning that, "the strong and competent believer is better and closer to Allah than the weaker believer" (Bukhari, 1974). This hadith signifies the importance of 'human capital' in relation to social and economic growth of a society, hence the talented and skilful Muslim professionals are better than the laymen Muslims. Moreover, developing the human capacity is much more important than having the utilities of economic production in terms of money and machines. This is because, while utilities of production diminish through consumption over time, human capacity of knowledge, and skills grow through

utilization. It is therefore expected that, Islamic education should be an avenue for strengthening the human capacity of Muslims particularly Muslim youth. This may be achieved when the mission, vision and the entire curriculum of *makarantar allo* are reviewed and integrated with human capacity development programmes.

Integrating Human Capacity Development into the Curriculum of the *Makarantar Allo*

Human capacity has been defined differently by different scholars, for instance, Schultz (1971) defines it as, "the knowledge and skills people acquire during education and training, and this capacity is the result of deliberate investment that yield return", while Fitz-Enz (2000) defines it as "the development of a person's traits, intelligence, fulfilling work energy, positive attitude, reliability and commitment, ability to learn, imagination and creativity." What is important is that, both definitions accept the fact that, development carries the notion of enhancement of one's capabilities and potentials which will allow an individual to achieve measurable and sustainable results, and also serves as a means of poverty reduction. It also implies a forward movement from a given position to a position of greater achievement, opportunity and benefits. Studies have also shown that, enhanced human capacity fosters self understanding, improves quality of lives and raises people's productivity and creativity thereby promoting entrepreneurship and technological advancements. In addition, it also plays a very crucial role in securing economic and social progress thus improving income distribution which may consequently emancipate people from the clutches of poverty (Omoniyi, 2013). Thus it becomes necessary that the human capacity of the Muslim youth should be enhanced, developed and strengthened through the curriculum of the *makarantar allo* through the following ways:

1. The curriculum should maintain its programmes on Qur'anic memorization and other Islamic disciplines, with the hope that, the teachings of Islam will guide the lives of the youth wherever they are and whatever they become later in life. The development of personal traits and moralities is very important in developing a Muslim personality and should also be enhanced. Thus, traits like integrity, transparency, good governance, fairness, commitment and continuation of work, and so on will enhance the human productivity and competence of individuals.
2. Building up professional skills and knowledge which will permit them to pursue income generating activities after graduation, and achieve higher living standard. Islam encourages working and productivity as a means of sustenance, and this is only possible when an individual has the skills

and know-how. The Prophet (SAW) is reported to have said, on showing the importance of work, “no one eats a better food than what he/she competently attained through his/her manual work” (al-Bukhari, 1974), and the best income according to the Prophet (SAW) is “that which proceeds from the work of one’s hand, as well as every legitimate business” (al-Bukhari, 1974). Islam also discourages laziness and begging. It has even been reported from the Prophet (SAW) that he said, “it is better for any of you to carry a load of firewood on his own back than beg from someone else” (Malik, 1984). It is therefore believed that when members of a given society have a means of sustenance, the likelihood of such a society being poor also declines.

3. Developing the moral and leadership qualities of the students who will eventually become transformational leaders possessing a global view and sound understanding of the realities and challenges of global geopolitics, finance and economics is also very important. Likewise, the self-esteem of the pupils should also be developed by promoting such values as respect, dignity, integrity, and self-determination. Such kind of leaders will eventually be able to deal successfully with the global geopolitical and economic development and challenges of the coming decades.
4. Strengthening the accountability techniques of the pupils. Islam teaches accountability and always draws the attention of Muslims towards it. Individuals have been entrusted with different favours by Allah, such as good health, property, leadership and so on, and everyone will be held accountable for what has been entrusted to him. The Prophet (SAW), has said, “Each one of you is a guardian, and each is accountable for what is entrusted to him”. (al-Bukhari, 1974).
5. Developing the awareness of the pupils to health issues. There should also be an avenue where the children will be enlightened on how to look after their personal hygiene, environmental sanitation and other health issues. Let the saying ‘health is wealth’ be inculcated into them. In Islam health is considered as one of the greatest blessings that Allah has bestowed on mankind. In fact a hadith has shown that, the greatest blessing after *iman* (faith) is good health. The Prophet (SAW) is reported to have said, “Ask Allah (SWT) for forgiveness and health, for after being granted certainty, one is given nothing better than health”. (Muslim, 1993)

CONCLUSION AND RECOMMENDATIONS

The importance of human capacity development cannot be quantified, because it is believed that it is the cornerstone of poverty alleviation and meaningful

development of a nation. That is why it is necessary that the *makarantar allo* should equally contribute its quarter towards developing and enhancing the human capacity of its students, particularly those at the higher level, by providing a holistic approach to human development, which should include moral responsibility, intellectual talent, knowledge and skills to its students. It is therefore necessary that all stakeholders should contribute their quota towards achieving this noble mission, by the following;

1. Government should establish a board to be saddled with the responsibility of looking after the schools by way of reviewing the mission, vision and the entire curriculum of the schools.
2. Government should also provide the financial aspect and all other aspects of running the school, just like it is providing in the western system of education.
3. While the government should support the *makarantar allo* towards this project in whatever way possible, the contributions of all Muslims whether financially, morally or through their talents, skills and abilities is equally needed. Every effort should be taken, whether formally or informally, and whether individually or collectively to develop the skills and abilities of the students to be self-reliant, and also provide them with opportunities to maximize their contributions towards poverty alleviation for national development. So any expenditure in training, development, health and support is an investment, which it is hoped will yield fruitful result in the future.

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INFLUENCE OF STUDENTS' FEEDBACK ON THE QUALITY OF SCIENCE TEACHING AMONG UNDERGRADUATES IN SOUTH-WEST NIGERIAN UNIVERSITIES

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ABSTRACT

The study examined the influence of students' feedback on the quality of the teaching of science teaching in four Nigerian Universities: Obafemi Awolowo University Ile-Ife, University of Ibadan, Ibadan, Osun State University, Osogbo and Lead City University, Ibadan. This was aimed at improving students' academic performance in the science disciplines. The study adopted a survey research design. The population for the study consisted of 346 students in the Faculty of Science and Science Education and in cognate courses in the universities. The students were selected using purposive sampling technique. A 30-item questionnaire each with likert type response format titled "Questionnaire on Influence of Students Feedback on Quality of Science Teaching" (OISFQST) were administered. Data obtained were analyzed using simple percentages, t-test and one way Analysis of Variance (ANOVA). The results showed that there was no significant difference between gender on perception of students feedback on the quality of science teaching ($t = 0.4959 > 0.05$). The results also showed that there was no significant difference between institution and the importance of students' feedback on the quality of science teaching ($F = 9.01 > 2.63$). The results further showed that there was no significant difference between institution on the effect of feedback on the quality of science teaching ($F = 32.97 > 2.63$). The study concluded that feedback by students is critical to good teaching and could bring about improvements to the faculty members and to the university at large.

KEYWORDS: influence; undergraduates; feedback; science; quality teaching

INTRODUCTION

Science is an intellectual activity carried on by humans that is designed to discover information about the natural world in which human live and to discover the ways in which this information can be organized into meaningful patterns and the ultimate purpose of science is to discern the order that exist between and among the various facts (Gottlerb, 2005). It is also the systematic evolution of natural events and condition in order to discover facts about them and to formulate laws and principles based on these facts, also an organized body of knowledge that is derived from such observations that can be verified or tested by further investigation.

Science have long been recognized as instruments for nation building in a developing country like Nigeria where means of achieving technological development and economic survival are being sought, high importance is placed on the teaching and learning of science in schools. This is reflected in Section 8 of the National Policy of Education where it was stated that, "not less than 60% of places shall be allocated to science/science-oriented courses in the conventional universities and not less than 80% in "Universities of

Technology".

Generally it has been revealed that over one billion students and lecturers are not aware of feedback and quality of science teaching in higher institutions of learning in Africa (Pretorious, 2012). Feedback is an essential part of effective learning. It helps students understand the subject being guided and gives them clear guidance on how to improve their learning. Bellon, Bellon & Blank (1991) stated that academic feedback is more strongly and consistently related to achievement than any other teaching behaviour, this relationship is consistent regardless of grade, socioeconomic status, race, or school setting.' Feedback can improve a student's confidence, self-awareness and enthusiasm for learning. Effective feedback during the first year in university can aid the transition to higher education and may support student retention. Providing students engage with feedback, it should enhance learning and improve assessment performance.

The quality of education depends on the performance of their duties by lecturers. The performance of students in examination, whether internal and external, had been

used to judge how good the lecturers are in teaching (Ajao, 2001). During interaction with student, the lecturers ultimately translate policy into action and principles based on practice (Afe, 2001). Thus, a lecturer is the one who produces result when trying to do his duty (Uchefuna, 2001). With the huge investment of government in public education, the output is nothing to write home about. The failure rates and the poor quality of students might have been a reflection of the instructional quality in schools and thus the widely acclaimed fallen standard of education in Nigeria.

Students' views on all aspects of their higher education experiences are essential to the effective monitoring of quality in universities (Hill, Lomas and MacGregor, 2003). In the United States of America and in European countries, student evaluation of lecturer's performance is very important for appraising the academic staff (Curtis, 2002; Emery, Kramer and Tian, 2003). This is not the case in Nigeria where qualifications, teaching, current research, publications and service to university/country are used (Mordi, 2002; Adomi and Mordi, 2003). University teachers are also expected to possess content competence, pedagogical competence, the ability to deal with sensitive topics in an open, honest, and respectful way, the ability to contribute to the intellectual development of the student, the ability to treat students' grades, other academic records, and private communications with strict confidentiality, assessment of students that is valid, open, fair and congruent with the course, and respect for the institution (Murray et al., 1996).

Duyilemi (1996) argued that some science academic staff showed positive attitude towards teaching the science subjects while some exhibited negative attitude towards teaching science courses to the students. Aigbomian (1990) have argued that the extent a student prefers a subject, to that extent the student works hard to achieve in it. A close examination of the submissions of Aigbomian (1990) and Duyilemi (1996) revealed that academic achievement may be dependent upon positive attitude from the academic staff and the students in the teaching/learning processes. Quality science teaching occurs when teachers believe all students needs to develop scientific capabilities and conceptual understanding in order to be equipped to live in our society. Also they should believe that students are able to achieve the science outcomes when they engage in effective teaching and learning programs, students should be encouraged to believe they can be successful learner in the area of science. Science teaching should therefore take place in a supportive environment that caters for individual differences, includes opportunity for cooperative and collaborative group work, allow student to engage in sustained conversation and task

about the "big ideas" that underpin the achievement of science and technology outcomes, should also include opportunity for substantive interaction between students to students and lecturer to student, encourage sustained effort by students to successfully complete task, provides access to a range of materials equipment and other resources related to science learning.

Many reasons can be attributed to students' poor performance in science. Feedback as a factor that can predict or affect the academic performance of students in sciences has not been thoroughly looked into. It is against the background that the influence of students' feedback is considered necessary.

STATEMENT OF THE PROBLEM

The quality of science teaching has been a major problem in the Nigerian contemporary society which can be due to the negligence of feedback; little or no attention has been paid to feedback and its influence on the quality of science teaching. Therefore to ensure quality and adequate science teaching feedback as an integral part of qualitative science teaching must be given adequate attention.

Competent lecturers are most crucial piece in improving student's academic performance in science disciplines. There are so many reasons or factors which can be attributed to student's low performance in sciences. Lack of feedback as a factor that can predict or affect the academic performance in sciences has not been thoroughly looked into although this has been shown to have affected on all disciplines, hence this study.

PURPOSE OF THE STUDY

The purpose of this study is to investigate the influence of feedback on the quality of science teaching among undergraduates in the Faculty of Science in Obafemi Awolowo University, Ile-Ife, University of Ibadan, Ibadan, Osun State University, Osogbo and Lead City University, Ibadan.

Therefore the specific objectives of this study are to:

- i. Determine the effect of feedback on the quality of science teaching.
- ii. Evaluate the perception of students on feedback on the quality of science teaching
- iii. Examine the importance of feedback on the quality of science teaching.

SCOPE OF THE STUDY

This study focused on the influence of students' feedback on the quality of science teaching among undergraduates in the Faculty of Science in Obafemi Awolowo University, Ile-Ife, University of Ibadan,

Ibadan, Osun State University, Osogbo, Osogbo and Lead City University, Ibadan.

RESEARCH QUESTIONS

The following research questions were generated for the study:

1. What is the effect of feedback on the quality of science teaching?
2. How can we determine the role of teachers in enabling feedback in learning process?
3. What are the factors that will enable adequate feedback?

RESEARCH METHODOLOGY

This discussed the study design, the population, the sample and sample procedures, research instrument, validity and reliability of the instrument. The study adopted descriptive research design which requires the opinion to respond to some variables. The population of this study comprised of all undergraduate students in the Faculty of Science in Obafemi Awolowo University, Ile-Ife, Osun State University, Osogbo, University of Ibadan, Ibadan and Lead City University, Ibadan. The sample consisted of 346 undergraduate students purposively selected from the Obafemi Awolowo University (100), Osun State University (100), University of Ibadan (128) and Lead City University (18). The sampling method or technique adopted for this study was purposive sampling. The research instrument adopted for this work was a questionnaire developed by the researcher and it was titled "Questionnaire on the Influence of Students' Feedback on the Quality of Science Teaching" (QISFQST) and was used to collect data from the subjects. The instrument was rated on a 5-point Likert-type scale. The questionnaire was divided into two sections A and B. Section A focused on the respondent's bio data such as sex, age, level etc. This will enable the researcher in preliminary analysis. Section B consisted of some set of questions which were specifically tailored at examining the influence of feedback on the quality of science teaching in tertiary institutions. For the purpose of this research work, the questionnaire was rated on a 5point likert scale with such category as strongly agree, agree, strongly disagree and disagree, neutral in order to efficiently elicit the exact responses from the respondents.

VALIDITY/RELIABILITY OF THE RESEARCH INSTRUMENT

The research instrument was validated by the researchers' supervisors. Content and construct validity was obtained by the help of the supervisors and other experts. All corrections and constructive criticism raised by the supervisor were taken into consideration in the preparation of the final version of the instrument. Reliability within the survey was obtained by

calculating the correlation coefficients for each scale. The Cronbach's alpha coefficient is used and ranges from 0.74 to 0.89. The mean correlations for this instrument ranged from 0.24 to 0.35, suggesting there is construct validity underlying each scale.

The research instrument which was the questionnaire was personally administered by the researchers to the respondents in their various institutions of learning. It must be noted that in administering the questionnaire, respondents were informed that confidentiality will be maintained. The respondents were then required to complete the questionnaire as sincerely as they could. 346 copies of the questionnaire were administered and they were all filled and collected back for further analysis. A sample of the questionnaire is attached to the appendix page.

The data collected from the respondents were analyzed using simple percentages, t-test and one way Analysis of Variance (ANOVA). This was to facilitate the objective of the various opinions with regards to the questions raised in the study. This focuses on the discussion, analysis and presentation of data on the various results obtained from the survey. The discussion and interpretation herein covers: the socio demographic characteristics of respondent surveyed, discussion on the objectives.

The hypotheses tested were;

1. There is no significant difference between genders on perception of students for feedback on the quality of science teaching, there is no significant difference between institution and the importance of feedback on the quality of science teaching; and there is no significant difference between the institutions on the effect of feedback on the quality of science teaching.

Table 1 determines the effect of feedback on the quality of science teaching. The result indicated that 82.0% agreed that they were more open to different ways of seeing things as a result of their experiences at the university, while 3.7% reported no university influence on their exposure on the ways they see things. Also 81.7% agreed that feedback by students brought improvement not only to the faculty level but also at the university level, while 4.0% still disagreed to this notion that feedback by students brings improvement. It is also believed by 84.0% that feedback by students is critical to good teaching, while 2.8% disagreed to the notion. 78.2% agreed that students' feedback on teaching will aid in the development and improvement of teaching, while 4.9% disagreed that the feedback from student teaching will aid in the development and improvement of teaching science. 81.0% agreed they have heard the word student feedback before, while 7.8% reported that

they have never heard it before. 71.8% agreed that their course develops sense of ethical responsibility, while 11.0% disagreed that their course develops sense of ethical responsibility. 70.7% argued in favour of some lecturers been able to explain things clearly and have effect on students' feedback, while 6.6% disagreed that some lecturers cannot explain things clearly. 64.9%

agreed that the feedback they received on their submitted work is provided in time to help them improve in their discipline, while 12.1% disagreed on any effect of feedback on works previously submitted. 63.9% agreed that teaching resources are appropriate for their needs, while 12.4% disagreed that teaching resources were appropriate for their needs.

Table 1. Determining the Effect of Feedback on the Quality of Science Teaching

	Strongly agree	Agree	Neutral	Undecided	Disagree
1 I have heard the word student feedback before	92 (26.8%)	186 (54.2%)	33 (9.6%)	5 (1.5%)	27 (7.8%)
2 Teaching resources are appropriate for my needs	91 (23.1%)	157 (39.9%)	43 (17.9%)	16 (6.6%)	39 (12.4%)
3 My course develops sense of ethical responsibility	91 (26.3%)	157 (45.5%)	43 (12.4%)	16 (4.6%)	39 (11.2%)
4 The feedback I received on my submitted work is provided in time to help me improve in my discipline	86 (24.8%)	139 (40.1%)	65 (18.8%)	14 (4.4%)	42 (12.1%)
5 I am more open to different ways of seeing things as a result of my experience at the university	120 (34.6%)	164 (47.4%)	34 (9.8%)	15 (4.3%)	13 (3.7%)
6 Some lectures cannot explain things clearly	134 (38.7%)	111 (32%)	65 (18.8%)	13 (3.7%)	23 (6.6%)
7 Feedback by students is critical to good teaching	115 (33.0%)	115 (44.7%)	43 (12.4%)	18 (5.2%)	15 (4.3%)
8 Feedback by students brings improvement not only to the faculty level but also at the university level	127 (36.7%)	157 (45.0%)	43 (12.5%)	9 (2.6%)	10 (2.8%)
9 Students feedback on teaching will aid in the development and improvement of teaching	122 (35.2%)	149 (43.0%)	47 (13.6%)	11 (3.2%)	17 (4.9%)

Responses showed a higher favour in percentage of the

effect of feedback on the quality of science teaching with only few percentage of disagreement overall.

Table 2. Evaluating the Perception of Students on Feedback for the Quality of Science Teaching

	Strongly agree	Agree	Neutral	Undecided	Disagree
1 My lecturers are extremely good at explaining things	77 (22.2%)	160 (46.2%)	65 (18.7%)	12 (3.4%)	32 (9.2%)
2 There is improved content and structure of learning during teaching	89 (25.7%)	141 (40.5%)	68 (19.6%)	17 (4.9%)	31 (8.9%)
3 I do find my courses interesting even when the lecturer is explaining in class	91 (26.0%)	146 (42.2%)	54 (15.6%)	13 (3.7%)	42 (12.1%)
4 My lecturers explain topics more clearly	75 (21.6%)	134 (38.7%)	93 (26.8%)	17 (4.9%)	27 (7.8%)
5 My lecturers give feedback on students' progress at the end of each course	67 (19.4%)	132 (38.1%)	77 (22.2%)	16 (4.6%)	54 (15.6%)
6 My lecturers encourage student's participation in classroom discussion	101 (29.1%)	155 (44.7%)	53 (15.3%)	8 (2.3%)	29 (8.4%)
7 My lecturers develop a structure of course to take into account individual needs	76 (21.9%)	128 (36.9%)	65 (18.7%)	23 (6.6%)	54 (15.6%)
8 My lecturers uses better teaching techniques	78 (22.5%)	127 (36.7%)	88 (25.4%)	13 (3.7%)	40 (11.5%)
9 My lecturers are more interactive in their teaching	84 (24.2%)	151 (46.6%)	67 (19.3%)	12 (3.5%)	32 (9.2%)
10 Course lecturers provides reading materials to students	94 (27.1%)	143 (41.3%)	53 (15.3%)	14 (4.0%)	42 (12.1%)
11 Lecturers make use of instructional aids during teaching	90 (26.0%)	129 (37.2%)	63 (18.2%)	14 (4.0%)	50 (14.4%)

Table 2 evaluates the perception of students on feedback for the quality of science teaching. On availability of reading materials 68.4% said that their lecturer provided

reading materials to students, while 12.1% disagreed on provision of any reading material by the course lecturers. Lecturers encouraging students participation

in classroom discussion was agreed on by 73.8% as a factor, while 8.4% disagreed on lecturers encouraging student's participation in classroom discussions. 68.2% agreed that they do find their courses interesting even when the lecturer is explaining in class, while 12.1% found it boring. 70.8% agreed on lecturers been more interactive in their teaching, while 9.2% disagreed on lecturers been more interactive in their teaching as a factor in determining improvement in feedback. Lecturers been extremely good at explaining things were agreed on by 68.4% of respondent, while 9.2% disagreed on lecturers been extremely good at explaining things. 63.2% reported that their lecturers make use of instructional aids during teaching, but 14.4% said their own lecturers' do not make use of any instructional aids during teaching. 66.2% agreed that they now have an improved content and structure of learning during teaching, with 18.9% disagreed on any improvement in content or structure of teaching. 60.3%

said their lecturers explain topics more clearly, while 7.8% had the opposite experience. 59.2% believed their lecturers use better teaching techniques, while 11.5% disagreed on the techniques used by their lecturer to be one that is good. 58.8% said their lecturers developed a structure of course to take into account individual needs, while 15.6% said their lecturer do not develop such structure of work that take individual needs into focus. And 57.5% student reported their lecturers' give feedback on students' progress at the end of each course, while 15.0% do not receive feedback at the end of each course.

The result shows an increasing level of disagreement between students perception of feedback by teachers as it affects the quality of science teaching. Even though the result indicates large disagreement by students, this cannot be extensively generalized for all the students.

Table 3. Examining the Importance of Feedback on the Quality of Science Teaching

		Strongly agree	Agree	Neutral	Undecided	Disagree
1	The course I am studying develops my problem solving skills	79 (22.8%)	182 (52.6%)	43 (12.4%)	22 (6.3%)	20 (5.7%)
2	I feel a sense of belonging to the university community	129 (37.2%)	153 (44.2%)	32 (9.2%)	6 (1.7%)	26 (7.5%)
3	My course includes global perspective	135 (39.0%)	142 (41.0%)	26 (7.5%)	18 (5.2%)	25 (7.2%)
4	There is interaction between I and my lecturers	88 (25.4%)	141 (40.7%)	75 (21.6%)	6 (1.7%)	36 (10.4%)
5	Student support system is well improved in my institution	80 (23.1%)	127 (36.7%)	59 (17.0%)	17 (4.9%)	63 (18.2%)
6	There is high level of engagement of student during teaching	77 (22.2%)	165 (47.6%)	67 (19.3%)	3 (0.8%)	34 (9.8%)
7	The learning environment is enabling for communication between lecturers and students	64 (18.5%)	163 (47.1%)	62 (17.9%)	11 (3.1%)	46 (13.3%)
8	Students participate fully during lectures	69 (19.9%)	127 (36.7%)	83 (23.9%)	17 (4.9%)	50 (14.4%)
9	Application of contents to workplace and wide range of information provided in course content facilitate a greater understanding of international practices	78 (22.5%)	133 (38.4%)	88 (25.4%)	20 (5.8%)	27 (7.8%)
10	Science experiments and teaching staff gives students more task to reform during and after class	93 (26.8%)	167 (48.2%)	54 (15.6%)	9 (2.6%)	23 (6.6%)

Table 3 examines the importance of feedback on the quality of science teaching. Global perspective was agreed to be important to feedback by 80.0%, while just 7.2% disagreed on the importance of global perspective on feedback. 81.4% agreed that they feel a sense of belonging to the university community due to feedback, while 7.5% disagreed on any sense of belonging with the university. Science experiments and teaching staff gave students more tasks to reform during and after class was agreed on by 75.0%, 6.6% disagreed that it served as an important factor in enabling adequate feedback. For the ability of the course of study been able to develop one's problem solving skills was agreed on as an important factor in determining feedback by

75.4%, while 5.7% disagreed on the importance of course of study developing problem solving skills which is meant to enhance feedback. 69.8% were highly engaged during teaching, while 9.8% said they were not highly engaged during teaching in the class room. Learning environment enabling for communication between lecturers and students was believed to be an important factor to ensure feedback on science teaching by 65.6%, while 13.3% disagreed on learning environment. 66.1% said interaction between them and their lecturers enabled adequate feedback, leaving 10.4% disagreeing on the student-lecturer relationship enhancing feedback. Students' participating fully during lectures was agreed on by 56.6% to be important for

adequate feedback, while 14.4% disagreed. And 60.9% reported that student support system was well improved in their institution, and application of contents to workplace and wide range of information provided in course content was agreed to facilitate a greater understanding of international practices. While 25.4% and 7.8% disagreed that student support system was well improved in their institution and application of contents to workplace and wide range of information

provided in course content to be important for feedback respectively. All reports indicate a percentage rate above average for the important of feedback to improve quality of science teaching.

H₀: There is no significant difference between genders on perception of teachers' roles in enabling feedback
Test table

Table 4. : t-test on Gender Perception on Feedback

Sex	N	Mean	Std. Deviation	T	df	Sig.(2-tailed)
Male	189	32.5721	12.3729	1.013	344	0.4959
Female	157	34.2914	18.0431			(>0.05)

The t test is used to test for a significant difference between genders on perception of students for feedback on the quality of science teaching. A significant value of 0.4959 which is greater than 0.05 the critical alpha value. We therefore conclude by accepting the null hypothesis that there is no significance difference

between genders on perception of students on feedback for the quality of science teaching.

H₀: There is no significant difference between institution and the importance of feedback on the quality of science teaching.

Table 5. One Way of Variance (ANOVA) on Institutions and Importance of Feedback

Source of variance	SS	df	MS	F	F-table
Between groups	1171	3	390.3	9.01	2.63
Within groups	14817	342	43.32		
Total	15988	345			

One way variance (ANOVA) was used to test for a significant difference between institution and the importance of feedback on the quality of science teaching. The result showed that there was no significant difference between institution and the importance of feedback on the quality of science teaching (F value 9.01>2.63). We therefore conclude by accepting the null hypothesis that there is no

significance difference between institution and the importance of feedback on the quality of science teaching.

H₀: There is no significant difference between the institutions on the effect of feedback on the quality of science teaching

Table 6: One Way of Variance (ANOVA) on Institutions and the Effect of Feedback

Sources of variance	SS	df	MS	F	F-table
Between groups	2812	3	937.2	32.97	2.63
Within groups	9720	342	28.42		
Total	12532	345			

One way variance was used to test for a significant difference between institutions on the effect of feedback on quality of science teaching. The result showed that there is no significant difference between institution on the effect of feedback on the quality of science teaching (F value 32.97>2.63). We therefore conclude by accepting the null hypothesis that there is no significance difference between institutions on the effect of feedback on quality of science teaching.

conception of teacher quality transcends issues focusing on acquisition of knowledge, skill and attitude to accommodate focus on teachers' accomplishments. The hypotheses tested by the study further buttressed the point that a strong relationship exists between students' feedback and quality of science teaching on the educational activities teachers engage themselves in and the quality of teachers' services delivery. However, this study identified some major constraints such as lack of retention of teachers, inadequate teaching facilities and most importantly teachers' general condition of service. The role of teachers' in the scheme of quality science teaching was confirmed from the findings, when respondents point out that the teachers' role cannot be overemphasized as they can make or mar any

DISCUSSION

The findings of this study revealed that teachers' proficiency can only be guaranteed through a constant review of student's feedback if quality service delivery would be achieved. 68% and this asserts that the

educational programme regardless of the quality of its design. Ignoring this and other factors would leave a yawning gap between the goals of quality teachers', service delivery and the continued search for effective implementers of curricula in our Universities.

SUMMARY

The study showed that university lecturers are apprehensive of students' evaluation of their instructional practices. This is probably because of the potential of academic and professional inadequacies that may be exposed by student evaluations especially for junior and less experienced lecturers. Kilpatrick (1997) and Imogie (2000) had reported that senior lecturers tend to have a more positive disposition towards students' evaluation of teaching than junior academics. This study also showed that lecturers are opposed to these evaluations being used for promotion criteria or any other punitive measures against them. Braskamp and Ory (1994) had reported that lecturers tend to question the practice of deciding issues of promotion, salary and tenure on the basis of anonymous student evaluations most of which have questionable degrees of validity and reliability. Iyamu (1998) had argued that an assessment by students can hardly measure accurately the complexity and multidimensionality of effective teaching. The assessment of lecturers by their students is really a problematic issue. In the light of such constraints, other mean to evaluate and assess teaching effectiveness should be sought.

CONCLUSION

Feedback is an essential part of education and training programmes that helps learners to be involved in all areas of their training, points out areas for improvement and actions to be taken to improve the performance.

It is clear by this study that public and private university in Nigeria, teaching effectiveness is currently not assessed. It is also not a criterion for promotion exercise. This implies that the benefits of such exercise are not realized and that lecturers may not have feedback on their teaching and then perpetuates the same mistakes ever the years. Also, students input to learning are also lost. The addition this would have had on staff development is also lost.

This practice is well entrenched in developed countries and should be embraced by universities in Africa. In Nigeria and in Africa at large, lecturers still have the 'large than thou' attitude in our tertiary institutions and this would not be good for the system. In the final analysis, when accepted, results from students' evaluation of teaching in tertiary institutions need to be treated with extreme caution.

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DO SOCIAL MEDIA UTILISATION AND ADDICTION INFLUENCE UNDERGRADUATE STUDENTS' SELF-PERCEPTION? A CASE STUDY OF UNIVERSITY OF IBADAN, NIGERIA

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ABSTRACT

Social media networks have become popular among the students because of the great potential they have in facilitation collaboration, communication and sharing among the students. Students' self-perception has been attributable to their exposure to social media networks. Previous studies have concentrated more on social media usage and social media addiction without considering their influence on self-perception. This study, therefore, examined the influence of social media utilisation and addiction on self-perception of undergraduate students in University of Ibadan, Nigeria. The study adopted the survey method of ex-post-facto design. Multistage sampling procedure was adopted to select 907 undergraduate students from 7 Faculties in University of Ibadan. a. A questionnaire named "Social Media Utilisation, Addiction and Self-Perception Questionnaire" ($r=0.77$) was used for data collection. Seven research questions were answered in the study. Facebook (751 or 90.2%) and Twitter (646 or 77.6%) were the most commonly accessible social media networks while meeting with friends (651 or 78.2%), getting news (566 or 67.9%), communication (554 or 66.5%) and online learning (450 or 54.0%) were major purposes for social media usage among the undergraduate students. Low level of social media addiction and positive self-perception were also established among the undergraduate students. Self perception is significantly positively related with social media utilisation social ($r = .181$, $p<0.01$) and social media addiction ($r = .195$, $p<0.01$). The relative contribution of social media utilisation and social media addiction to self perception were ($\beta = .111$, $t = 2.852$) and ($\beta = .140$, $t = 3.569$) respectively. Social media utilisation and addiction to social media relatively contributed significantly to University of Ibadan undergraduates' self-perception.

KEYWORDS: social media networks, social media utilisation, social media addiction, self-perception, undergraduate students

INTRODUCTION

The dwindling educational development in most developing countries of the world calls for surgical measures with a bid to galvanising all processes that could bring meaningful, rapid and sustainable growth to the education sector (Olatubosun, 2010). One of these measures is the use of social media networks. Making use of social media networks in the process of education in schools has the potential of raising the standard of education. Learning is the development of new knowledge, skills or attitudes as an individual interacts with information and environment using conventional teaching methods poses problems and limitations to the learners (Heinrich, Russel & Smaldino, 2002). Considering its role in education, social media can facilitate collaborative and constructivist teaching and learning in schools. In this, learners are, among other things, engaged in knowledge construction and creative activities (Olatubosun, 2010).

Social media networks provide useful tools to strengthen the human, institutional and organisational capacity at all levels. Social media networks are designed to foster collaboration among individuals, institutions and nations of the world with such collaboration aiming at bringing about meaningful development through the sharing of ideas and resources (Zavazana, 2012). Most importantly, students in higher institutions of learning in Nigeria can collaborate with their colleagues in developed countries of the world to enable them to be able to live up to the intellectual, economic, and social demands of this 21st century. However, low level of social media awareness is a major risk factor in meeting the objectives of social media networks based projects destined for use by the students in developing countries. These factors often translate into low usage; and hence, lower chances for sustainability.

In recent years, social media has become a huge and integral component of how students spend their time online. Between wikis, blogs, Facebook, Twitter, and many others, people are spending enormous amounts of time on websites used to share information and connect with people (Acar, 2008). Not surprisingly, students are easily connecting with others and sharing information more than ever before. Many students get news, gossip, and friendship updates via social network sites, sometimes even before breakfast from the convenience of their mobile phone or laptop (Boyd, 2008).

Today's students integrate social media networks into all aspects of their lives for multiple purposes, particularly socialising, entertaining and shopping (Asselin and Moayeri, 2008) as well as doing homework by using the Internet (Lenhart, Madden and Hitlin, 2005). In addition to helping establish and maintain interpersonal connections, studies have shown that social media sites have the ability to guide students entering an unfamiliar social environment. Selwyn (2007) argues that social media network like facebook has "become an important site for the informal, cultural learning of 'being' a student, with online interactions and experiences allowing roles to be learned, values understood and identities shaped. Social media networks have also been found to be able to offer a unique opportunity to promote socialisation to the institution's environment as it can help students learn about their peers and college which, in turn, can create satisfaction and affiliation with the University.

However, although use of the social media networks by students is on the rise, Spencil and Gitimu (2011) emphasized concerns that heavier use of social media networks, otherwise called social media addiction, by students might interfere with academic achievement, conventional social interaction, and exposure to desirable and undesirable cultural experiences. Early support for the concept of "social media network addiction" comes from Young (1996), who posted a form-based survey on a website that allowed for self-selecting anonymous input from "avid social media networks users". In university settings, anecdotal evidence of problems stemming from excessive use of new technologies has been reported on various campuses (Adamic and Alar, 2005; Cabral, 2010). For example, study by Boyd and Ellison (2007) reported that 50% of students interviewed after dismissal for academic failure listed excessive usage of social media as a reason for their problems.

Rose (2012) in her study found that young adults that spend more time on Facebook are more likely to have high and positive perception about their ability to be more acceptable than others. Also, Williams (2012)

reported that social media use and addiction can have a positive influence on college students' self perception, though this may be because users can shape their image and social interactions on the platform tend to reflect that image. However, a University of Houston study (2008) found a correlation between those who frequently use social media and those who suffer from depression tended to compare themselves to others, which added to their negative self perception. It would therefore be a noble venture to investigate the extent to which social media usage and addiction would be able to determine the self-perception of undergraduate students in University of Ibadan, Nigeria

On the purpose of social media use, Sawyer (2011) findings revealed that students use social media sites to communicate with their friends and families and to stay in touch with people whom they cannot talk to face to face. Staying connected to people is important for relationships building. In corroborating this, Balci and Golcu (2013) reported that university students in Turkey use facebook more for communicating with friends, getting information about people and events, entertainment and relaxing as well as messaging. Also, Charney and Greenberg (2001) reiterated that students use social media basically for the purposes of keeping informed, diversion and entertainment, peer identity, good feelings, communication, sights and sounds, career and coolness. Cheak, Goh and Chin (2012) also reported checking of messages, checking of comments/testimonies and playing games as topping the list of purposes for which university students in Malaysia visit social networking sites just as they reported regular use of friendster, tagged and MySpace among the students.

Social networking addiction is sometimes used to refer to someone spending too much time using Facebook, Twitter and other forms of social media etc so much so that it interferes with other aspects of daily life. Olowu and Fasola (2012) findings on level of social media addiction among students revealed that majority of the students in tertiary institutions in Oyo State affirmed that they spend more time on social media and that they felt agitated when they are not able to access their social network at least twice daily. This established a high level of social media addiction among the students. Subathra, Nimisha and Hakeem (2013) also reported a high level of addiction to social media among college students in Coimbatore, India as majority of the students (98.0%) were found to be addicted to social network chatting. Benson, Filippaios and Morgan (2009) reported a significant difference in social media addiction between undergraduate and postgraduate students in UK and European universities. Findings from the study revealed that graduate students exhibit

more addiction to social media than undergraduate students.

The research that exists about the effects of social media on self-perception and self-esteem is all quite contrary (LaRose and Eastin, 2004; Selwyn, 2007; Kaya, 2010; Walker, 2012). While some studies suggested social media has a negative effect on self-perception, others proved that social media has a positive effect on self-perception. On the other hand, studies have found contradictory data that suggested that addiction and high use of social media such as facebook can have detrimental effects to self-esteem and self-perception. However, literature review has revealed that more information exist that supports the positive aspect of social media when it comes to its effects on self-esteem and self-perception, but much of this research is related to social media addiction and dependency. Taking this knowledge into account, Allen (2012) concluded that the positive effects of social media in boosting an individual self-esteem and self-perception are merely superficial.

There have been studies on social media networks use among students such as Bradley (1990), Kaplan and Haentein (2010), Karaiskos, Trazvellas, and Papapriogopoulos (2010), Spencil and Gitimu (2011), and Stollak, Vandenberg, Burklund, and Weiss (2011). Such studies focused mainly on college students and only few focusing on university students. Also, the few studies that focused on university students were done outside the shore of Nigeria. On the other hand, studies such as Ivala and Gachago (2010), Kuss and Griffiths (2011), and Alabi (2013) that studied the use of social media by university students focused only on facebook and blogs while other social media were left out. Therefore, this study investigated the use of and level of addiction to social media networks as influencing factors in undergraduate self-perception in University of Ibadan, Nigeria.

OBJECTIVES OF THE STUDY

The specific objectives of the study are to:

1. investigate the pattern of use of social media networks by undergraduate students in university of Ibadan;
2. establish the level of addiction to social media networks among undergraduate students in university of Ibadan;
3. find out how undergraduate students in University of Ibadan perceive themselves;
4. ascertain the relative contribution of social media networks use and addiction to undergraduates' self perception in University of Ibadan.

RESEARCH QUESTIONS

The following research questions will be addressed in the study

1. For what purposes do the undergraduate students in University of Ibadan use social media networks?
2. What is the frequency of use of social media networks among undergraduate students in University of Ibadan, Nigeria?
3. What is the level of social media addiction among undergraduates' students in University of Ibadan?
4. How do undergraduate students in University of Ibadan perceive themselves?
5. What is the relative contribution of social media networks use and addiction to social media to undergraduate students' self-perception in University of Ibadan

RESEARCH METHODOLOGY

This study adopted the ex-post-facto type of survey method. The population of the study comprises all the undergraduate students in university of Ibadan, Nigeria. The respondents are distributed across the thirteen faculties offering undergraduate courses in university of Ibadan viz: Faculties of Education, Science, Social science, Technology, Agriculture and Forestry, Veterinary medicine, Pharmacy, Dentistry, Public Health, Clinical sciences, Basic medical sciences, Arts, and Law that offer undergraduate courses in university of Ibadan. The multi-stage sampling technique was adopted in selecting the sample population for the study. At the first stage of sampling, the simple random sampling method using balloting system was adopted in selecting seven faculties representing (50%) of the total number of faculties in University of Ibadan, Nigeria. The seven faculties selected are, Faculties of Science, Arts, Clinical sciences, Law, The social sciences, Pharmacy, and Agriculture, and Forestry. The last stage of the sampling procedure adopted the simple random sampling to select ten percent (10%) of the total undergraduate enrollment in each of the Faculties selected for the study. Thus, a total number of nine hundred and seven undergraduates form the sample size for the study (See Table 1).

Table 1: Sample size for the study

Faculties	Undergraduate enrollment	Sample size (10% of undergraduate enrollment)
Agriculture and Forestry	1361	136
Arts	1816	182
Clinical sciences	1191	119
Law	578	58
Pharmacy	330	33
Science	2334	233
The Social science	1464	146
Total	9074	907

Source: Preliminary Survey, 2012

The research instruments adopted for this study was questionnaire. In validating the questionnaire, the draft of the questionnaire was given to experts in the field of library and information studies for their inputs on the adequacy and appropriateness of the items included in the main instruments. The questionnaire was trial-tested on twenty undergraduate students in the Faculty of Education which is not part of the Faculties selected for the study. The data collected were subjected to Cronbach Alpha reliability coefficient with the results yielding 0.77. This is considered suitable and appropriate for the study.

DATA ANALYSIS AND DISCUSSION OF FINDINGS

A total of nine hundred and seven (907) copies of the questionnaire designed for the study were administered on the undergraduate students, out of which only eight hundred and eighty three were returned with useful responses. This gives a response rate of 91.8% which was considered adequate for the study.

Research Question 1: For what purpose do the undergraduate students in University of Ibadan use social media networks?

Table 2: Respondents Opinion on Purpose of Use of Social Media Networks

Statement	Frequency	Percentage (%)
Finding communities of my interest	370	44.4
Finding social contacts	269	32.3
Finding Jobs online	79	79.5
Making friends	651	78.2
Sharing links	209	25.1
Online learning	450	54.0
Communication	554	66.5
Research work	412	49.5
News	566	67.9
Leisure/Fun/Entertainment	357	42.9
Advertisement	219	26.3
Passing away time	194	23.3
Video conferencing	60	7.2

Research Question 3: What is the level of social media addiction among undergraduate students in university of Ibadan?

From Table 3, the Grand Mean of the level of social media addition is 2.96 which is lower than the criterion mean of 3.00 set for a higher level of social media addiction. It can, therefore, be inferred that there is a low level of addiction to social media among undergraduate students in University of Ibadan. This is further affirmed in the disagreement of majority of the respondents with statements that tends towards social media addiction such as "I think I am addicted to social media" and agreement with statements that are against social media addiction such as "I am able to control my use of social media". This is variance with findings from Olowu and Fasola (2012) study which revealed a

From Table 2, it can be deduced that majority of the respondents to attested to making friends 651 (78.2%), getting news 566 (67.9%), communication 554 (66.5%) and online learning 450 (54.0%) as the major purposes for which they make use of social media networks. This implies that undergraduate students in University of Ibadan make use of social media network mainly for the purposes of making friends, getting news, communication and online learning. This is in support of Sharafah (2011) findings which reported social interaction, communication motives and companionship as major purposes for students' use of social media networks.

Research Question 2: What is the frequency of use of social media networks among undergraduate student in University of Ibadan, Nigeria?

Information on the frequency of use of social media networks among the respondents showed that majority of the respondents affirmed the use of only Facebook and Twitter on regular basis with response rates of 695 (65.2%) and 467 (56.1%) respectively. On the other, a larger proportion of the respondents does not make use of other social media networks listed such as Youtube, Picassa, Flicker, Mys[ace and Blogger among others. This implies a low level of social media networks' use among the undergraduate students in University of Ibadan as only Facebook and Twitter are being used by the undergraduate students in University of Ibadan. Boyd and Ellison (2011) findings that reported regular use of Facebook, Twitter and Myspace among University students.

high level of social media addiction among students in tertiary institutions in Oyo state.

Information on the time spent on social media networks by the respondents revealed that majority of the respondents 665 (79.8%) spend less than 90 minutes on social media networks while only few respondents spend more than 90 minutes on social media networks. This implies that the undergraduate students spend less time on social media networks. This further affirms the low level of social media addiction among the undergraduate students in University of Ibadan.

Table 3: Social Media Addiction among Undergraduate Students

Statement on social media addiction	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	Std Dev
I find that I spend more than intended on social media	181 (27.7%)	250 (30.0%)	114 (13.7%)	89 (10.7%)	2.62	1.260
I often check my social media site before every other things that I need to do	75 (9.0%)	245 (29.4%)	325 (39.0%)	81 (9.7%)	3.11	1.193
I find my performance suffers because of social media	140 (16.8%)	140 (16.8%)	194 (23.3%)	110 (13.2%)	2.99	1.266
I tried to cut down the amount of time I spend online	104 (12.5%)	4.75 (57.0%)	66 (7.9%)	64 (7.7%)	2.11	1.055
I often find myself saying "Just a few minutes" when using social media	29 (3.5%)	163 (19.6%)	190 (22.8%)	34 (4.1%)	3.04	0.852
People comment negatively about my social media usage	58 (7.0%)	215 (25.8%)	413 (49.6%)	50 (6.0%)	3.22	1.107
I feel stressed out, disconnected and /or paranoid when I cannot access social media	83 (10.0%)	307 (36.9%)	238 (28.6%)	71 (8.5%)	2.89	1.176
I cannot imagine going without social media	157 (18.8%)	188 (22.6%)	127 (15.2%)	150 (18.0%)	3.01	1.398
I spend more time using social media than just about anything else.	81 (9.7%)	121 (14.5%)	344 (41.3%)	187 (22.4%)	3.52	1.255
I can risk any relationship because of social media	47 (5.6%)	121 (14.5%)	384 (46.1%)	153 (18.4%)	3.57	1.1150
I use social media as a way of escaping from problem or relieving mood	98 (11.8%)	388 (46.6%)	101 (12.1%)	63 (7.6%)	2.57	1.085
I stay online than originally intended	109 (3.1%)	209 (25.1%)	276 (33.1%)	25 (3.0%)	2.88	1.101
I am able to control my use of social media	146 (17.5%)	363 (43.6%)	100 12.0%	59 (7.1%)	2.48	1.125
I do not feel like losing anything without social media	106 (12.7%)	135 (16.2%)	152 (18.2%)	59 (7.1%)	2.91	1.063
I feel depressed when I cannot access my social media account	191 (22.9%)	221 (26.5%)	246 (29.5%)	38 (4.6%)	3.07	1.225
I think I am addicted to social media	136 (16.3%)	92 (11.0%)	283 (21.2%)	171 (21.2%)	3.33	1.359
Grand Mean					2.96	

Research Question 4: How do undergraduates in University of Ibadan perceive themselves?

It can be inferred from information supplied on undergraduates' self-perception that the undergraduates in University of Ibadan have positive perception of themselves. This can be established through the agreement of majority of the students with statements that portrays positive self-perception such as "I think I am smart" and "I feel I am academically good" with response rates of 676 (81.2%) and 446 (53.6%) respectively. On the other hand, majority of the students disagreed with statements on negative self-perception such as "I feel inadequate because of my exposure to achievement of others through social media network". Thus, it can be inferred that undergraduate students in University of Ibadan perceive themselves positively. This is in support of Kaya (2010) findings which reported that people who use social media networks have a higher self-esteem and positive perception about themselves.

Research question 5: What are the relative contributions of social media networks use and addiction to University of Ibadan undergraduates' self-perception?

Table 4: Multiple Regression Analysis Showing the Relative's contributions of the Independent variables to the Dependent variable

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
Model					
Constant(Self-perception)	21.006	1.329	-	15.806	0.000
Use of Social Media Networks	6.321	0.028	.111	2.852	0.000
Addiction to social media networks	7.868	0.022	.140	3.569	0.004

Table 7 presents information on the relative contributions of social media utilization and social media addiction level to undergraduates' self perception. It revealed addiction to social media as contributing more to undergraduate students self perception ($\beta = 0.140$, $t = 3.569$, $p < 0.05$) than social media utilisation ($\beta = 0.111$, $t = 2.852$, $p < 0.05$). Both social media utilisation and social media addiction do make significant contributions to undergraduate self-perception in University of Ibadan. Social media addiction and social media utilisation contributed 14.0% and 11.0% respectively to self-perception among undergraduate students in University of Ibadan

RECOMMENDATIONS

The following recommendations were made:

1. There should be adequate orientation on social media utilisation and addiction among the students. This will further encourage regular use of social media among the students and sustainable development in the education sector.
2. The management of the University should create awareness among the undergraduate students about other social media networks that can help students' learning.
3. The management of the University should ensure the adequate provision of social media networks for students' utilisation. However, the use of the available social media should be monitored by the school authority to guide against abuse.
4. The management of the University and Parents should be guided against excessive use of social media that can lead to addiction.
5. The cost of accessing the Internet should be made affordable to the students to enable them to be able to utilise social media networks.
6. There is also the need for the provision of a good policy environment for the effective use of the social media networks by the students.
7. Students should be encouraged towards positive use of social media. The use of social media networks for collaborative learning among the students should be encouraged.

LIMITATION OF THE STUDY

This study only considers what is obtainable among the undergraduate students in University of Ibadan. Also, Only seven faculties were considered out of the thirteen faculties and a College available within the University of Ibadan.

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CAPACITY BUILDING STRATEGIES FOR TEACHERS AND SUSTAINABLE DEVELOPMENT IN UNIVERSITIES IN CROSS RIVER STATE OF NIGERIA

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ABSTRACT

This study investigated strategies for capacity building for teachers' and sustainable development in Universities in Cross River State in Nigeria. Three research questions were posed and three hypotheses were formulated for the study. The design for this study was descriptive survey. The population of this study consisted of all the lecturers in University of Calabar and Cross River University of Technology. A sample of 399 respondents was purposively selected for the study from University of Calabar and Cross River University of Technology (CRUTECH) out of a population of 1,330 lecturers. The research instrument used in this study was questionnaire titled "capacity building strategies for teachers Questionnaire (CBSTQ) developed by the researcher. Based on the findings, the researcher recommended among others that for human capacity development to succeed, teachers in higher education should be exposed to a continuous professional development and training programmes to enable them to be more productive and adapt to the changing world of teaching and research in the highly competitive and globalized economy. The study also recommended that efforts should be made to improve on the conditions of school buildings, where staff and students spend the majority of their educational experience in order to impact effectively on teaching and learning of those concerned.

KEYWORDS: capacity building, strategies, teachers sustainable development in universities

INTRODCUTION

Anybody, normal or physically challenged who is of school going age in an educative context where inclusive education is functional to have passed through the four walls of a school or experienced formal schooling, would agree that he or she must have been taught by either one teacher or the other, or that teachers, individually or collectively, have inspired, mentored, directed, guided, induced or facilitated his/her learning in school. It is no exaggeration to posit that "the best work force, the best social beings and formidable team of leaders" (Esu, 2012, p.3) in all sectors of their economy were, and are still being produced by teachers through the process of formal schooling, invariably, the place of the teacher in any meaningful national development striving is indispensably inevitable.

In the context of professional teaching, teachers are to be professionally trained, socialized into rubies of the complex task of teaching and in fact equipped professionally with the requisite teaching competences that are desired for their teaching effectiveness. A teachers' professional training is a life-long endeavour.

The initial teacher professional preparation to get him or her prepared for teaching, and the teachers' continuous professional development to keep him or her abreast of

the current developments in the teaching profession is the concern of teacher education "a specialized area of education". Teacher education in Nigeria is not a one-shot affair in which all prospective teachers are keyed into the same programme. The teacher education curriculum varies according to the level in which a prospective teacher is to teach.

CONCEPT OF CAPACITY BUILDING

Capacity development is a process of change, and hence it's about managing transformations, peoples' capacities and institutional capacity and a society's capacity change over time. A focus on what development policies and investments work best to strengthen the abilities networks, skills and knowledge base cannot be a one-off intervention (Millennium declaration, 2000).

Akpombo (2002), stressed the importance of training and development of human resources, that the university system worldwide is regarded as the citadel of knowledge, the fountain and foundation of intellectualism, the most ground for the intellectual incubation of leaders of tomorrow, and the greatest apparatus of socio-economic development in any country. A system which certifies only competent students in character and learning should have lecturers who are equally well developed, trained and retrained academically and professionally.

Kulwart (2000) identified five significance of human resources development as follows;

1. That the vast reservoir of human talents could be harnessed to achieve industrial objective through developmental programmes.
2. Developmental programmes make human resources adapt to the changing technological improvements.
3. Development programmes which comprises planned development and training extends to every process of management to improve the role of a manager, his interactions with the group and his ability to get things done through the group.
4. Formal and informal development of people would be positive through well planned and executed development programme.
5. Human resources development approach involves policies which will be useful in providing satisfactory work, enhancing opportunities for career growth and in reducing the sense of frustration among human beings.

To Peretomode and Peremode (2005), human resources development are planned activities that focus on increasing and enlarging the capabilities of employees so that they can successfully have greater or assume higher position in the organizational hierarchy to better handle current responsibility. It is greatly acknowledged that quality education is crucial to national development.

The success and development of every educational system as in any organization depends the quality of its human and material resources. Of all these factors, the human resources appear to be the most important because without it, all other factors are inept. Human capacity development hinges absolutely on the educational system and of course teachers are the pivot of the education system. Teachers being at the centre of teaching and learning process need to be adequately prepared and exposed to a continuous professional development and training programmes to enable them be more productive and adapt to the changing world of teaching and the highly competitive and globalized economy. Human resources development is the frame work for helping and developing employees to develop their personnel and organizational skills, knowledge, abilities and the work attitude that will elicit sustainable development.

Teacher Education

Teacher education is the education process through which all teachers in the nation are professionally trained to qualify for the training task as well as keep abreast of changes or innovations in teaching

consequent upon technological developments that are impacting on teaching and learning. The two complimentary components of teacher education were alluded by Abimbola (2004, p. 49) when he averred that “all teachers should not consider themselves finished products upon graduation (after professional training and certification –pre-service teacher education). They must continually update their knowledge (skills and competencies) within their discipline during this era of scientific and technological advancement or era of information and communication technology that is impacting on all facets of teaching and learning.

Teaching and Learning

The primary and ultimate goals of teaching and learning involves transfer and the acquisition of skills and knowledge which provide for the individual learner, the ability to function within the world of work or in the society in general. Every organization has a set of goals which it strives to achieve. The school therefore is not an exception. The goals of the school as an organization comes under the word “teaching and learning” a motive the teacher and students pursue by interacting with materials and their physical environments.

Environmental factors affects teaching and learning in Nigeria. Environment means different things that we come across, handle and observe around us. They include the various amenities that are around us in our homes, schools and the community where we are located. The environment moulds our lives, determines what we learn and how we learn it and also helps in shaping our behaviour. In the process of education, a child is influenced by the home which is the child’s first window to the outside world, peer group members, relatives, the culture of his/her immediate society and most especially by his/her school environment. School environment has variously been described as one important factor that affects the school system greatly. Berry (2002), observed that there is a clear relationship between environmental quality of schools and educational performance. Findings from his study show that facility management system determines environmental quality in schools, the quality of school environment shapes attitudes of students, teachers and behaviour and behaviour affects performance. This pre-supposes that physical discomfort can be the cause of indiscipline, which cannot aid teaching and learning in anyway.

Teaching is any interpersonal influence aimed at changing the ways in which other persons will behave. It is the process of providing learning experiences which entails mental and physical involvement. According to Okorie (1986), it involves more than pushing in as many facts into the brain of the child without taking note

whether the child is ready or mature for it. Bidwell (1993) defined teaching as a series of interaction between someone in the role of teacher and someone in the role of a learner with the explicit goal of changing the learners' cognitive or affective state. One of the key terms here is the concept of interaction, assimilation and reaction. In the process of interaction, what is exchanged is information, and the information is assimilated. For this process to be concrete (Aderounmu, 1984) stated that, the concept of participation is required.

This means that the teacher is inseparable from the learners. This is because the process of teaching has meaning only when this interaction between these people takes place. Clark and Starr (1986) stated that, teaching is an attempt to help someone acquire or change some skill, attitude knowledge, ideal or appreciation. It is a purposeful and a goal oriented activity. The goal of teaching is to produce learning.

Learning is conceptualized in terms of behavioural change and Bidwell (1993) defined it as a relatively enduring change in behaviour that is a function of prior behaviour. The changes in behaviour are usually described as intended outcomes. They are the expectations of the teacher after the process of interaction with the learners. It must not be imagined that this interaction produces only the intended outcomes, of course unanticipated consequences may follow and unexpected barriers to goal attainment may arise.

Learning is a positive change in behaviour which comes as a result of an encounter with some of experiences. According to Unachukwu (1990), it is the process by which learners acquire and retain attitudes, knowledge, understanding, skills and capabilities that cannot be attributed to inherited behaviour patterns or physical growth. Farrent (1981) opine that, learning is a change in human disposition which persists over a period of time and which is not simply ascribed to the process of growth. Gague (1997) added that, the change must have more than monetary permanence and it must be capable of being retained over some period of time. Learning must be distinguishable from the kind of change that is attributed to growth. It is the activity of the child and the teacher and it is sustaining changes occurring in behaviour as a result of experience.

Quality Teaching For Quality Learning

The teachers' job is to teach, and teaching is an activity which can be carried on successfully or otherwise. The question of teaching arises when something can be done to help bring out learning by someone, and the teacher does not only bring out learning but accepts

responsibility for failing to do so. The learner to provide the necessary motivation in the classroom through his ingenuity.

The success of every education process depends on the wisdom and knowledge of the teacher and on the teachers' sensitivity to the students. No education system can rise above the quality of the teachers. It is therefore necessary to consider the quality of teachers in every discussion concerning education.

This is imperative because:

- A qualified teacher is not necessarily a competent teacher.
- A competent teacher is not necessarily an efficient teacher.
- An efficient teacher is not necessarily an effective teacher.

A qualified teacher is one that has the minimum condition and certification for entry into the teaching profession. In Nigeria, the minimum condition is the possession of the Nigeria Certificate in Education (NCE). A competent teacher is one who has mastered the art of teaching, while an efficient teacher is one who can apply the art of teaching as instructed. An effective teacher is one who applies knowledge of the arts of teaching creativity and consequently in maximizes student learning (Obanya, 2012:13).

Socrates contended that the skillful teacher asks leading question to stimulate his students to ponder upon certain basic human concerns about life, truth, justice and beauty. Discussion sharpens the child's reasoning skills. A healthy classroom situation should involve the direction of factors of reading, listening, speaking, writing and reasoning.

STATEMENT OF THE PROBLEM

The nations of the world have come to rely on the three-fold function of the university; this include teaching, research and community service as a means of advancement in knowledge, production of qualified workforce, social and economic transformation. Human resources in any organisation constitute the most important input, being the actual agents who accumulate wealth, use material resources, build social, economic and political ties for development. Capital and material resources are positive factors in production unless used by humans. Employees (lecturers) training and development is aimed at raising the standard of skills possessed by an employee (a lecturer) with a view to expanding a whole man's ability to fully use his capabilities and apply his knowledge and experience to old, novel and potential problems.

Some of the lecturers, including professors, associate professors and senior lecturers never received training in the principles and methods of teaching, since lecturing involves teaching. Some negative dispositions are noticeable, lack of interest in the job, poor teaching environment, high incidents of teaching ethical disciplinary cases, low lecturers morale, among others (Nwachukwu, 1989; Akpombo, 2000; Uchendu et al., 2003 and Anwo, 2012).

It is important to determine whether participation in training and development programmes of lecturers by status, influence the quality of their output in the universities in Cross River State. This research is therefore to answer questions such as the influences of lecturers' participation in training and development; how funding affects lecturers' learning outcomes by status such as capacity building mechanism on quality education.

PURPOSE OF THE STUDY

The purpose of the study is to investigate;

- How environmental factors affect teaching and learning in the education system.
- How funding affect learning outcomes in the areas of training and manpower development.
- How does quality research affect teaching and learning?

RESEARCH QUESTIONS

- To what extent does environmental factors affect teaching and learning?
- To what extent does funding affect learning outcomes in the areas of training and manpower development?
- To what extent does quality research affect teaching and learning?

STATEMENT OF THE HYPOTHESES

1. There is no significant influence of environmental factors on teaching and learning in the education system
2. There is no significant influence of funding on training and manpower development on learning outcomes.
3. There is no significant influence of quality research on teaching and learning.

METHODOLOGY

The research design adopted for the study was descriptive survey. The population of the study consisted of 1330 lectures from the two universities. The sample size was 30% selected from each of the institution. Simple random sampling technique was used in selecting 399 lectures from the two institutions.

Questionnaire titled: capacity building strategies teachers questionnaire (CBSTQ) containing 18 items statements. The instrument was divided into two sections (A and B). Section A comprised personal information of the respondents such as gender, while section B comprised questionnaire items constructed based on the variables of the study. The four (4) point Likert scale of Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD) was used. A reliability index of 0.85 and 0.82 was obtained using Cronbach reliability estimate. Pearson Moment Correlation was used to analyze the data.

PRESENTATION OF RESULTS

In this section, each of the study hypothesis is re-stated and the result of data analysis carried out to test it is presented. Each hypothesis was tested at .05 level of significance.

Hypothesis One

There is no significant relationship between environmental factors and teaching and learning. The independent variable in this hypothesis is environmental factors while the dependent variable is teaching and learning. Pearson product moment correlation statistical technique was employed to test the hypothesis. The result is as presented in Table 1.

Table 1: Pearson product moment correlation coefficient analysis of the relationship between environmental factors and teaching and learning (N=399)

Variables	X	SD	r-value
Environmental factors (X)	29.00	1.63	0.96
Teaching and learning (Y)	27.46	2.56	

*P<0.05, df= 397 critical r=0.196

The result in Table 1 shows that the calculated r-value of 0.96 was found to be higher than critical r-value of 0.196 needed for significance at 0.05 alpha level of significance with 397 degree of freedom. The null hypothesis that, there exists no significant relationship between environmental factors and teaching and learning was rejected. This means that environmental factors significantly enhanced teaching and learning.

Hypothesis Two

There is no significant relationship between funding and training and manpower development. The independent variable in this hypothesis is funding while the dependent variable is training and manpower development. Pearson product moment correlation statistical technique was employed to test the hypothesis. The result is as presented in Table 2.

Table 2: Pearson product moment correlation coefficient analysis of the relationship between funding and training and manpower development (N=399)

Variables	X	SD	r-value
Funding (X)	27.19	2.96	0.282*
training and manpower development (Y)	26.83	2.67	

*P<0.05, df= 397 critical r=0.196

It could be observed from Table 2 that the calculated r-value of 0.282 was found to be greater than critical r-value of 0.196 needed for significance at 0.05 alpha level of significance with 397 degree of freedom. This result implies that there exists a positive significant relationship between funding and training and manpower development. This means that funding increase, training and manpower development increases.

Hypothesis Three

There is no significant relationship between quality research and teaching and learning. The independent variable in this hypothesis is quality research while the dependent variable is teaching and learning. Pearson product moment correlation statistical technique was employed to test the hypothesis. The result is as presented in Table 3.

Table 3: Pearson product moment correlation coefficient analysis of the relationship between quality research and teaching and learning (N=399)

Variables	X	SD	r-value
Quality research (X)	27.07	3.24	0.55*
Teaching and learning (Y)	27.46	2.56	

*P<0.05, df= 397 critical r=0.196

It could be observed from Table 3 that the calculated r-value of 0.55 was found to be greater than critical r-value of 0.196 needed for significance at 0.05 alpha level of significance with 397 degree of freedom. This result implies that there exists a positive significant relationship between quality research and teaching and learning in central senatorial district. This means that as Quality research increase teaching and learning increases.

DISCUSSION OF FINDINGS

This section is devoted to the discussion of findings of the hypotheses formulated to direct the study. The result of the analysis revealed that capacity building strategies significantly relate to teachers with and teaching sustainable development. This finding is in line with view of Berry (2002) who observed that there is a clear relationship between environmental quality of schools and educational performance. Findings from his study show that facility management system determines

environmental quality in schools, the quality of school environment shapes attitudes of students, teachers and behaviour and behaviour affects performance. This presupposes that physical discomfort can be the cause of indiscipline, which cannot aid teaching and learning in anyway. Teaching is any interpersonal influence aimed at changing the ways in which other persons will behave. It is the process of providing learning experiences which entails mental and physical involvement. Okorie (1986), also stated that it involves more than pushing in as many facts into the brain of the child without taking note whether the child is ready or mature for it. Farrent (1981) also opine that, learning is a change in human disposition which persists over a period of time and which is not simply ascribed to the process of growth. Gagne (1997) also added that, the change must have more than monetary permanence and it must be capable of being retained over some period of time. Learning must be distinguishable from the kind of change that is attributed to growth. It is the activity of the child and the teacher that is sustaining changes occurring in behaviour as a result of experience.

Obanya (2012) also noted that the success of every education process depends on the wisdom and knowledge of the teacher and on the teachers' sensitivity to the students. No education system can rise above the quality of the teachers. It is therefore necessary to consider the quality of teachers in every discussion concerning education. A qualified teacher is one that has the minimum condition and certification for entry into the teaching profession. In Nigeria, the minimum condition is the possession of the Nigeria Certificate in Education (NCE). A competent teacher is one who has mastered the art of teaching, while an efficient teacher is one who can apply the art of teaching as instructed. An effective teacher is one who applies knowledge of the arts of teaching creativity and consequently in maximizes student learning.

Akpombo (2002) also stressed the importance of training and development of human resources, that the university system worldwide is regarded as the citadel of knowledge, the fountain and foundation of intellectualism, the most ground for the intellectual incubation of leaders of tomorrow, and the greatest apparatus of socio-economic development in any country. A system which certifies only competent students in character and learning should have lecturers who are equally well developed, trained and retrained academically and professionally.

Kulwart (2000) also stated that the vast reservoir of human talents could be harnessed to achieve industrial objective through developmental programmes. Developmental programmes make human resources

adapt to the changing technological improvements. Development programmes which comprises planned development and training extends to every process of management to improve the role of a manager, his interactions with the group and his ability to get things done through the group. Formal and informal development of people would be positive through well planned and executed development programme. Human resources development approach involves policies which will be useful in providing satisfactory work, enhancing opportunities for career growth and in reducing the sense of frustration among human beings.

Peretomode and Peremode (2005) also noted that human resources development are planned activities that focus on increasing and enlarging the capabilities of employees so that they can successfully have greater or assume higher position in the organizational hierarchy to better handle current responsibility. It is greatly acknowledged that quality education is crucial to national development.

The success and development of every educational system as in any organization depends the quality of its human and material resources. Of all these factors, the human resources appear to be the most important because without it, all other factors are inept. Human capacity development hinges absolutely on the educational system and of course teachers are the pivot of the education system. Teachers being at the centre of teaching and learning process need to be adequately prepared and exposed to a continuous professional development and training programmes to enable them be more productive and adapt to the changing world of teaching and the highly competitive and globalized economy. Human resources development is the frame work for helping and developing employees to develop their personnel and organizational skills, knowledge, abilities and the work attitude that will elicit sustainable development.

Environmental factors affect teaching and learning in Nigeria. Environment means different things that we come across, handle and observe around us. They include the various amenities that are around us in our homes, schools and the community where we are located. The environment moulds our lives, determines what we learn and how we learn it and also helps in shaping our behaviour. In the process of education, a child is influenced by the home which is the child's first window to the outside world, peer group members, relatives, the culture of his/her immediate society and most especially by his/her school environment. School environment has variously been described as one important factor that affects the school system greatly.

CONCLUSION

Higher education impacts indebt knowledge and understanding so as to advance the students' new frontiers of knowledge in different works of life. It also helps students to develop the ability to question and seek truth and makes them competent to critique on contemporary issues. It also broadens the intellectual powers of the individual within a narrow specialization (subject domain) but also gives him or her a wider perspective of the world around. It can also be deduced that the quality of higher education in any nation determines the quality of capacity development of human resources, entrepreneurs and quality assurance in a country that elicit sustainable development globally. Thus, higher educational institutions provide an entrance ticket to the upper class of society and serve as the main innovators and disseminators of specialized or sophisticated knowledge required for the functioning in modern society.

Government, parents and stakeholders in education should ensure adequate provision of infrastructures and facilities to cater for the explosion in students' enrolment in our schools.

RECOMMENDATIONS

- Human capacity development hinges absolutely on the educational system, without it, all other factors are inept. This is why teachers in higher education should be exposed to a continuous professional development and training programmes to enable them to be more productive and adopt to the changing world of teaching and research in the highly competitive and globalised economy.
- Government should provide adequate teaching materials for effective teaching delivery in universities.
- University management should ensure proper supervision and motivation of academic staff for effective job performances in universities in Cross River State.
- University management should improve on academic staff management to promote the quality of the staff understanding their jobs' responsibility, improve the quality of lecturers through conferences/workshops and improved skills among lecturers for quality teaching.
- Building deficiencies impair the quality of teaching and learning and contribute to health and safety problems of staff and students. Efforts should therefore be made to improve on the condition of school buildings, where staff and students spend the majority of their educational experience by these concerned.
- Adequate fund must be made available and must be

expended appropriately. All stakeholders must be involved in funding education; parents, guardians, the society in general, the private sector and non-governmental agencies.

- It is critical to develop strategies to encourage cost sharing between government and stakeholders. Therefore, developing incentives to attract private sector participation in education and training as well as evolving strategies to sustain mutually beneficial school-community partnerships, are also necessary and important.
- Government should establish clear policies, laws and regulations to guide public-private partnership in educational funding. There is also the need for instituting effective means/strategies of keeping proper accountability of funds allocated.

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FUNDAMENTAL ISSUES IN THE MANAGEMENT OF SECONDARY EDUCATION IN NIGERIA

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ABSTRACT

This paper x-rayed the fundamental issues in the management of secondary education in Nigeria. It sought to examine the roles of government, teachers, school heads and provision of infrastructural facilities in the management of secondary education in Nigeria. Because a well-focused and defined pattern of educational system that is all embracing that is fashioned and well-developed can lead to goal actualization; considering the fact that whenever developed minds talk about development in the society, they also talk about the role of education and training in building people's productive capacities to stimulate, strengthen, spread and sustained growth. Therefore, viable suggestions were made with a view to sustaining and enhancing qualitative secondary education, believing that all the stakeholders in education will synergize efforts to curb the menaces of decadent issues in educational management.

KEYWORDS: fundamental, issues, management, secondary and education.

INTRODCUTION

Education is generally acknowledged to be means of empowering an individual through the acquisition and utilization of knowledge and skills to enable him/her become useful to himself/herself in the community. Nwadiani (2000) acclaimed education as a magic wand for the solution to the problems that plague mankind. Education therefore is the aggregate of all processes by means of which a person develops abilities, attitude and other forms of behavior of positive value in the society in which he lives. Hence, in Nigeria, there have been introduction of a series of "targeted" forms of education such as Education for development, Global education, Education for peace and human rights, Education for women, Education for citizenship and so on. Secondary education plays important roles in the actualization of making an individual self-reliant and developing the nation. Hence, over the years, many secondary schools were opened and the existing ones were expanded in availability of infrastructure, so as to provide the formal education needed for the secondary school going age. When the issue of producing qualitative secondary school leavers comes to mind, the need for qualified, efficient, dedicated, experienced and effective teachers cannot be over-looked. However, these schools can achieve nothing without qualitative and efficient teachers, as well as a vibrant and result-oriented secondary school system.

Government purported huge capital outlay on human capital formation and capacity building for increased job performance for teachers and enhanced secondary school system in Nigeria seem not to be yielding the expected results. Perhaps, governments lip service on enhancement of teachers remunerations, infrastructural development, welfare package (which includes teachers' hazard allowance), and other acclaimed incentives are cosmetic. Heads of schools who are commonly referred to as school managers are allegedly made to bear the brunt of the government's ineptitude, although they have their own share of the blame. Management of secondary schools has involuntarily come under focus by stake holders of education as the bane of pragmatic secondary school education. Parents, students and other stakeholders may only maintain a stance of simulated innocence but could also be blamed in their respective concerns. It is against this backdrop that this paper seeks to elucidate the fundamental issues in the management of secondary education in Nigeria with a view to proffering suggestions that will help advance the prospects of secondary education in Nigeria.

Obviously, there appears to be a plethora of fundamental issues that will come to the fore when the problems of management of secondary education are to be examined. For the purpose of sequence and clarity, these issues will be discussed under the following sub-

headings: the role of government, teachers, students, parents, etc. To this end, there is need to accelerate, spur greater integration, encourage and also create socio-economic environment that is more lenient, increased access to knowledge and skills-training will be essential in the process of improving productive capacities that can be sustained and lead to national development and transformation.

CONNECTING EDUCATION WITH SUSTAINABLE DEVELOPMENT

All the foregoing complex interrelationships call for a restructuring of education and technology in such a way that the coordinating unit such as “Ministry of Education, Innovation and Technology” to replace the traditional stand-alone Ministry of Education. This paper is responsible for harnessing basic education and entrepreneurial innovations and then connecting them with the other socio-economic and environmental segments of the society. This restructuring becomes necessary because of the much discussed disconnection between education and the labour market on one hand and between school management transformations in Africa with special reference to Nigeria. Babalola (2013) asserts that development is concerned with the transformation of the individuals, households, communities, private as well as public institutions through building of human capacities to ensure that available resources are properly managed and directed towards societal and economic improvements. Sustainable development connotes the ability to keep going and keep up the progress made in the social,

economic and ecological segments of the society without making the future generation worse off. Stiglitz (1998) introduces the concept of structural transformation to the definition of development by saying that: Development represents a transformation of society, a movement from traditional relations, and traditional ways of dealing with health and education, traditional methods of production, to more “modern” ways. The changes that are associated with development (that) provides individuals and societies with more control over their own destiny. (And that) enriches the lives of individuals. Moreover, World Bank (2003) asserts that “development is sustainable if it “meets the needs of the present without compromising the ability of future generations to meet their own needs”. This paper is significant in creating networks for researchers, policy makers, business community (responsible for tapping, creating ideas and technologies used for balanced socio-economic metabolism; therefore, an increase in investment in rural, urban/vocational training will enable young people to acquire the skills needed to succeed in education industry as this is centered on development and sustainability.

Efficient management of education means efficient management of the economy such that wealth of the nation could be made to translate to people’s welfare through adequate investment in health services, education services, enabling environment and employment opportunities to ensure maximum contribution of skilled labors to National productivity and the growth of the society.

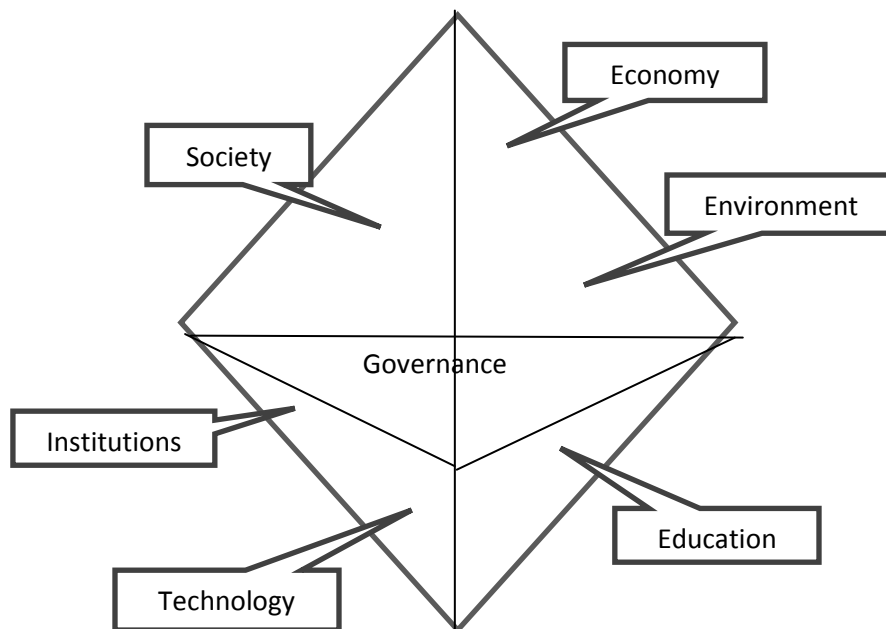


Fig. 1: Education and technology for Sustainable Development.
Source: Scoullas (2007).

Fig. 1 clearly spells out the place of education and technology as tools for sustainable development as tools for sustainable development. The model is made up of two pyramids in which the upper one contains the three pillars of sustainable development while the lower portion is made up of three tools that can be used to address challenges of socio-environmental impacts of economic activities involved during the process of structural transformation of a society. The basic thrust of the concept is that social institutions including institutions of learning (through their curricular, teachers and learners) should endeavor to educate (in attitude, skills and knowledge) the society to attune (in everyone's consciousness and mentality) to the fact that the environment whether renewable or non-renewable is the source of the national wealth and that some irreparable damages could be done to this important root of wealth.

THE ROLE OF GOVERNMENT

Perhaps, one of the most important issues that agitate the minds of stakeholders' in secondary education is that of government policy in relation to the secondary education system. These issues include prompt payment of salaries, refusal to implement approved wages and salaries as outcomes of negotiations, supervision of schools, recruitment policies, reward structure for hard work, politicization of the education sector and advancement of car loans to the teachers (Omorogbe, 2013). The above list is by no means exhaustive but they represent core areas where government has failed to live up to its responsibilities.

Government appears to be paying lip service to funding of secondary education in Nigeria. International benchmark on the percentage education to be received in relation to the total national budget is estimated to be in the neighborhood of at least twenty six percent (26%). It is sad, yet true, that budgetary allocation to education in Nigeria over the last two decades to be specific is a far cry from this benchmark. No doubt, the quality of education a nation can provide her citizens is a function of the funding profile accorded the education ministry at all levels. Nigeria has not done much in this regard (Omorogbe, 2013). Therefore, government's lip service to education portrays an outward demonstration of commitment that may be seen to be there, but a closer perusal reveals yawning gaps that are craving for serious attention.

Furthermore, government's inability to accord teachers their rightful place in society and implement policy decisions that are capable of enhancing their living standards is an important issue in the management of secondary education in Nigeria. By virtue of the various roles the teacher plays in the community, almost every

school child and most members of the community where the school is located knows him. As the mainstay of the educational system, the teacher promotes the teaching learning process in various capacities as an instruction counselor, researcher, friend and innovator. To enhance the quality of education therefore, adequate provisions should be made by the government for the production of highly motivated, dedicated, devoted, respected and competent teachers who can fit adequately into the social life of the school, community and the society at large. This can be realized only, if both the government and the general public recognize the job of the teacher as being crucial for the survival of the individual and development at large and to give him the social recognition he deserves (Ehiaguina, 2009). The government seems to fail to accord teaching the befitting status of a profession; hence the shoddy way and manner in matters affecting the profession are treated.

Underlining the importance of teachers and the need to retain them in the secondary schools, Fagbemiye (1998) put it succinctly that any mention of falling standard of education should seem facile without tackling the root cause – the public image of teachers, the untold consequences of teachers' poor self-image, confidence, the related problem of teachers and effectiveness. Notable Nigerian researchers like Ukeje (1992), Ogunu (1998) and Adesina (1982) all attributed the high attrition rate and seeming instability of the teaching service to poor salary, low public image, poor retirement benefits and poor conditions of service, which are all predicated on government's irresponsible attitude to teachers and the education system.

Although, the secondary school system is expensive to keep afloat, quality however, in any form is partly a function of the total funds made available by government to the system and judiciously utilized for the purpose to which is meant for. Funds are required and necessary to maintain both the human and material resources of the system in order to achieved desired goals. Also, there is the need for an effective monitoring of management of funds presently being allocated to the sector, as effort should be intensified to improve on what is currently being allocated to the system.

THE ROLE OF TEACHERS

The most important person in the curriculum implementation process is the teacher. With their knowledge, experience and competencies, teachers are central to any curriculum improvement effort. Teachers are the most knowledgeable about the practice of teaching and are responsible for introducing the curriculum in the classroom. Since implementation takes place through the interaction of the learner and the

planned learning opportunities, the role and influence of the teacher is indisputable (Eimuhi, 2014).

When the roles of teachers are critically viewed against the backup of socio-economic development and capacity building for increased job performance, the need for highly qualified experienced, dedicated and efficient crop of teachers needed for the effective management of secondary education cannot be over-emphasized (Ehiaguina, 2009). In spite of the large numbers of teachers so far produced by the various teachers' institutions and the enormity of teachers absorbed over the years, it is baffling to observe the number of teachers in the teaching profession is still grossly inadequate.

The shortage of qualified and experienced teachers who should have brought about the realization of the laudable national education objectives in our secondary schools gives cause to worry because it is at the secondary level that career decisions are made by young graduates. When the idea of producing qualitative School leavers comes, the notion of having adequately qualified and experienced teachers cannot be overlooked because without them, there can be no qualitative education. At present, not only are the teachers insufficient to meet the management needs of the secondary school system, the few ones already there are allegedly leaving the system. As reported on page five of the Nigerian Tribune of August 12, 2008 under the caption "Government needs 39,239 teachers yearly," it was stated that "both the state and federal governments needs to recruit 39,239 qualified teachers annually into the secondary school system for the next eight years to set up the standard of education ... it required the commitment of the state government to hire qualified teachers to fill emerging vacancies..."

The present staff strength in the secondary school system could be attributed to the attrition of the available teachers to other sectors that are deemed more economically viable; thus the teaching profession being used as a stepping stone to other professions. This may account for the decline in the level of personal discipline amongst teachers in schools. Indiscipline among teachers can be manifested in absenteeism, lateness to school, I –don't care attitude to assigned tasks and general lack of enthusiasm among such teachers. There is also the problem of limited level of exposure of some secondary school teachers, arising from their inability to network with other colleagues within and outside the shores of their localities, local government and states. This situation could be more disturbing when many teachers have not attended any workshop, seminar or development programme since recruitment into the teaching profession. Training is

organizational effort aimed at helping an employee to acquire basic skills for the efficient execution of the function for which he was hired. It is all about learning and planned or structured activity or approach that is designed to help an individual or a group of people to do different things. Such trainings include all activities engaged in by professionals (teachers) during their service and these activities are designed to contribute to professional improvement.

In fact, the quality of teachers at the secondary school level is an important management issue. In terms of numerical strength, it can be argued that there are more teachers in schools now than in those days that standard of education was adjudged very high. However, majority of those who were the miracle workers in schools in the 1970s and 1980s have retired from service. The ability of some teachers in our secondary schools in Nigeria is declining. Many factors are responsible for this phenomenon but one that needs to be given attention here is the part time programme syndrome. In my view, all that relate to this programme in relation to full time courses of study is in short supply and deficient whether in the area of contact hours (lectures), assessment during examinations, project writing etc.

However, in loco-parents, i.e. poor parenting, not in the sense of home experience but in teachers' unwillingness to accept they are parents by virtue of their roles in the school system, is also an issue. No sane parent will watch his/her child drifting into destruction without concern. A teacher is a parent in school and so, must strive to give such care to students who need attention in school.

THE ROLE OF SCHOOL HEADS

The principal maintains a school tone and culture that create the climate of social responsibility. Effective curriculum implementation does not take place in a school where the principal is incapable of executing supervisory functions. (Eimuhi, 2014).

The administrative style of some school heads is an important management issue. Some school heads see themselves as bosses, not first among equals. Some heads adopt the autocratic leadership style and therefore nucleate a reign of terror on the teachers in their circumstances and may work in fear and subdued silence. Some school heads may use laissez-faire or participation leadership styles. Suffice it to depose, however, that the type of leadership style that is adopted by the school head has an impact on this managerial efficiency. Ideally, an educational manager as a formal leader in the school plays a key role in developing teachers' identification with the school and its goals.

The adoption of these characteristics will help the school head to motivate teachers and other staff members not only to participate in the school activities, but also to commit themselves to the life of the school.

According to Hoy and Miskel (1991), the greater inducement pattern created by the school leader, the more committed teachers and other staff members will be to the school. It is therefore, expected that the leadership behavior of the education manager will be a force in the generation of teachers and other staff members' commitment. Schools that are led by leaders who provide structure, resources, considerations, influence, professional support, work facilitation and non-controlling and manner should be the work place that elicits teachers and other staff members' commitment to the school system.

More so, lack of accountability and transparency as core elements in the value system in present day Nigeria, which has crept into the education sector, is also a management issue. Subventions and other collection are allegedly not adequately accounted for by school heads (Orboh, 2010). However, undue involvement in politics of the days by school heads without being mindful of the fact that they belong to a calling that is divinely set apart for the advancement of humanity. As mentioned earlier, the quality of school administrators have decline too. Some principals, do not reside in localities where their schools are situated. Some access their schools at most twice and thrice weekly. This kind of attitude has far-reaching implications for the entire school system and academic performance as a whole.

PROVISION OF INFRASTRUCTURAL FACILITIES AND MANAGEMENT

Facility management (FM) is an interdisciplinary field devoted to the coordination of space, infrastructure, people and organization, often associated with the administration of office blocks, arenas, schools, convention centers, shopping complexes, hospitals, hotels, etc. However, FM facilitates on a wider range of activities than just business services and these are referred to as non-core functions. Many of these are outlined below but they do vary from one business sector to another. In a 2009 Global Job Task Analysis, the International Facility Management Association (IFMA) identified eleven core competencies of facility management. These are: communication; emergency preparedness and business continuity; environmental stewardship and sustainability; finance and business; human factors; leadership and strategy; operations and maintenance; project management; quality; real estate and property management; and technology. FM is subject to continuous innovation and development, under pressure to reduce costs and to add value to the

core business of the client organization where possible (Mudrak, Wagenberg and Wubben, 2004). No meaningful teaching and learning take place without adequate resource materials e.g. whiteboards, flip charts, simulators, models etc. The availability and quality of resource material and the availability of appropriate facilities and personnel such as teachers, administrative and technical staff has a great influence on curriculum implementation in the secondary schools.

Decayed infrastructure is another management issue in secondary education. A visit to some schools especially in the rural areas, reveals that a number of classroom blocks which was in use in the 1980s have either their roofs blown off, or are now in the bush due to lack of care and attention. Although the situation has improved slightly in some states, we are yet to get to the Promised Land. There is also the issue of teaching/learning resources. Many schools lack modern chalkboard, libraries, sporting facilities, desks and chairs, water supply, electricity, laboratories, workshops, reagents/chemicals, internet facilities among others. (Omorogbe, 2013) The absence of most of these basic facilities has resulted in poor academic performance in most schools.

CONCLUSION

For an educational system to be classified as functional and effective it must be all encompassing, all embracing and should be fashioned out and well- developed. The struggle for the restoration of Secondary education in Nigeria to its rightful place is worthwhile. It is however, the submission of this paper, that all the stakeholders in the education industry – government, school heads, teachers, students and parents are joint collaborators in the decline observed in the educational standard in the country today, with the government playing a leading role. Therefore, in order to elucidate these fundamental issues, there is need for synergy of the afore-mentioned stakeholders that will culminate in chasing away the decadent issues in the management of Secondary education in Nigeria, so that what is learnt in the school can be made to translate to sustainable creation of wealth in the society.

RECOMMENDATIONS

In view of all that has been discussed so far, the following measures are suggested in order to redeem the dwindling of the academic performance and management of the secondary education in Nigeria. There is need for a total turn around in terms of government's attitude in the area of policy implementation towards Secondary education. Government should stimulate the growth and increase in education industry as well as effective management so

as to achieve the desired goals. As a matter of urgency, attention should be paid to these issues:

1. Revitalization and restructuring of ministries of education particularly, the inspectorate wing. There is need to invigorate this arm so as to forestall undesirable practices and restoring core professional values in schools.
2. As a matter of priority, there should be prompt attention to academic issues and challenges before they go out of hands such as;
3. Prompt payment of teachers' salaries
4. Prompt implementation of resolution relating to wages and conditions of employment.
5. Due process should be followed in matters relating to discipline of teachers and students.
6. There should be massive infrastructural development in rural and urban schools.
7. Need for attitudinal change among teachers so as to be punctual, disciplined and committed to their jobs.
8. Finally, there should be massive recruitment of teachers across subject areas or specialization at the Secondary School level.

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NATIONAL CAPACITY BUILDING STRATEGY IN LEARNING AND TEACHING IMPERATIVE FOR SUSTAINABLE DEVELOPMENT OF NIGERIA EDUCATIONAL SYSTEM

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ABSTRACT

This paper discusses the issue of National Capacity Building Strategy in Learning and teaching in Nigerian Schools. The focus is on secondary school education system. The paper recognises quality education as one of the most widely used and spoken of concept in Nigeria. However, in Nigeria today, there is mounting concern about the state of schooling at all levels. It is in line with this that the paper looks at various strategies which can build up capacity for teachers as the major stakeholders in education. Four questions raised were answered as to the capacity strategies such as training and re-training of teachers, improvement for self development and for improvement in teaching. The use of inspectorate division from the Ministry of Education to supervise teaching and learning in the school. The need to utilise Information Communication and Technology in teaching and learning in the schools, imperative for sustainable development of the nation's educational system. The need for curricula innovation reform to meet the societal needs in this 21st century, these are also discussed. Conclusion and recommendation were made. This includes, increase in financial allocation to education sector so as to provide necessary infrastructure for teaching and learning. Regular re-training of teachers to meet the demands on them in terms of adaptability to modern trend of teaching. Provision of Information Communication and Technology tools for teaching and learning in all schools in Nigeria.

KEYWORDS: capacity building, inspectorate division, supervision, re-training of teachers, teaching and learning

INTRODUCTION

Education plays vital roles in the development of every nation. It is the bedrock of societal development, hence every society strives to invest huge resources in education in order to enhance socio-political, economic and technological advancement that will put it on a pedestal to compete favourably in the global Arena (Ajayi 2011). The quality of education of a country is crucial to its development as it forms the basis for human capital development and facilitates socio-economic empowerment of the citizenry.

Babalola (2011) noted that the world today is characterised by post industrial knowledge, digital and technological resolutions, universal declarations, appearance of powerful scientific policy documents, emergence of neo-liberal policies in form of globalisation and democratisation and changing structures of employment and labour market. All these propel industrial development in the global arena. The revolutionary dynamics worldwide now as X-rayed by Babalola (2011) are anchored on quality education (Ajayi, 2014) noted.

In realisation of the fact that education is a veritable tool for achieving the objectives as a nation, the Federal Republic of Nigeria stipulated in her National Policy on

Education (2004, P3) that education is to bring about the acquisition of appropriate skills and the development of mental, physical and social abilities and competencies as equipment for individual to live and contribute the development of the society. Education is rightly recognised as 'an instrument per excellence' for affecting national development. For Education to contribute effectively to the development of any nation the citizen must have access to quality education. Quality in the sense of preparing the recipients for technical and vocational competence that will make the individual child to be self reliant. The quality of output of education of a nation depends on the quality of teachers/instructors, facilities/equipment quality books, computers/ICT, resource centers and funds.

Recognising this, the Federal government mandated each state government to set standard for the establishment of schools. Among the conditions prescribed are teacher/student ratio of 1:40 and 1:20 for practical work in technical and vocational education. A teacher qualification of not less than the Nigeria Certificate in Education (N.C.E.) for junior Secondary Schools and Bachelors Degree for the Senior Secondary Schools. Well equipped laboratories for science subjects et cetera. The extent of the level of compliance remains

a major question that requires a clear and empirical answer.

The importance of the quality of teachers in qualitative education is well documented in research. Olaleye (2011) noted. For instance in teachers' quality and student achievement, it was found that teachers characteristics such as certification and degree in the field to be taught are very significant and positively correlated with student outcomes. Teachers can be seen as the prime mover in the development of optimum conditions for learning. They control many of the qualities that make a good climate for learning within the classroom. It has however been observed that for over a decades in Nigeria, especially in the secondary education, parents, the media and the international communities that graduates in Nigerian schools are of poor quality. Poor performance of students in West Africa Examination and National Examination Councils, were recorded over the years.

The National Economic Empowerment Strategy (NEEDS) (2004) aptly describes the appalling state of education in the country. The delivery of education in terms of teaching and learning has suffered from years of neglect, compounded by inadequate attention policy frameworks within the sector. Inadequate funding, lack of conducive physical facilities, poor curricula that could not meet the challenges for sustainable development of the Nation in this 21st Century.

It has since become an undisputable fact that education is the most potent instrument for national development anywhere in the world and in whatever political system. Yet in some of the developing polities where neo-colonisation has dominated the general trend of development, cognisance is not usually taken of the salient fact that well trained teachers are indispensable for maintaining the standard of education.

The apathy displayed by teachers to the teaching profession, lack of opportunities for professional growth, lack of self confidence have relegated teachers to background (Obanya 2004). This has grossly affected teacher's performance on the job and consequently student achievement.

The recently released Senior School Certificate Examination (SSCE) results of May/June 2014 showed that only 529,425 representing (31.28%) of those who sat for the examination obtained credit possess in five subjects including Maths and English language (Daily Trust). Adesulu (2014) noted that the recent statistics released by the two examination bodies show that the quality of teaching and learning in schools have continued to wane at an alarming rate.

This result when compared with that of 2012 and 2013, there appears to be a steady increase in the failure rate. While 649,156 candidates representing 38.18% obtained five credits with English language and Mathematics in 2013. It was 36.57% in 2012 in other word. 61% failed in 2012, about 63% in 2013 while about 69% failed in 2014.

In 2009, it was only 25.99% candidates who obtained credit passes in English language and Mathematics (Nwadike 2010) noted. This poor result was also reflected in National Examination Council (NECO). News Desk (2010) reported only 11% (126,500) candidates out of a total of 1,184,900 passed with five credits including English Language and Mathematics. This indicates an urgent attention is needed to the education system in the country. What could be identified for the rising failure is low quality of teacher earlier discussed, School Curricular, Poorly Trained Teachers, lack of Textbooks, Poor Teaching and Learning, lack of adequate Infrastructural Facilities just to mention a few. These identified reasons need National Capacity Building for Sustainable Development of Nigeria. This paper therefore aimed at discussing the strategies needed for building capacity in Teaching and Learning. This paper will be discussed under the following sub-headings.

- The teacher as educator
- Strategies for provision of adequate physical facilities in schools. (This would facilitate teaching and learning)
- Provision of quality books, teaching aids, library in schools.
- Capacity building for improved school curricular that would prepare the youths for the world of work for Entrepreneurship Education.
- Quality management of School that would involve capacity building for school inspectors for efficient monitoring of Teachers.
- Capacity building for school administrators or school managers for effective utilisation of school fund and school supervision.
- Capacity building in the use of (ICT) computers for teaching and learning in the school.

This will be discussed as follows:

The Teacher as Educator

Wilson (1973) defines the teacher as a person who helps another person to learn something more quickly and easily than the learner could by himself. Teacher therefore is the one to introduce the learner into the formal world of learning. This require the most comprehensive education and pedagogical training, the most effective communication skill, the most balanced temperaments, the largest variety of useful instructional

materials and the equipment and the most conducive work or training environment to make the most important task of education effective.

In the National Policy on Education (2004), Teacher education and quality of teachers have been given special recognition. This is in relation to the fact that no education system can thrive without planning and developing the teachers who are to mend the minds of the young ones, children and youths. Teachers at all levels are very important in the overall development of any nation hence the quality of any educational system depends to a great extent on the quality of teachers. This is in terms of academic, professional qualification and experience as well as their level of competency. Unfortunately qualified teachers are grossly inadequate (Ogbuka 2000) noted.

At present the poor academic performance of students could partly be attributed to the poor quality of teachers in schools. The quality of teachers determines the tempo of the society and the quality of people educated for such a nation as (Fafunwa 1974) noted. Capacity building for teachers is imperative for effective teaching and learning in the classroom. The questions raised by this paper are:

1. What are the capacity building strategies needed for effective teaching in the school?
2. What are the capacity strategies needed for learning in the schools?
3. To what extent are teachers trained to meet 21st century challenges of teaching and learning?
4. To what level are teachers exposed to the use of Information Communication Technology for effective teaching in the schools? These research questions will be answered in the paper.

To answer question one,

In-Service Training

1. In-Service Training for Teachers is a process for continuous updating of teachers knowledge, skills and interests in their chosen field or profession. It is part of staff development programme which is organised for teachers. Adesina (1988) refers to it as human resources development programmes which are ways to improve the qualitative and quantitative contributions of human resources to the overall goals of the systems.

It is training and re-training capacity building for teachers that will help to acquire skills and competence for increased efficiency. It has been observed that several products of Colleges of Education in Nigeria were stunted academically and professionally. Hence

these teachers need to be retrained for effective teaching and learning in the school.

In-Service training could be in form of workshops, conferences, seminars, demonstration lessons and refresher courses. They give teachers opportunities to be abreast with new ideas in teaching, knowledge, concepts and skills on educational issues and practices, when they are in contact with other educators. They shared knowledge and skills. Principals, Ministry of Education officials, State Government, Local and Federal officials should endeavour to sponsor teachers to undergo these training programmes, participate in Seminars and Workshops where new knowledge and ideas are disseminated.

Professional conferences can be organised for secondary school teachers. This will help to improve their knowledge and skills in teaching. Teachers can also join professional Associations and present papers for the journal of the associations. In this way teachers will be abreast of time and contribute meaningful to National Development.

Naturally, the Federal Government has tried to organise training and retraining programmes for Universal Basic Education teachers. The re-training programme should cut across all the entire system of education including the secondary school teachers and university teachers.

Another strategy for National Capacity building for teaching and learning is supervision of schools by the Inspectorate division of the Ministry of Education.

2. Supervision of Teachers by School's Inspectors

Supervision of Teachers is a way of improving teaching and learning in the school to assist teachers in classroom management. Olele (1995) noted that Supervision makes the incompetent teachers confident and competent. Educational system can be said to be reliable in terms of the quality of teaching, the teachers are able to deliver to the pupils. Supervision therefore is one of the broad tasks of educational administrators to maintain and promote the effectiveness of learning and teaching by working directly with teachers (Udoh and Akpan 1990). Supervisory strategies for improving instruction are:-

- The pre-visit conference
- Classroom observation of teachers
- The Post visit conference
- Collegial/Supervision
- Workshop Technique
- Micro-Teaching Technique

Classroom supervision is a technique whereby the supervisor visits the school in order to observe the quality and quantity of instruction that is taking place. The supervisor focuses on planning and preparing of lesson plan. He observes the teacher in action while teaching and therefore makes recommendation that would facilitate professional competence in teaching.

Collegial Supervision is another strategy whereby teachers are involved in supervision of each other. The strategy may be used to reduce stress and tension among teachers. The strategy will also assist teachers to learn more because nobody can claim to be master of all.

Workshop Technique:- This method involves organising various educational workshops for the purpose of teaching and learning conditions. During the workshops, new discoveries are put into consideration by the facilitators and the teachers are encouraged to update themselves with the new discoveries. The new discoveries might be used for sustainable development of the nation's educational system.

Micro-Teaching Techniques is a method whereby the teachers partake in actual teaching using the colleagues rather than using the pupils for the exercise. The strategy helps to identify the weakness and strength of the teachers involved. Micro teaching technique has become one of the recommendation means by which supervisor helps new professionally weak teachers to improve their teaching skills. Supervision therefore is an important component of quality control strategy in education that would ensure the maintenance of high standard in the Nation educational system.

Capacity Building for Teachers in the use of Information and Communication Technology (ICT) in Teaching and Learning

Effective teaching is paramount when we consider teaching and learning as the acquisition of knowledge and skills to enable one become a more useful member of the society. Teaching embraces forms of process behaviour and activities which do not succumb to explanation by a single theory (Olorundare 2006). Teaching therefore is a dynamic process in education. In the classroom situation, Information Communication technology (ICT) has been noted as indispensable tools for effective teaching and learning. The use of ICT in classroom situation sees the teachers as facilitators rather than dispenser of knowledge. It is therefore necessary to embrace the use of ICT in teaching and learning so as to avoid being eliminated from the global village of internet and intranet. ICT are tools that are necessary in all educational institutions that is, from primary, secondary and tertiary institutions. The tools comprise electronic devices such as computer (hard and software) networking, telephone, video, multi-media, the internet services, television, satellite discs, photocopy, CD-Rom, Fax machines and so on. In the

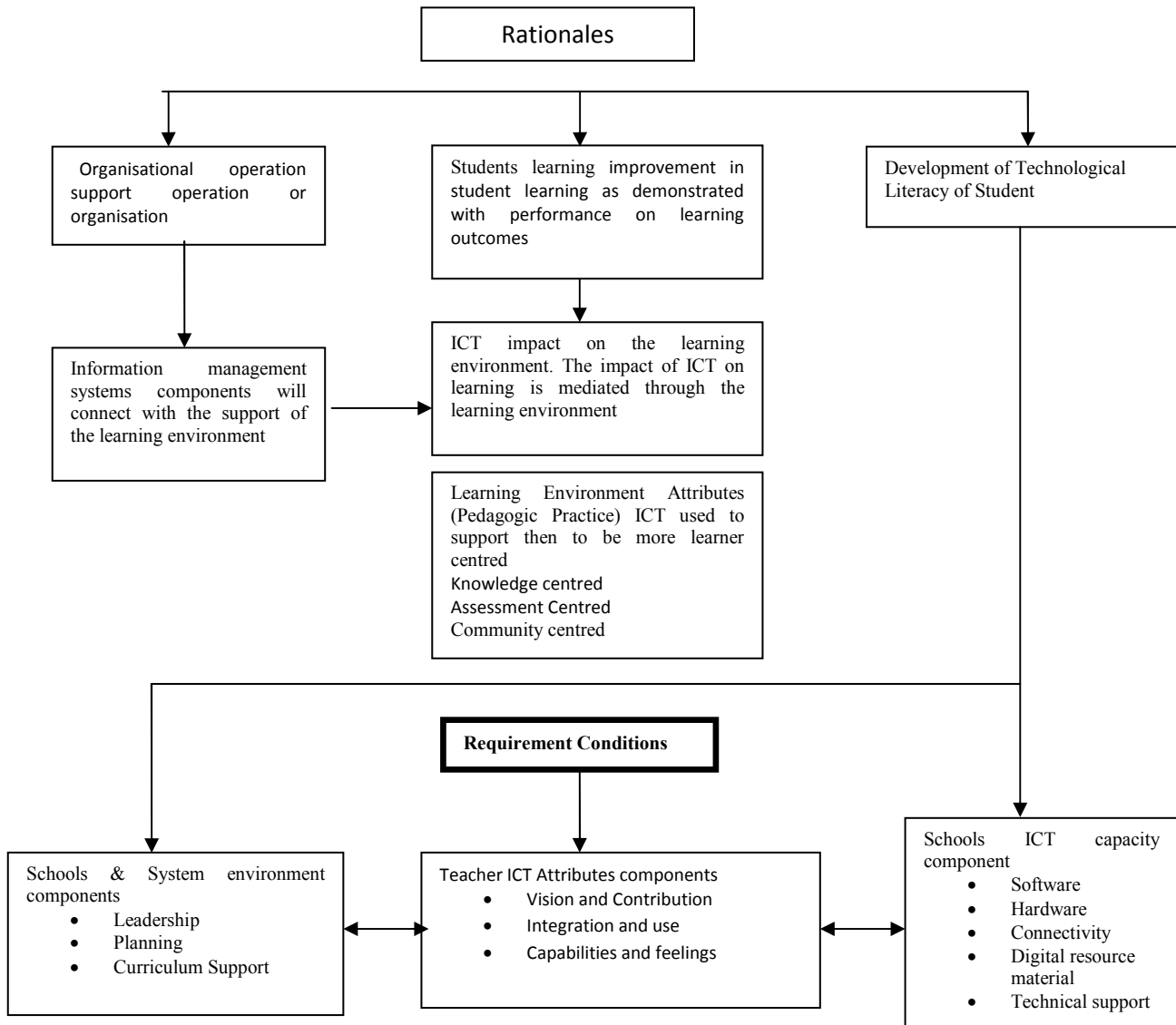
classroom situation utilisation of ICT tools for teaching and learning is imperative. Nwankwudo, Oguejiefor and Nwankwo (2006) noted that ICT provides students and teachers with practical and functional knowledge of the computer. Classroom teachers are expected to adequately equip themselves with professional skills in ICT.

A Schematic representation of the relationship between the uses of ICT in schools is provided in the following diagram.

The diagram highlighted the rationale behind the use of ICT in schools with much emphasis on teaching and learning process. The need for teachers and students to be computer literate through integration and the use of computer is shown. The need to provide schools with technical staff and computer tools is also highlighted. This will improve teaching and learning in the schools system. Other areas of ICT utilisation include evaluation of learning outcomes and classroom management. ICT facilities could be used to prepare lesson plan, write students' reports, store data, collect and analyse students' achievements, recent research findings in any particular subject area could be easily obtained through the internet and e-learning. This does not only bring about improvement in what is taught in the classroom but also encourage personal and professional advancement.

Over the years, The Federal government's intention has been to provide ICT facilities in schools (FRN 2004) but this has not been realised. Teachers are not adequately well exposed to the realities of ICT tools and skills that would assist them in teaching and learning. For instance, in Kwara State, only nine out of the 235 existing public secondary schools offer computer education up till JS3 (Alabi 2001). Before 2009 no public primary and secondary school in Nigeria had computer studies in their curriculum nor in schools timetable (Onuma 2007) opined. Only private schools offered this course for their students. The issue of utilisation of ICT by teachers should be of paramount importance to school administrators, State and Federal government if Nigeria is to attain educational growth in the Committees of Nations. More so management of Secondary education is becoming complex as a result of increases in student enrolment as well as the multiplicity of academic programmes which have made teaching and learning difficult for both teachers and students. Hence capacity building in the use of ICT for effective teaching and learning is imperative

ICT IN SCHOOLS



Source: Adapted from Teachers ICT attributes (2002) Framework Newhouse, Trinidad & Clarksor

In a study carried out on utilisation of the ICT in one of the states in Nigerian by Olaleye and Oyebanji (2010). Findings showed that computer and all allied tools were not available in the schools and teachers do not have access to computer training. Hence 50.09% of them play avoidance technique. They are unwilling to change and this prevents full integration of ICT in their classroom. Capacity strategies that are therefore needed are mandatory training and retraining in ICT programmes. The trainings should be in form of workshops, conference and seminar. Adequate infrastructural facilities for ICT workshops should be provided in schools across the country. ICT instructional tools for teaching and learning should be made available for

teachers. ICT instructors are needed to train teachers. These instructors should be employed to train teachers during the organised workshops and Seminars. Adequate funding and investment in Information Communication Technology (ICT) are necessary for effective teaching and learning. There is need for effective computer based data collection and data analysis for educational planning in Nigeria (Omekwu 2003). Teaching and learning process need to be technologically updated. Hence capacity building is needed for ICT instructors in schools. Poor funding of schools, teachers resistance to change, poor power supply were some of the factors militating against the use of ICT equipment and facilities for effective

teaching and learning in the schools. (Olaleye & Oyebanji) 2010

The facilities needed for ICT should be adequately provided for sustainable development of the country. Basically schools are re established to fulfil the educational goal of teaching. In order to achieve this goal, the three components of production human, finance and material resources must be present and harmoniously managed within the school system (Sahon 1998). No meaningful teaching and learning can take place without school facilities. School facilities are material resources that facilitate effective teaching and learning in schools. The quality and quantity of school facilities such as classrooms, offices, libraries, furniture, laboratories etc enhance the quality of teaching and learning as well as effective school management (Ojedele, 2003). Researchers have revealed that there is positive relationship between school facilities and school effectiveness (Olutola 1989). Educational facilities are vital tool for efficient and effective delivery of education programme spelt in the Curriculum (Jaiyeoba and Ademola 2003).

It is however sad to note that the school plant facilities in Nigeria are below standard. They are either not available, available not adequate, laboratories are poorly equipped for meaningful science practical'. Most classrooms are poorly built; chairs and desks are not available for students. In some states, students learn under dilapidated buildings. In this case, how can teaching and learning be effective?. Educational facilities are needed to develop cognitive areas of knowledge, abilities and skills that are necessary pre-requisites for academic achievement. For quality assurance in the education sector of the nation, a capacity building strategy needed include providing more facilities such as classrooms, libraries, laboratories, textbooks and furniture to accommodate the teeming population of students in schools. The available facilities should be well maintained. Minimum standards of school plant for individual or voluntarily agencies that wish to be involved in the business of education should be prescribed. This will ensure uniformity in quality of educational services and programmes provided. Private sector can be encouraged to provide these facilities for schools or institutions of learning. Parents and communities can also assist in the provisions of school plant facilities to facilitate teaching and learning in the school.

Funding

One of the most important problems facing Nigerian Secondary Schools is that of limited financial resources in the face of increasing responsibility and dwindling economy. The Federal Ministry of education (1998) in

the National policy on education stated explicitly that education is an instrument per excellence for affecting National Development. Education in Nigeria has not been properly funded and this leads to poor infrastructure development in the Universities, secondary and primary schools. The poor infrastructure makes the environment very hostile. The table below shows Federal Government budgetary allocations to education in 1999 to 2009.

Year	Allocation (%)
1999	11.12
2000	8.36
2001	7.08
2006	8.77
2008	10.02
2009	8.08

Sources: Abubakar S. and Muritala A.R. (2010) P. 257

The table shows how Nigerian's allocation to education has been dwindling. The results of these poor allocations are poor quality education, poor teaching and learning, incessant strikes action by teachers union. This also explains why pupils and students in the school systems sit on bare floor and under dilapidated buildings to receive lessons and lectures. As the sector is not properly funded it cannot efficiently contribute to national development. This explains why Jega (1997) calls Nigerian funding of her educational sector. 'Much ado but nothing' no doubt, Teaching and learning are seriously affected. There is disregard for quality education in Nigeria Crisis of credibility appears to have bedevilled the academic qualifications obtained in Nigerian Universities today. For education to impact positively on national development, therefore, Government should be determined to make provision for effective funding of education. The Federal Government should endeavour to earmark 26% of the total budget for educational development as recommended by UNESCO.

Education should be a tripartite affairs and responsibility of Federal, State and Local Governments, Private sector should be made to contribute to the funding. Multinational Companies operating in Nigeria should set aside 5% of their profits to finance education and allied projects. In these ways teaching and learning will be effective and there will be growth and sustainable development in the country.

Curriculum Innovation

One of the ways of alleviating poverty in Nigeria is to rethink the education curricula to meet the demand of the 21st century. Nigeria is witnessing rapid changes in the use of technology especially in Information Communication and Technology (ICT). For Nigeria to be mentioned in the committee of Nations, there is need

to modify its educational system. The curriculum has two widely accepted types of definitions. It is seen as a content of education or as a process (i.e the dynamic of giving flesh to organisational, teaching and learning principles in education). In order words the curriculum deals with the real acts of ensuring that learning and teaching yield the desired benefits.

The secret of constructive, comprehensive and complete education is the curriculum. This includes the subjects taught, a functional curriculum that is of vocational bias, a curriculum designed to suit an indigenous system of education and our peculiar culture as a nation. A capacity needs to be built around the curriculum that would provide modern Nigeria primary, secondary school education the overall structure of courses or programmes that would blend theory and practical into a vibrant 9-3-4 system of education.

- Materials needed for the implementation of the curriculum especially instructional and training materials as well as methods must be creatively selected. Creative thought and action can be inculcated not only through the so-called 'practical subject's but also across disciplines. In this way, the curricula selected should be geared towards self sustenance, Entrepreneurship education where individual child will work and self dependent should be the goal of the educational system. This will reduce youth unemployment alleviate poverty and boost Nigeria economy for sustainable Segments of education such as capacity building for teachers to improve teaching and learning.
- Improvement in the provision of material resources for teaching and learning such as textbooks, classrooms, laboratories libraries.
- Capacity building in the utilisation of Information Communication and Technology for teaching and learning in schools.
- Curriculum innovations in education system to meet the needs of 21st century.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

In summary, this paper highlighted the importance of quality education in National Development. The recent development in educational sector in Nigeria weakened the aspiration of education stakeholders especially parents and they have openly lamented the rot in the educational system. The poor performances of students in external examinations called for rethinking and actions on the system. The need for capacity buildings in all. All these are highlighted in this paper. The importance of highlighted points cannot be over-emphasised in education sector and for sustainable

development of Nigeria. For education is the bedrock of any nation.

Various ways of capacity building for effective teaching and learning in schools were also highlighted. These include;

- ❖ Training and retraining of teachers on continuous basis. Organising in-service training in form of workshop, conferences, seminars, refreshers course and supervision of teachers. To this end the following recommendations are made:
- ❖ Federal and State Government should appoint only professionals to supervisory positions in schools and to the inspectorate in the Ministries of Education. Proper monitoring and supervision of Teachers in teaching are necessary tools to quality and quantitative educational system in the country.
- ❖ The current set of teachers now in the primary and secondary schools need a pragmatic approach through regular training and retraining to meet new demands on them in terms of adaptability to modern trend of teaching.
- ❖ To this end teachers must be computer literate, they must be made to teach computer and through the computer improve teaching and learning.
- ❖ Federal and State government should increase expenditure on education especially in Information Communication and Technology (ICT). ICT tools should be provided for teachers and students in order to build capacity for teaching and learning in this 21st century.
- ❖ Professionally trained teachers should be employed and make teaching profession attractive by paying commensurate salaries and give other fringe benefits to teachers.
- ❖ Management and leadership in schools should set up school culture, values and standards in order to provide an all round training of teachers.
- ❖ Federal and State Ministries of Education should review school Curricular regularly and update them in order to make them relevant to current trends and needs of the nation.

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CAPACITY BUILDING THROUGH ADULT EDUCATION PROGRAMMES FOR POVERTY ALEVIATION IN NIGERIAN COMMUNITIES

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ABSTRACT

The sustainability of any development depends on good capacity. Education is one of the principle activities to achieve sustainable development. This means any country that has an intense desire for sustainable development must be committed to a holistic and humanistic vision of quality education, the realization of everyone's right to education and the belief that education plays a fundamental role in human, social and economic development. It is through education (functional one) that everyone can respond adequately to contemporary challenges. Responding to contemporary challenges means building the capacity of individuals through education to face such challenges (<http://www.unescoorg>). Poverty is ravaging the nooks and cranny of not only Nigeria but also many countries over the world. Nigeria is one of the third world nations where a good proportion of the largest poorest citizens live (Millennium summit 2000). So many attempts and efforts have been made by Nigerian government to reduce poverty in an effort to improve the lifestyles of people; but one still discovers that these attempts and efforts are yet to yield the best of results. To break the circle of poverty or at the best reduce poverty among the people, education must play a major role in building the capacity of the people. It is evidently not possible for every community member in Nigerian society to become literate through formal education, this is why Adult education should be prioritized to provide literacy education and skill training while addressing the need for an integrated functional literacy or livelihood training programmes that encompass critical areas of adult education such as civic, cultural or environmental education or the broad field of continuing education. This is to equip learners or establish a livelihood or carry out economic activities after they have completed a course of training. For poverty reduction and sustainable development to be achieved by any country therefore, there is the great need for increasing equity and access to education, there is also the need to ensure that education develops knowledge and skills in all areas to the extent that people are empowered to shake off the shackles of poverty. This paper examines the importance of adult education programmes in poverty reduction in Nigeria.

KEYWORDS: education, empowerment, development, participatory, knowledge, improved living standard.

INTRODCUTION

Capacity building which can also be synonymously used as capacity development is a conceptual approach to development that focuses on understanding the obstacles that inhibit people, government, international organizations and nongovernmental organizations from realizing their development goals while enhancing the abilities that will allow them to achieve measurable and sustainable results. This term refers to strengthening the skills, competences and abilities of people and community so that they can overcome the causes of their exclusion and suffering (www.wikipedia.org). When capacities of people are built, they can guide their internal development and activities as they would have been skilled and knowledgeable to act in ways that would improve their standard of living to the extent that their poverty would be reduced. The UNDP defines capacity building as a long term continual process of development that involves all stake holders including ministries, local authorities, nongovernmental

organizations, professionals, community members, academics and more. (UNDP- Wikipedia.org). This implies that capacity building does not exclude any community member; it is an all inclusive activity since its aim is to tackle problems that are related to methods of development. The potential, limits, and needs of the people concerned are put into consideration in the process of capacity building.

United Nations of committee of expert on Public Administration states that capacity building can take place on an individual level, institutional level and societal level. On an individual level, capacity building requires the development of condition that will allow individuals to build and enhance existing knowledge and skills. It also calls for the establishment of conditions that will allow individuals to engage in the process of learning and adapting to change (Capacity Building Wikipedia.org). It can be inferred from the

above that individuals have potentials which can be improved upon to bring about better living standard such that poverty can be reduced if not totally eradicated. It also implies that capacity building is a process whereby individuals learn to change the status quo. Therefore building people's capacities changes the myopic view of people about their lifestyles to a widened one and thus they have the view that they have the right to be the authors of their own development and denying them this right leads to poverty and suffering (Capacity building:<http://en.wikipedia.org/wiki/capacity-building#cite-note-Deborah-2005-30.E2-80.939>).

Capacity building is therefore not a one for all process. It is a continuous process through which individuals, groups, organizations and societies enhance their ability to identify and meet developmental challenges. Capacity building therefore emphasizes planned development, increase in knowledge, and management skills. In the process of capacity building, learning is thus encouraged. It means that a person whose capacity is to be effectively built must be educated in a functional way. Access to quality education that will enable community members to identify their needs and seek solutions to such is of great importance. When people are educated they will be able to use their knowledge to manage their skills to bring about increase in output rate in whatever they do.

Capacity building is also defined as empowerment which encompasses the ability, will and skill to initiate, plan, manage, undertake, organize, budget, monitor, supervise and evaluate project activities (www.adf.qor). Education empowers, education will help people to be more organized, planned and help them to make good use of their skills to bring development not only to their persons but to the community in which they live. Education as the viable key to necessary information and development should be made accessible and available to every community member. This is because knowledge is the foundation of capacity. A person who is not knowledgeable cannot contribute in any way to poverty reduction in self let alone of community. Investment should thus be made in establishing educational systems and opportunities that would aid continual learning and the development of professional skills. Capacity building is a process of developing and strengthening the skills, instincts and abilities, processes and resources that communities and individuals need to service, adapt and thrive in the fast changing world (Philbin, 1996). Capacity building which is also empowerment can therefore be equated with bottom up approach and one that is participatory in outlook. However, for this empowerment to be meaningful it must be backed by meaningful and functional education. Capacity building should be pursued through informal

approaches like networking e.g. building relationships with communities where development projects had been successfully carried out. It is therefore of great importance that a sufficiently structured adult education system which imparts knowledge and skills relevant and useful to the various sections of the community be instituted.

ADULT EDUCATION FOR CAPACITY BUILDING: Adult education remains a fundamental principle for capacity building in a bid to reduce poverty because it is education for all because of its multidisciplinary nature and its various programmes. Adult education provides education for people that need basic education skills and other diverse needs and for whom there is no other place to go for such. Adult education is popularly known as education that provides second chances for adults. The importance of Adult education was brought forth by Loius Freeberg (Executive Director of Edsource, California) when he states that Adult education is "*education that is serving a population that falls through the cracks*" (<http://topped.svefoundation.org>). In another comment on the importance of adult education for capacity building, Mckay, a 49 year old single Mother who dropped out in the 9th grade but was back in adult school said: "*Education is so important because when you don't have it, you're so limited*". She also states that "*being back in school has opened her mind and given her a different outlook in life*", stressing the importance of education to her children she also says "*I always tell my children, get your education because, I don't really get all mine and you see where am at. They hear that from my mouth every day.*" (<http://topped.svefoundation.org>).

The above is an indication that with adult education, capacities can be built for greater exploits. When one is educated, there is no limitation to what one can become and education is an eye opener to the world event and so with education, poverty can be conquered. Education will give one a broader outlook that will make one to take active steps in raising one's standard of living. When one is not able to get it when young, adult education is the option, because the mission of adult education is to advance the economic workforce development and societal goals by preparing adults for career and civic responsibilities.

Adult education is suitable for capacity building considering its methodology which is participatory and experiential in nature. Its method is one that enriches the already gained experience and knowledge of the learners and it enhances the skills of learners for efficient management in whatever they do. Through various programmes of adult education, the capacity of

people can be built through trainings in life skills education in various training centres. (Capacity Building: <http://www.srcindove.com/capacity-building.php>). Adult education is the education that brings about holistic development and one that leads towards good health and thus empower people for better living. Capacities of people can be built through various adult education centres such as training centres, vocational training centres and extension education. From here, people can acquire one vocation or the other. By being equipped, they are empowered to be free from poverty.

Adult education is easily accessible and affordable and so it is appropriate for building people's capacity in a bid to overcome abject poverty because it provides educational opportunities and services to equip adults with the knowledge and skills necessary to participate effectively as citizens, workers, parents, and family and community members. It provides adults with education and skills required in a competitive economy for a better quality of life. It is education for all. It prepares people for employment, citizenship, parenthood and self sufficiency. It gives basic skill training and job skills training opportunities in preparation for employment and self sufficiency.

Programmes of Adult Education

The following are some of the programmes of Adult Education that could lead to capacity building:

- i. **Adult basic literacy Education.** The objective is for learners to learn basic literacy and numeracy skills to enable them to be functionally literate in whatever job placement they found themselves in.
- ii. **Citizenship education:** This will prepare them for active citizenship and civic participation so that they become active participants in politics so that they are not cheated.
- iii. **Vocational adult education programmes** are geared to the vocational and occupational needs of learners. Adult education trains people with various occupations with a view to enabling them improve their working efficiency and increase their productivity. This type of adult education helps people to apply their new knowledge and skills to solve basic economic and social problems. It leads to increase in manpower output production of foodstuffs, and it involves the kind of adult education which sets out to teach the basic way of modern living.

Under the Vocational Adult Education is Extension education under which there is :

- a. **Agricultural Extension Service:** This adult education programme aims at building the capacity of farmers to make them better farmers with increase

productivity. The programme mobilizes and educates farmers in modern agricultural technique and thus bringing about a radical change in agricultural methods from subsistence farming to an advanced one that leads to the development of economy. This type of agricultural extension education brings about socio-economic revolutions- the type that poverty cannot withstand.

- b. **Health Extension Education:** The focus of this adult education programme is to educate people on how to live well so as to eradicate poverty in healthy living. The people are educated and empowered on how to keep their environments clean. Through such health education services, people realize that their prosperity and progress depend on their good health which may be assessed as their greatest asset to good and improved living (Adedokun 2008).

2 Training and Re-training programme

Training is the acquisition of knowledge, skills and competencies which may be as a result of the teaching of vocational or practical skill and knowledge that relate to specific useful competences. (<http://en.wikipedis.org>) Its goal is to improve one's capability, capacity productivity and performance (Collings 2008). This type of adult education programme builds the capacity of adults to perform their duties more competently than before thus yielding more economic dividend with which they can improve their living standard and raise their head above poverty. Retraining of workers involves the renewal or updating of workers' skills, knowledge, attitude or work habits and competences to enable them perform their assigned responsibilities more creditably. Retraining in whatever form is germane to high productivity considering the level of technological advancement in the world today. When people are trained and retrained, they are equipped and empowered to face contemporary challenges of any form and thus relevant to make their living to subside poverty.

3. Civic Education

It is that adult education programme that aims at enlightening the adults with the hope of raising their consciousness and making them responsible adults in their society. Civic education educates people concerning their rights as well as responsibilities thereby guarding against the exploitation of the masses by the elite class. It is education for good citizenship

4. Liberal Adult Education

This type of adult education programme emphasizes education for leisure and for the improvement of the minds so that each person is set free from the bondage of oppression. It is education that sets man free from the hold of ignorance. When minds are liberated from the

hold of ignorance and bondage, each person will think of what to do to live above poverty.

The above discussed and many other programmes of adult education are to build the capacity and capability of individuals through various informal approaches to get people sensitized that when they are empowered, they can overcome poverty. Other forms of adult education programmes include apprenticeship scheme.

POVERTY

Poverty has been defined in various ways and perceived by individuals from various angles. The consensus of all these definitions is that poverty is an enemy of man; it humiliates and dehumanizes its victims. Poverty is a situation in an economy where there is inadequate level of income and consumption resulting in insufficient basic necessities of life such as health care, housing and adequate nutrition (www.hollerafrica.com). The poorest citizens in Nigeria and World over are beset with high child mortality, malnutrition, sickness, poor physical health, illiteracy and poor access to sustainable water because of their inability to make good living. The above portrays poverty as a concept that is multidimensional in nature. It is a situation of low income and low consumption; a situation where people are not able to meet the basic necessities of life as stated above.

Ajaikaye and Adeyeye (2001) see poverty as a situation in which an individual is unable because of economic, social, political and psychological incapacitation to provide for himself, and his family the basic necessities of life

CLASSIFICATION OF POVERTY

Galbraith, (1969), Rogers, (1998) classify poverty into three major parts:

Absolute poverty: This refers to lack of minimum physical requirements for existence.

Relative Poverty: This is a situation in which the provision of basic needs for individuals within household is lower than that of others.

Rural Poverty: This refers to poor material condition, low level of education, lack of infrastructure, low investment and high level of migration

Urban Poverty: This refers to environmental degradation, overcrowded accommodation, low per capital income, slums, ghetto and shanties.

It is through capacity building, awareness programmes and education of one sort or the other that one can overcome the effect of various classes of poverty on people. Education will help people to take good care of their health, make them to be employed or improve on their skills for better productivity; will teach them to

take good care of their environment and teach them not to live in overcrowded accommodation. This will lead to helping them to live a type of dignified life.

CAUSES OF POVERTY

Some of the causes as stated by Obadan (2001) are as follows

- Inadequate access to employment opportunities
- Inadequate physical asset
- Destruction of natural resources and
- lack of power to participate

Other causes include:

- Poor macro economic and monetary policies which have made it difficult for small and medium enterprise (SMES) to thrive and which would have contributed to reduction of poverty through job creation.

Globalization: This refers to trade liberalization. Nations are supposed to trade freely among themselves for the mutual benefits of their people. The gains of globalization in trade are eluding Nigeria because of her inability to export manufactured goods abroad like other developed nations.

Good governance: Policies should be formulated by those at the helm of affairs giving consideration to the welfare of the citizens with the aim of reducing poverty among the people.

Aku et al (1997) state the following as some of the consequences of poverty

- Loss of confidence: poverty renders people vulnerable to external influence because they are poor there is loss of self confidence and they are at the lowest ebb of self esteem.
- It makes production remain on subsistence level due to lack of capital needed for expansion. Labour becomes intensive but productivity is low.

Several approaches have also been recommended to tackle the issue of poverty; some of which are stated below

- (a) **Basic needs approach:** This means making efforts to provide the basic needs for the poor such as shelter, portable water, food, sanitation and health care.
- (b) **Rural development approach:** efforts should be made to see that people living in rural communities are benefitting from various poverty alleviation programmes. There should be radical changes in ownership and credit structure so as to favour the rural poor. Employment and income generating opportunities should be given to the rural areas. (AKU etal 1997)

- (c) Target approach: This approach is to favour specific targeted groups within the country e.g Micro credit scheme and school meal programmes

Apart from the approaches stated above, several efforts have been made and several programmes put in place by various heads for government in Nigeria. Some of these include; River Basin Development Authorities (RBDA), the Agricultural Credit Guarantee Scheme (AGGS), the Rural Electrification Scheme (RES) and the Rural Banking Programme (RBP) (Ogwu Mike, 2001). All these programmes and many more such as Poverty Eradication Programme (PEP), National Economic Empowerment Development Strategy (NEEDS), and Community Banks (CB) among others are put in place to reduce poverty to the barest minimum. The programmes were designed specifically to take care of such objectives as employment generation, enhancing agricultural output and income generation and stemming the tide of rural/urban migration in order to reduce poverty.

Breaking Poverty Cycles through Capacity Building

It should be noted that the government of any country cannot do all for the people and this is why it is imperative for people's capacity and capability to be built so that each person could make personal efforts to overcome poverty. Putman (2008) is of the opinion that strong interpersonal ties in villages or organized groups can provide shared assistance that will break poverty.

Breaking poverty cycles also involve having comprehensive programmes which include a variety of services that bridge individuals and community needs. People should also be involved in collaborative efforts which involve networking among participants and among people outside their immediate community in a bid to seek solution to the problem of poverty.

Breaking poverty cycle must include individuals participating actively to raise his standard of living. The poor should be empowered to break loose from the hold of poverty.

The capacity of people must be built through adult education programme of one type or the other through which people are empowered to play a special role in overcoming poverty while at the same time democratic values are being developed in them (Adedokun 2014). In the process of capacity building, they are being made capable to have ultimate control over their destiny and a substantial degree of freedom both by individuals and groups which will give them absolute independence and confidence in their income generating activities.

When proper education is given to people, they will acquire needed skills or upgrade the already acquired ones to help them in overcoming their inadequacies in terms of adequate income generating activities and thus begin to overcome poverty.

Education will open people up to resourcefulness and will equip them with abilities to succeed in their established businesses. The capacity of people can be built to reduce poverty by establishing community skills training centres and establishing socio-economically diverse environment to provide systematic skill training to people. (Educationally disadvantaged people unesco.org).

CONCLUSION

It could be concluded from the above that education remains a viable tool in building people's capacity for sustainable development and bringing about transformation in the lives of people. It is also a strong tool for empowering citizens and hence a tool for poverty reduction. In this light, the government should prioritize the development and provision of access to education by every community member in the nooks and cranny of the country. Adult education with its diverse programmes has the capacity to empower the young, adolescent and the old with one vocational skill on the other which will help them to overcome poverty tendencies. Adult education should therefore be emphasized as an alternative route to basic formal education.

Livelihood oriented Adult Non-formal education initiative should be embarked upon for poverty to be alleviated. In like manner, adult literacy should be promoted using a livelihood approach to promote social empowerment, income generation, community development and vocational training.

Opportunities should also be provided for adults and out of school children to learn and receive training in non-formal education centres so that they can be empowered as done in Ethiopia (www.unesco.org/ui/litbase).

The type of education to be given for capacity building is the type that would reflect and capture the fundamental needs of both the nation and individual beneficiaries. It is the type that will lead to reduction/alleviation of poverty among the people and the type that will emphasize livelihood skills and the type that will help people to engage in income generating activities and one that will lead to improved standard of living and make them contribute to the development of their communities both socially and economically. These qualities are found in Adult Education Programme (www.gla.g.uk/centres)

IMPLICATION

A lot of people look down on adult education as education of the adult, it is high time for people to realize that adult education is education for all time and for all people and it is education that seeks quick solutions to identified problems. The above submission has proved that adult education can prove so relevant in a poverty ridden economy. In Nigeria today many banners are put up asking people to attend one week or more empowerment training programmes and there are jingles and adverts asking people to also attend empowerment programmes. All these short time trainings and programmes of empowerment or capacity building are all programmes of adult education. The clarion call is that people should not look down on adult education again but make people aware of its relevance in poverty alleviation.

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CHILD FRIENDLY PEDAGOGY FOR SUSTAINABLE HUMAN CAPACITY DEVELOPMENT IN NIGERIAN PRIMARY SCHOOLS

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ABSTRACT

The study investigated Child Friendly Pedagogy as a strategy for sustainable human capacity development of a child. The population of the study was all the primary school teachers in Anambra state numbering 10,470. Stratified simple random sampling technique was used in selecting 10% of the population, numbering 1,045 teachers. Three research questions were formulated and two hypotheses tested at 0.05 level of significance guided the study. Researcher-developed questionnaire instrument named “Child Friendly Pedagogy and sustainable human capacity development” was used for data collection. Data collected were analyzed using mean and ranking. The instrument was validated by two experts while reliability of the instrument was done using Crombach alpha statistic. The reliability index of 0.82 gotten indicated that the instrument was reliable. Findings revealed among others, that Child Friendly Pedagogy model plays a very significant role in sustainable human capacity development of a child, most teachers in both rural and urban areas do not apply all the attributes of this model in teaching and learning etc. It was recommended that government should organize seminars, workshops and conferences for teachers on the importance of Child Friendly Pedagogy in the capacity development of a child etc.

KEYWORDS: child friendly pedagogy, strategy, sustainable, human capacity development.

INTRODCUTION

Education is a vital instrument for individual’s sustainable development. This is acknowledged by the Nigerian Government when it stated in it’s National Policy on Education (2004), that Education is an Instrument “par excellence” for effecting national development. This is the reason developed nations of the world appropriate a sizable portion of their gross national income to the development of education sector. They also observed that education is not an end in itself but an investment and a pre-requisite for sustainable human capacity development. Education is the best legacy any nation can offer to her citizens. This is based on the fact that the development of any nation depends to a large extent on the quality of education offered by such country. No wonder, Odogbor (2007) added that education is a lifelong learning, both formal and informal, which aims at equipping the individual effectively with acceptable skills, knowledge, attitudes, beliefs, facts and competencies that will enable him cope favourably with the problems of the society. Through quality education, especially at primary school level, a child is meant to acquaint himself with the basic and fundamental skills that will see him through his life. The principle of catching them young educationally will go a long way in focusing the principles and ideologies of a child.

Basic education provides the foundation for all future education and as it contributes to sustainable human capacity development. One of it’s goals is to produce children who are happy with themselves and others, who find learning exciting and develop inquiring minds, who begin to build up a storehouse of knowledge about the world and more importantly, an approach to seeking knowledge they can use and develop throughout their lives.

In realizing the above, UNICEF in collaboration with the Federal Government came up with Child Friendly School (CFS) Model. The modalities of CFS should be such that will enhance the acquisition of lifelong skills, wealth creation and poverty alleviation. It is geared towards making the educational sector at any level responsible for the development of appropriate human capacity skill that will sustain the individual.

Abetega (2003), opined that human capacity development is the development of human capabilities towards enhancement of innovative ideas for creating and generating jobs. In this write up, human capacity development will be seen as building up in learners a storehouse of knowledge, skills, ideas, values and attitudes that will make them be productive and live a meaningful life in the society. When a child gets this

kind of quality education, the totality of the child's mind and thinking will change meaningfully.

Child Friendly School (CFS) Model according to UNICEF (2000) report, is a school "where the learning environment is conducive, the staff are friendly to the children, and the health and safety needs of children are adequately met. The school is community-based, recognizes the right of all children, irrespective of gender, religions and ethnic differences, family status, physical and mental abilities/disabilities. The report also stated that a child –friendly school must ensure quality education and positive learning for the child. UNICEF (2009) also concluded that CFS model is not a rigid, blue print or a final destination at which schools arrive, recognizing that there is no "one – size – fits – all" solution for improving quality education in schools. The model is rather a pathway to foster the progressive realization of children's right to a quality education. Each country is expected to fashion its own standard according to its peculiar needs and circumstances, while not deviating too much from the stipulated standards.

In CFS model, the pedagogy of instruction is called Child Friendly Knowledge Pedagogy (CFP) delivery. Some of the characteristics of the pedagogy according to UNICEF (2009) are:

Inclusiveness of children:

- i. It does not exclude, discriminate or stereotype on the basis of differences
- ii. It respects diversity and ensures equality of learning for all children. (eg girls, children of ethnic minorities, and affected by HIV/AIDS, children with disabilities, victims of exploitation and violence)
- iii. It responds to diversity by meeting the differing circumstances and needs of children (eg based on gender, social class, ethnicity, ability level).

Effectiveness of learning:

- ❖ It promotes good quality teaching and learning processes with individualized instruction appropriate to each child's developmental level, abilities, learning style and with active cooperative and democratic learning methods,
- ❖ It promotes structural content and good quality material and resources,
- ❖ It enhances teacher capacity, morale, commitment, status and income and their own recognition of child's right.
- ❖ It promotes quality learning outcomes by defining and helping children learn what they need to learn and teaching them how to learn

Gender – Sensitiveness:

- It promotes gender equality in enrolment and achievement
- It eliminates gender stereotypes

- It guarantees girl – friendly facilities, curricula, text books, and teaching learning processes
- It socializes girls and boys in a non – violent environment, and
- Encourages respect for each other's right, dignity and equality.

(<http://www.unicef.org/french/lifeskills/index>)

In Nigeria context, CFS model came into existence in the year 2000. It was piloted with 8 schools in the Northern part of the country at the initial stage and later introduced to all the 36 states and FCT with the support of UNICEF, in collaboration with the government.

Child Friendly Pedagogy (CFP) model is related to Vygotsky (1975) theory of social constructivism which stressed that learners are expected to acquire knowledge through active interaction with teachers, instruction and peers in order to form concept that should be learned. The way children respond to a teacher's instruction depends to a large extent on how the teacher steers the learners to learn. Children came from different socio-economic backgrounds and learn at different rates. Hence teachers must implore a strategy that will not only motivate learners to learn but instigate active participation in teaching and learning activities. No wonder Obanya (2013) concluded that teaching and learning practices become qualitative when they are learner – centred, activity-based, and interactive, with emphasis on teaching for mastery by all learners. In a related view, Ekemezie (2013) added that no teaching method is the best on its own, rather the best is the one a teacher will use and all the learners in the class will participate actively and the objective will be achieved at the end. In order to encourage the acquisition of knowledge, skills and attitudes required for sustainable human capacity development, teachers should employ effective knowledge delivery strategy that are child's friendly. When a child is ready for school early in life, he learns better, acquires the desired skills and knowledge that will build his person. The child will form a concept that will focus his attention on the reality of being somebody in life. When a child's capacity is developed early in life, the nation's capacity development will be sustained because most misinformed children from low socio economic homes, etc, will realise themselves in time. This is in line with Emmer, Evertson, Clement & worsham (1997), who stated in their study on the effect of classroom management on students' achievement, observed that when children are taught principles, rules and procedures by a friendly teacher, they develop fewer problems in later years. Parents will also be glad because the quality of their childrens' education is assured which leads to sustainable capacity

development of children thus the nations' capacity development at large.

PROBLEM OF THE STUDY

In Nigerian context, access to quality education as practiced by CFS model is still a mirage. Teachers of today are faced with the challenge of organizing instruction in such a way as to facilitate learning for most of the learners so as to enhance sustainable human capacity development. Mkpa (2005), Dimson (2007) and Onasanya (2007) concluded that many practicing teachers do not know the appropriate teaching and assessment techniques that democratize and enhance learning. Agwagah (2000) also noted that there has been a continuous search for ways and means of improving children's performance in the subjects in schools. Agwagah regretted that as the search continues, children's performance in the subject got worst especially in primary schools. Despite the fact that sustainable human capacity development can only be achieved through quality education, it has been observed in recent times that education industry in Nigeria is suffering from so many odds or irregularities such as poor provision of quality and access education, defect in the implementation of methods, etc, thus leading to non realization of CFS model goal. However, inspite of the need and importance of CFP model and the unrelented efforts of Government in collaboration with UNICEF, it seems CFP model has not been properly implemented in Nigerian educational system. Teachers still use the traditional teacher-centered approach in schools despite the clarion call for the need of the former, for better and mastery of learning. This paper therefore seeks to find out the following: roles of CFP model in sustainable human capacity development of a child, the extent of applicability of CFP model in schools and the challenges faced by teachers in successful implementation of CFP model in schools.

RESEARCH QUESTIONS

The following research questions guided the study.

1. What is the role of CFP model in sustainable human capacity development of a child in Anambra state primary schools?
2. What is the extent of applicability of CFP model by teachers in Anambra state primary schools?
3. What are the challenges faced by teachers in successful implementation of CFP model in Anambra state primary schools?

HYPOTHESIS

The following null hypotheses were tested at 0.05 level of significance guided the study.

HO₁: There is no significance difference between the mean response of urban and rural teachers on the roles of CFP model in sustainable human capacity development of a child.

HO₂: There is no significance difference between the mean response of urban and rural teachers on the extent of applicability of CFP model by teachers in schools.

METHODOLOGY AND PROCEDURES

This research adopted survey design. The study was conducted in Anambra State. The population of the study comprised of 10,470 primary school teachers in 21 local government area and 5 educational zones in Anambra state. Stratified simple random sampling technique was used in selecting 10% of the entire population, a sample of 740 urban teachers and 307 rural teachers were used. The instrument for data collection was a researcher- developed questionnaire named "Child Friendly Pedagogy for sustainable human capacity development". It was a 30 item questionnaire structured on a 4 point rating scale of Strongly Agree (SA) = 4 points, Agree (A) = 3 points, Disagree (D) = 2 points and Strongly Disagree (SD) = 1 point. The instrument was validated by two experts in Educational Foundations and Administration of University of Nigeria, Nsukka: Crombach Alpha statistic was used in testing the reliability of the instrument. The index coefficient value of 0.82 yielded indicated that the instrument is reliable. A total of 1047 questionnaire were distributed through the help of two research assistants and 1045 were returned and used for the study. Data analysis was done using mean (\bar{x}) and rank order. Items with mean scores of 2.50 and above were regarded as agreed while items with mean scores below 2.50 were regarded as disagree. Z-test statistic was used in analyzing the hypotheses at 0.05 level of significance.

PRESENTATION OF RESULTS

Research Question One: What is the role of CFP model in sustainable human capacity development of a child in Anambra state primary schools?

Table I: Mean and ranking of urban and rural teachers' response on roles of CFP model in sustainable human capacity development of a child in Anambra state primary schools.

S/N	Items	Urban teachers N =740			Rural teachers N =305		
		X	Rank	Dec	X	Rank	Dec
1	It promotes good quality teaching and learning processes with individualized instruction suitable to each child's developmental level	3.90	1 st	A	3.92	1 st	A
2	It provides structured content and good quality materials and resources capable of developing the child's human capacity	3.45	4 th	A	3.40	3 rd	A
3	It enhances teachers' capacity development, hence inculcating the desired skills, attitudes and values in learners	2.59	5 th	A	2.56	5 th	A
4	Places learners at the centre of instructional process, thereby making the learner the centre of attraction by all the stakeholders.	3.61	3 rd	A	3.30	4 th	A
5	It takes care of learner's readiness, interest and learning profile thereby bringing out the best in the learner.	3.85	2 nd	A	3.71	2 nd	A
	Aggregate Mean	3.48			3.38		

In table I, all items on the responses of both urban and rural teachers on the role CFP model plays in sustainable human capacity development of a child recorded above 2.50 which means that they are all accepted as roles CFP model plays in the development of a child's capacity. For urban teachers, the order of ranking goes thus: item 1 = 1st, 5 = 2nd, 4 = 3rd, 2 = 4th while 3 ranked 5th. For rural teachers, item 1 = 1st, 5 =

2nd, 2 = 3rd, 4 = 4th while 3 = 5th respectively. From the aggregate mean of both urban and rural teachers' response, 3.48 and 3.38 respectively indicated agreed.

Research Question Two: What is the extent of applicability of CFP model by teachers in Anambra state primary schools?

Table II: Mean and ranking of urban and rural teachers' response on the applicability of CFP model by teachers in Anambra state primary schools.

S/N	Items	Urban teachers N =740			Rural teachers N =305		
		X	Rank	Dec	x	Rank	Dec
6	Teachers work closely/in collaboration with the parents/guardians of the children	2.41	14 th	D	2.23	14 th	D
7	Teachers are seen as facilitators and not instructors	2.47	10 th	D	2.45	10 th	D
8	Teachers saw learners as individuals that have some innate potentials and not dunce	2.48	11 th	D	2.32	12 th	D
9	Teachers sought learners opinion during lesson all the time	2.45	12 th	D	2.30	13 th	D
10	Teachers protected the child against all forms of discrimination	2.70	5 th	A	2.65	5 th	A
11	Teachers encouraged active participation of all the class members by using participatory/collaboratory method of teaching.	2.44	13 th	D	2.41	11 th	D
12	Teachers eliminated gender stereotypes of any kind.	2.58	8 th	A	2.58	8 th	A
13	Teachers were resourceful and improvised in order to make learning meaningful to learners	2.80	4 th	A	2.76	2 nd	A
14	Teachers made the learning environment conducive at all time	2.88	2 nd	A	2.75	3 rd	A
15	Teachers socialized boys/girls and motivated them alike to learn.	2.62	6 th	A	2.50	9 th	A
16	Teachers encouraged respect for each others' right, dignity and equality	2.52	9 th	A	2.56	7 th	A
17	Teachers were friendly all the time	2.90	1 st	A	2.72	4 th	A
18	Teachers were ready to meet the health and safety needs of the children.	2.81	3 rd	A	2.80	1 st	A
19.	Teachers tolerated the children at all time	2.60	7 th	A	2.62	6 th	A
	Aggregate mean	2.62			2.55		

In II, for urban teachers, 9 out of 14 items on the responses of teachers on the applicability of CFP model in teaching and learning recorded above 2.50 and were

accepted as the practices done in their schools. The items and their ranking order are; items 17=1st, 14=2nd, 18=3rd, 13=4th, 10=5th, 15=6th, 19=7th, 12=8th

and 16=9th respectively. It means that urban teachers accepted 9 items out of 14 as what are practicable in their various schools while the following items and their ranking order were rejected as not being practicable in their schools. They are item 7=10th, 8=11th, 9=12th, 11=13th and 6=14th respectively. For rural teachers, 9 out of 14 items on the response of teachers were recorded from 2.50 and above which means agree while 5 items recorded below 2.50 which means disagree. The items and their ranks are, item 18=1st, 13=2nd, 14=3rd, 17=4th, 10=5th, 19=6th, 16=7th, 12=8th, 15=9th, 7=10th, 11=11th, 8=12th, 9=13th while 6=14th respectively. The difference in the responses of both

urban and rural teacher's response was in ranking, which means that the same practices are obtainable in both urban and rural schools but the difference was the degree or extent to which it is practiced.

Research Question III: What are the challenges faced by teachers in successful implementation of CFP model in Anambra state primary schools?

Table III: Mean and ranking of urban and rural teacher's response on the challenges of successful implementation of CFP model in Anambra state schools.

S/N	Items	Urban Teachers			Rural Teachers		
		X	Rank	Dec	X	Rank	Dec
20	Access to basic education	3.85	1 st	A	3.90	2 nd	A
21	Low socio economic status	3.82	2 nd	A	3.96	1 st	A
22	Poor infrastructural facilities	3.76	3 rd	A	3.82	3 rd	A
23	Poor knowledge of teachers on the best approach to teaching.	2.57	6 th	A	2.68	3 rd	A
24	Gender sensitivity	2.48	9 th	D	2.51	9 th	A
25	Cultural background	2.42	10 th	D	2.56	8 th	A
26	Poor motivational strategies on the part of teachers.	2.56	7 th	A	2.57	6 th	A
27	Population explosion	2.60	4 th	A	2.45	11 th	D
28	Poor supervisory services	2.52	8 th	A	2.58	7 th	A
29	Misappropriation of resources	2.59	5 th	A	2.50	10 th	A
30	Level of parental exposure	2.41	11 th	D	2.60	5 th	A
	Aggregate mean	2.87			2.92		

In table III, for urban teachers, 8 out of 11 items on the challenges faced by teachers in successful implementation of CFP model in Anambra state recorded above 2.50 and were accepted as challenges faced by teachers while 3 of the items-; (items 24,25 &30) recorded below 2.50 and were rejected as not among their challenges. The items and their rank order are item 20=1st, 21=2nd, 22=3rd, 27=4th, 29=5th, 23=6th, 26=7th, 28=8th, 24=9th, 25=10th, 30=11th respectively. For rural teachers, 10 out of 11 items recorded above 2.50 and were accepted as major

challenges they faced in the successful implementation of CFP in their schools. Only (item 27 on population explosion) was rejected because it scored below 2.50. The items and their rank order are; items 21=1st, 20=2nd, 22=3rd, 23=4th, 30=5th, 26=6th, 28=7th, 25=8th, 24=9th, 29=10th, while 27=11th respectively. Also for urban and rural teachers, there were differing opinions on their responses in the order of ranking which means that most a times, what possessed as challenge in urban may not be for rural teachers.

Table IV; Z – test analysis of the mean responses of urban and rural teachers on the roles of CFP model on sustainable human capacity development.

Variables	N	X	SD	Df	t-cal	t-cri	Level of sign.	Dec
Urban teachers	740	3.48	0.42	1043	1.27	1.96	0.05	A
Rural teachers	305	3.38	0.37					

t- cal < t - cri=Accept

Table IV shows that the calculated value of Z at 1043 degree of freedom and 0.05 level of significance is 1.27. This is less than the critical value of Z (1.96). It means that the null hypothesis that says that there is no significance difference between the mean responses of

urban and rural teachers on the role of CFP model to sustainable human capacity development is accepted. This therefore means that teachers in both urban and rural areas see CFP model as a strategy for building the capacity of a Nigerian child.

Table V: Z- test analysis of the mean response of urban and rural teachers on the extent of applicability of CFP model in Anambra state primary schools.

Variable	N	X	SD	Df	t-cal	t-cri	Level of Sign.	Dec
Urban teachers	740	2.62	0.51	1043	-306	1.96	0.05	Accept
Rural teachers	305	2.55	0.42					

t- cal < t- cri = Accept

Table V shows that the calculated value of Z at 1043 degree of freedom and 0.05 level of significance is -306. This is less than the critical value of Z (1.96). It means that the null hypothesis that says that there is no significance difference between the responses of urban and rural teachers on the extent of applicability of CFP model in Anambra state is accepted. It therefore means that in both urban and rural areas, CFP model has not being fully implemented probably because of some challenges.

DISCUSSION OF RESULTS

Findings of the study in table one revealed that child friendly pedagogy model of teaching and learning plays a very important and crucial role in the sustainable capacity development of a child. The result was confirmed by the high mean scores of most of the identified roles. This finding is in agreement with UNICEF (2009), who stated that CFS model is not a rigid blue print or a final destination at which schools arrive... but a solution for improving quality education in schools. This findings also concored with Obanya (2013), who concluded that teaching and Learning practices became qualitative when they are learner-centered, activity –based and interactive, with emphasis on teaching for mastery by all learners. Also Onasanya (2007) added that to have the desired result, the teacher must adopt a teaching strategy which is structured with felt needs and interest in mind. And this is what CFP model is all about. The findings in table 4 on Z test analysis of the hypothesis 1 on the role of CFP model plays in sustainable human capacity development also indicated an agreement that CFP model is *sin qua non* to quality education.

In table II, on research question 2, on the extent of applicability of this model, the findings also revealed that though CFP model promotes quality education, most of the characteristics of this model were not fully practiced in the schools in both urban and rural areas. The findings in table V, hypothesis 2 also revealed that both urban and rural teachers accepted the null hypothesis. This was supported by Mkpa (2005), Dimson (2007) and Onasanya (2007) who concluded that many practicing teachers do not know all the appropriate teaching and assessment techniques that democratized and enhanced learning.

The finding in table III on the challenges of successful implementation of CFP model in Anambra state primary schools. majority of the items were accepted as challenges faced by teachers. This is in line with Mkpa (2014), who stated that despite the fact that sustainable development can only be achieved through quality education, education industry in Nigeria is suffering from so many odds or irregularities like provision of qualities and access education, defect in the implementation of methods and poor facilities, etc. In collaboration with UNESCO (2013), access to quality education is the major hindrance. A glean from demographic and health survey (2008) in Mkpa (2014) also added that 74% of children of school age in urban area attend school as against 57% in rural area. The findings were also in support of Irene (2011) who opined that for any education to function properly, infrastructures such as classroom, library resources, playground, laboratories and staff accommodation are needed. Irene also added that children from low socio economic background lack basic textbooks and conducive learning environment at home.

Irene (2011) and Gwangfogbe (2011) also agreed that the inadequacies of those facilities in the African school situation, is a serious draw back to the proper adoption of learner-centred instructional process. Though the implementation is facing many challenges, nothing good comes easy all the times. An interview with Dr Cream Wright, UNICEF’s chief of Education about the CFS model, confirms that it encourages and supports children’s capacities as learners, by providing a school culture and teaching behaviour that is lifelong. It provides an enriched educational experience through which people can thrive, develop and achieve their full potentials. This type of education will promote the capacity development of a child. Capacity development of a nation cannot be achieved without first of all developing an individual. A nation whose members are incapacitated educationally is in darkness. This is why this pedagogy calls for catching them young. This lends support to what the Bible says in Proverbs 22 verse 6 ‘Train up a child in the way he should go; and when he is old, he will not depart from it’. CFS model provides the quality education that sharpens the understanding and vision of a child and priority set right early in life. Parents and teachers no longer drag and force children to school because children have known the need to be educated. Here, the child acquires a skill and knowledge that build his person and sustain him for life. This will

invariably lead to the national capacity development because a child of today is an adult of tomorrow. This national capacity development is sustained because learning is intrinsic and not extrinsic.

CONCLUSION

Children in the school come from different cultural and socio-economic backgrounds. They learn in different ways and at different rates. This emphasizes that the learning process is not the same for all children. Teachers, being the captain that holds the boat that carries learners, should be abreast with the appropriate innovative teaching approach that will promote quality learning that engenders sustainable human capacity development, not minding all odds.

RECOMMENDATION

Based on the findings of the study, the following recommendations were made:

1. Proper legislation should be instituted by government to force parents/guardians to send their children to school.
2. Government should organize seminars, workshops and conferences on the need for CFP model for teachers and parents.
3. Government should sensitize the public on the need for CFP model.
4. Government should provide as many infrastructural/instructional facilities needed for proper implementation of CFP model in all schools.
5. Teachers should be properly motivated by both government and parents to enable them carry out their duties effectively.
6. Government should consider proper funding of primary education very serious.
7. Government should set up supervisory services to supervise proper implementation of CFP model in all schools etc.

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EVALUATION OF ENTREPRENEURIAL SKILLS NEEDED BY THE STUDENTS OF UNIVERSITIES FOR SELF RELIANCE AND SUSTAINABLE DEVELOPMENT IN THE SOUTH-EAST NIGERIA

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ABSTRACT

This paper evaluated the entrepreneurial skills needed by students of Federal Universities in the South-East Nigeria. 3 research questions and 3 hypotheses were formulated to guide the study. This was a descriptive survey research design and the population consisted of 325 lecturers from only Faculty of Education in the five Federal Universities from five states in the South-East. Stratified random sampling technique was used to select a total of 98 lecturers as the sample. Well structured questionnaire was used to collect data, rated on a four point scale and it contained 40 items. The instrument was tested for reliability using Pearson Product Moment Correlation Coefficient and it yielded an index of 0.79 which was adjudged high for measuring the consistency of the items. Mean and SD were used to answer the research questions while t-test was used to test the hypotheses at 0.05 level of significance. From the analysis, it was observed that the entrepreneurial skills needed by the students of universities include innovative, creative, administrative, financial skills among others. It was then recommended that stakeholders should incorporate in curriculum those subjects that will help expose these students to other skill acquisition programmes in addition to entrepreneurship education.

KEYWORDS: entrepreneur, entrepreneurship education, entrepreneurial skills, self reliance, sustainable development.

INTRODCUTION

Functional education is seen as a standard yardstick for the measurement of growth and development in all the areas of life such as political, social, economic and cultural. It is also fundamental to the construction of knowledge in all the nations. Logically, the quality of education an individual receives determines the extent of his usefulness to himself and the nation at large. Nigeria today is experiencing mass unemployment rate unlike in the past when people are employed on graduation. The unemployment rate has continued to increase that about 60%-70% of the graduates are not employed while the labour market can only absorb just about 20%. (World Bank, 2009). There is no gain saying that this high rate of unemployment is disastrous and might have contributed to the high rate of crime which has soared in this country ranging from social disturbances and armed robbery to kidnapping and many other social vices. It appears that our graduates are the worst hit because the society has failed to give them proper sense of direction through sound, qualitative and functional education. Many who dropped out of the schools or passed through the schools lack the basic or the pre-requisite skills and knowledge to compete in the rather weak economy and tight labour market. Therefore the need to create

employment opportunities for the students has necessitated the creation of entrepreneurial based environment in the schools to ensure that there is a synergy between university education and entrepreneurship education in Nigerian schools. This will ensure the acquisition of appropriate skills that could be transformed to economic, social, physical and mental competencies as equipment to live in and contribute to the development of the nation. (Federal Republic of Nigeria, FRN, 2004). In line with the above, the quality of instruction at all the levels of education needs to be revitalized by capacity building programmes and imparting in the students important skills for self reliance after graduation.

An entrepreneur is a person that conceives of an idea and utilizes the identified opportunities by employing the factors of production; land, labour, and reproducible capital towards productive ends by way of bringing about appropriate innovation in the production process. He revitalizes an existing business or starts an entirely new one, innovates results in the production of goods and services, which directly or indirectly help in solving socio-economic, cultural, political and other problems of both the individual and the society. He also

transforms and innovates a sustainable enterprise that engenders values which benefit the individuals and the society. Iheonunekwu, (2003) identified the unique personality traits of an entrepreneur as including positive attitudes, high aptitudes, rational reasoning, critical thinking and decision making. He equally generates and articulates his visions into concrete reality as well as assumes a reasonable degree of risks.

Entrepreneurship education according to Osaam (2009) embraces all the formal and informal processes intended to create enabling environment for the students to facilitate the development of entrepreneurial skills, attitude orientations, experience and values for sustainable business, economic growth and sustainable development. FRN (2004) outlined that entrepreneurship education must be in a central position in our educational system especially in our universities as a strategy to put the Nigeria economy on a fast lane of economic regeneration and growth. This will help make our economy one of the strongest in the year 20:2020. FRN (2004) continued to emphasize that those skills needed by these students are the vital tools for the attainment of the Millennium Development Goal (MDG) of which poverty alleviation is a priority, hence emphasizing on the need for functional and qualitative education that helps in the promotion of a progressive and united nation.

Furthermore, entrepreneurial skills are then seen as those skills that are acquired through entrepreneurship education and training such as management, creative, manipulative and so on. These skills serve as tools that prepare the individuals for gainful self employment and minimizes unnecessary dependent on white collar jobs. (Ezeh, 2012). It also helps the individuals to engage in meaningful exploration of the activities in such areas as manufacturing, production, construction, machine operations and many more. Nwangwu (2007) further asserted that the entrepreneurial skills that are needed by the students of education offer them the privilege to experience job, earnings, savings, and investing money in some businesses that will help sustain them after graduation. This will go a long way in reducing the high rate of unemployment and other related social vices. More importantly, it will offer the students the opportunities for creative thinking as well as broadening their horizon and understanding of career opportunities in the society where they live and operate in. In addition to the above, Osaam (2009) outlined that the students are expected to have a broad array of entrepreneurial skills to succeed in today's competitive market. They must be in possession of basic skills that are necessary to enable them start, nurture, finance, market and maintain their own business enterprises. Self reliance is synonymous with self sufficiency and self

independence. It means doing things for oneself rather than expecting from another. It is also referred to a state of not requiring any external aid, support or interaction for survival. It is also seen as a personal autonomy through the acquisition of skills (FRN, 2004). Skill acquisition then involves the process of getting the students equipped with saleable skills necessary for employment after graduation as well as help to update their work skill that sustains development. It is however, necessary that the type of education that would guarantee self reliance, self employment and independence be provided for the Nigerian students. This can be made possible through entrepreneurship education that will create the enabling environment. This therefore calls for full incorporation of entrepreneurship education as part of the curricula for those studying in the universities. The major concern for this is for them to have a self development and self fulfillment to take more responsibilities for themselves. Ezeh (2012) maintained that this will make them discover their inherent capabilities and aptitudes that help them maximize the available opportunities of coping with the complexities in the society. Therefore the type of skills these students need are the ones that will enhance the development of a profitable investment. Such skills as financial, innovative, personnel management, manipulative, creative thinking skills and so on will in no small measure make the recipients benefit and develop positive values of self reliance, self esteem, resourcefulness, creativity, initiative, courage and responsibilities on graduation. (Gbenidio, 2012).

Sustainable development on the other hand is the development that upholds the present generations to meeting their personal needs. It implies economic growth together with the protection of environmental quality, with each enforcing the other. (Ezeh, 2012). The economic growth and development of any nation are dependent on the inter-relatedness of the skills acquired by the available manpower and the needs of labour market. Therefore, the essence of this form of development is to have a stable relationship between human activities and the world, that will not alter the prospects of the future generations to enjoy the needed quality life. It requires balancing environmental, societal and economic considerations in the pursuit of development and an improved quality of life. Sustainability according to Gbenidio (2012) involves the maintenance of intergenerational equity, gender equity, just and peaceful societies, social tolerance, human capacity building, environmental preservation and restoration, poverty alleviation and natural resource conservation. The essential tools for achieving sustainable development also include improvement of the quality of basic education, reorientation of the

existing education and other programmes that address sustainable growth and development, public awareness, understanding and provision of trainings for all sectors of private and civil society.

Practice has over the time perceived to have been ignored in the educational sector. This deficiency has robbed Nigeria the functionality in its educational system. Consequently, the present emphasis on academic oriented programmes devoid of the acquisition of entrepreneurship skills thus seem not to be preparing the students for different career paths in the constantly changing world. This without being told has so much effects on the sustainable development in Nigeria. All the efforts made by the government to produce self reliant citizens are seen to be a mirage. Could this be traced to the fact that our graduates are not properly equipped with the saleable skills needed to sustain themselves thus roaming about the streets in search of white collar jobs? It is against this background that this paper seeks to evaluate the entrepreneurial skills that are needed by the university students, the problems that may hinder the inculcation of such skills as well as the possible measures to be taken to improve the acquisition of such skill in the students of Federal Universities in the South-East Nigeria.

STATEMENT OF THE PROBLEM

Nigeria like most developing nations of the world is faced with multitude of problems which include poverty, unemployment, ethnic conflicts, insecurity, diseases among others. These situations pose great challenges to the existence of individuals. All these could be traced back to the quality of functional education acquired by the students who are in the universities. Higher educational system seems to have failed to equip the recipients with adequate skills thus making them be over dependent on non-existing white collar jobs. A solution to this ugly situation could be traced to the development and inculcation of functional entrepreneurial skills in them. In the light of the foregoing, this paper intends to evaluate the needed entrepreneurial skills by these students, the problems of inculcating them as well as the possible measures to be taken to enhance the acquisition of entrepreneurial skills in the students of the Federal Universities in the South-East Nigeria

PURPOSE OF THE STUDY

Specifically, the study sought to:

1. Ascertain the entrepreneurial skills needed by the students of Federal Universities in the South-East Nigeria.
2. To identify the problems facing the acquisition of these entrepreneurial skills in the students of Federal Universities South-East Nigeria.

3. To investigate on the possible measures to be employed to help the students acquire the needed entrepreneurial skills.

RESEARCH QUESTIONS

The following research questions guided this research work

1. What are the entrepreneurial skills needed by the students of Federal universities in the South-East, Nigeria?
2. What are the problems facing the acquisition of entrepreneurial skills in the students of Federal universities in South-East Nigeria?
3. What are the possible measures to be employed to help the students acquire the needed entrepreneurial skills?

RESEARCH HYPOTHESES

1. There is no significant difference between the mean rating of male and female lecturers opinions on the entrepreneurship skills needed by students of Federal universities in the South-East Nigeria..
2. There is no significant difference between the mean rating of male and female lecturers opinions on the problems facing the acquisition of these entrepreneurial skills in the students of Federal Universities in the South-East Nigeria.
3. There is no significant difference between the mean rating of male and female lecturers opinions on the measures of improving entrepreneurship skills acquisition by these students.

SIGNIFICANCE OF THE STUDY

No nation can maintain a sustainable economic and human development without the alleviation of unemployment and poverty. Nigeria looks forward to such advancement of human capacity building as a means of achieving a sustainable development and this can only be achieved when its citizens are able to contribute positively to himself and the nation. These contributions are based on the level of skilled manpower that are available. This work will therefore help the government and other stakeholders in education to contribute in repositioning the strategies for promoting creativity and the acquisition of entrepreneurial skill in the university students. The study will equally help the students to know that this is not a text book programme or theory course rather a programme that provides for functional and practical education that will help them acquire the saleable skills for self reliance against over dependence on white collar jobs. The paper will also help the National Universities Commission (NUC) to constantly reform entrepreneurship education curriculum to accommodate all that are necessary in building of human capacity and investment in human capital necessary to improve the skills, attitudes,

creativity, aptitudes and abilities. The knowledge of these will enhance adequate priority capacity building programmes in our universities which in turn leads to sustainable development and poverty alleviation in Nigeria.

RESEARCH METHODOLOGY

Research Design: This is a descriptive survey research design that deals with comparison of variables.

Population: The population consisted of all the five Federal Universities from the five States in the South-East Nigeria. Only the faculty of Education was used with a total of 325 lecturers in these Universities. There were five departments that make up the faculty.

Sample and sampling technique: A simple random sampling technique was used to select two universities from the five. They are (Nnamdi Azikiwe University Awka Anambra State and University of Nigeria Nsukka Enugu State) while a stratified random sampling technique was used in selecting a sample size of 98 lecturers from faculty of education in the two universities chosen. The five departments that make up this faculty and the sample size are Educational Management (20 lecturers), Educational Psychology(20 lecturers), Educational Foundations (20 lecturers), Adult and Non-Formal Education(19 lecturers), Curriculum Education (19 lecturers).

Instrument for data collection: The instrument for data collection was a well structured self administered

questionnaire that contained 40 items. That is 20, 10 and 10 items developed from the 3 research questions. This was developed on a likert four point scale of Strongly Agreed (SA=4points), Agreed (A=3points), Disagreed (DA=2points), Strongly Disagreed (SD=1point). 98 copies were distributed by the researcher and her assistant and all were retrieved on the spot.

Validity of the instrument: The questionnaire was validated by experts in the Department of Measurement and Evaluation Michael Okpara University, Umudike.

Reliability of the instrument: These items were subjected for reliability testing using Pearson Product Moment Correlation Coefficient. It was administered to 40 lecturers from Michael Okpara University Umudike who were not part of the sample. This yielded a reliability index of 0.79 which was found reliable and consistent.

Method of data analysis: Data collected were analyzed using mean and standard deviation for the research questions while a t-test was used to test the hypotheses at 0.05 level of significance.

PRESENTATION OF RESULTS

Research Question I: What are the entrepreneurial skills needed by students of Federal Universities in South-East Nigeria.

Table 1: Mean responses of the entrepreneurial skills needed by the students of federal universities in the South-East Nigeria

S/N	Description of items (Needed skills)	Mean \bar{x}	SD	Rmrks
1	Financial skills	3.33	0.66	Agree
2	Administrative skills	3.50	0.64	Agree
3	Organizational skills	4.15	0.61	Agree
4	Sales and marketing skills	4.49	0.79	Agree
5	Self motivational skills	3.33	0.66	Agree
6	Planning skills	3.03	0.73	Agree
7	Innovative skills	4.49	0.79	Agree
8	Creative thinking skills	3.98	0.79	Agree
9	Accountability skills	3.03	0.73	Agree
10	Risk taking skills	3.46	0.65	Agree
11	Manipulative skills	4.10	0.64	Agree
12	Practical skills	4.11	0.63	Agree
13	Productive skills	3.50	0.64	Agree
14	Controlling skills	3.98	0.79	Agree
15	Personnel management skills	3.33	0.66	Agree
16	Communication skills	3.03	0.73	Agree
17	Thinking skills	3.40	0.66	Agree
18	Coordinating skills	4.00	0.70	Agree
19	Time management skills	3.80	0.73	Agree
20	Evaluating skills	3.72	0.75	Agree
	Grand mean	3.68	0.72	Agree

From the table above, it was revealed that all the twenty entrepreneurial skills outlined such as sales and marketing skills, financial skills, administrative skills, time management skills, evaluating skills, planning skills and so on had the mean ranging between 4.49 and 3.03 and with a grand mean of 3.68 which is above the

decision rule of 2.50. This shows that all the entrepreneurial skills outlined are needed by the students of universities.

Research Question 2: What are the problems facing the acquisition of entrepreneurial skills by students in Federal Universities in the South-East Nigeria.

Table 2: Mean responses of the problems facing the acquisition of entrepreneurial skills in the students of federal universities in the South-East Nigeria

S/N	Description of items	Mean \bar{x}	SD	Rmrks
21	Dearth of adequate skilled manpower.	3.03	0.70	Agree
22	Lack of motivation for the teachers.	3.30	0.66	Agree
23	Poorly equipped workshops, laboratories and Classroom.	3.98	0.79	Agree
24	Unclear description of the goals and objectives. of entrepreneurship education to the students.	3.46	0.65	Agree
25	Improper distribution of funds to schools	4.10	0.64	Agree
26	Lack of commitment of teachers to teaching.	2.02	0.11	Disagree
27	Unconducive teaching and learning environment.	4.10	0.64	Agree
28	Lack of motivation and reinforcement of the students through exposure to carry out practical work .	4.11	0.63	Agree
	Poor administrative qualities of the heads.	2.30	0.22	Disagree
29	Non challant attitude to practically oriented subjects in schools.	3.80	0.73	Agree
30	Grand mean	3.42	0.66	Agree

From table 2 above, it was observed that eight out of the ten outlined problems such as lack of motivation, dearth of adequate skilled manpower, poorly equipped workshops, classrooms, and laboratories had a mean ranging between 4.11 and 3.03. While items 26 and 29 had the mean of 2.02 and 2.30 respectively. But table has a grand mean of 3.42 which is above 2.50 decision point. This means that the outlined constitute the

problems facing the acquisition of the needed entrepreneurial skills by the students of the universities in the South-East.

Research Question 3: What are the possible measures to be employed to help the university students acquire the needed entrepreneurial skills?

Table 3: Mean responses of the possible measures be employed to help the students of universities acquire the needed entrepreneurial skills in South-East Nigeria.

S/N	Description of items	Mean \bar{x}	SD	Rmrks
31	Provision of adequate skilled manpower	3.46	0.65	Agree
32	Constant and appropriate motivation for Teachers	3.03	0.70	Agree
33	Well equipped laboratories, classrooms and workshops.	4.49	0.79	Agree
34	Very clear description of the objectives of entrepreneurship education to the students	3.50	0.64	Agree
	Proper distribution of funds to schools	3.46	0.65	Agree
35	Full commitment of teachers to teaching and learning	3.40	0.66	Agree
36	Provision of conducive teaching and learning environment	4.10	0.64	Agree
37	Adequate motivation and reinforcements to the students through exposure to practical work	3.30	0.65	Agree
38	Good administrative qualities of the school's Head	3.03	0.73	Agree
39	Full attachment of importance to practical based subjects in schools	4.00	0.70	Agree
40	Grand mean	3.57	0.68	Agree

The table above shows that all the outlined are possible measures such as provision of adequate skilled manpower, well equipped workshops, classrooms, laboratories, full commitment of teachers to teaching and learning and so on when employed will help the acquisition of entrepreneurial skills in these students. They all had the mean ranging between 4.49 and 3.03 and a grand mean of 3.57 which fall above the decision point. Therefore all constitute the measures to employed

to help these students to acquire the needed entrepreneurial skills.

TEST OF HYPOTHESES

Hypothesis One: There is no significant difference between the mean rating of male and female lecturers opinions on the entrepreneurial skills needed by university students of universities in South-East Nigeria.

Table 4. Mean rating of male and female lecturers opinions on the entrepreneurial skills needed by students in federal universities in the South-East Nigeria

Variable	Group	No	\bar{x}	SD	Df	Tcrit	Tcal	Decision
Skills	Male	69	4.30	0.60	68	1.96	1.20	Accept Null HO
	Female	29	3.83	0.74	27	1.96	0.41	

Table 4 revealed that the t-cal of males and females were 1.20 and 0.41 which are less than the t-value of 1.96 at 0.05 and degree of freedom of 68 and 27. This indicated that the null hypothesis that says that there is no significant difference between the mean rating of male and female lecturers opinions on the entrepreneurial skills needed by students of universities is upheld.

Hypothesis Two: There is no significant difference between the mean rating of male and female lecturers opinions on the problems facing the acquisition of entrepreneurial skills by students of universities in South-East Nigeria.

Table 5. Mean rating of male and female lecturers opinions on the problems facing the acquisition of entrepreneurial skills by students in federal universities in the South-East Nigeria

Variable	Group	No	\bar{x}	SD	Df	T-crit	Tcal	Decision
Problems	Male	69	4.12	0.65	68	1.96	1.19	Accept Null HO
	Female	29	3.23	0.63	27	1.96	0.37	

Table 5 revealed that the t-cal of males and females were 1.19 and 0.37 which are less than the t-value of 1.96 at 0.05 and degree of freedom of 68 and 27. This indicated that there is no significant difference between the mean rating of male and female lecturers on the problems facing the acquisition of entrepreneurship skills by the students. We therefore fail to reject the null hypothesis.

Hypothesis Three: There is no significant difference between the mean rating of male and female lecturers opinions on the measures to be employed to help the students of universities in South-East Nigeria acquire the needed entrepreneurship skills.

Table 6. Mean rating of male and female lecturers opinions on the measures to be employed in helping the students of federal universities in the South-East Nigeria to acquire the needed entrepreneurship skills

Variable	Group	No	\bar{x}	SD	Df	T-crit	Tcal	Decision
Possible Strategies	Male	69	4.02	0.61	68	1.96	1.11	Accept Null HO
	Female	29	3.88	0.68	27	1.96	0.42	

Table 6 revealed that the t-cal of males and females were 1.11 and 0.42 which are less than the t-value of 1.96 at 0.05 and Degree of freedom of 68 and 27. This indicated that the null hypothesis that says that there is no significant difference between the mean rating of male and female lecturers on the measures to be employed to help these students acquire the needed entrepreneurial skills is accepted.

DISCUSSION ON FINDINGS

The findings in table 1 above showed that all the entrepreneurial skills such as financial, administrative, organizational skills and so on are highly needed by the university students. This is because they will go a long way in helping them to achieve self reliance and be self employed after graduation. This goes in agreement with the findings of Ezeh (2012) who maintained that the acquisition of management skills, financial skills, decision making skills and ability to monitor the

business environment has the likelihood or potentials for the attainment of self reliance that contributes to sustainable development. In support of the above, FRN (2004) added that there is need to create varied employment opportunities for the education students by ensuring that there is a synergy between entrepreneurial skills and the world of work. This will enhance the acquisition of appropriate skills that could be transformed into economic, social, physical and mental competencies as valuable equipment to live and contribute to the development of oneself and the nation at large.

Table 2 revealed that such problems as lack of funds, dearth of adequate skilled manpower, lack of facilities, lack of teacher motivation, poor environmental conditions among others hinder the acquisition of the needed entrepreneurial skills by university students. Kayode (2010) confirmed this by observing that most of the teachers have not acquired the new and needed entrepreneurial skills to impart in the students as well as the teaching methodology which has not changed fundamentally from the old system of paper and pencil based to the present digital era. Isah, Erwart and Fabunmi (2009) in agreement to this noted that Nigeria is faced with the greatest challenges in the recent past resulting from bureaucracy, poor funding, infrastructural decay, poor motivation of teachers to indecision on the part of the educational planners among others. All these have affected the quality of skill and practical based education delivery adversely. Gbenidio (2012) rightly supported the above by frowning that despite the purported huge investment in education, our country has not done well educationally. Teaching, learning equipment and facilities such as good libraries, workshops, laboratories, audio visuals, scientific and technical equipment are grossly inadequate.

From the findings on table 3, it was observed that all the possible measures such as the provision of adequate skilled manpower, constant and appropriate motivation for the teachers, well equipped workshops, laboratories, classrooms and others if employed will help the students to acquire the needed entrepreneurial skills for self reliance after graduation. This findings is in consistent with that of Nwangwu (2007) who pointed out that the Nation's institutions are in need of experts in entrepreneurship education. He continued by maintaining that the task of producing competent entrepreneur graduates demands specialists in the field who have practical orientation in entrepreneurship education. National Universities Commission NUC (2004) opined that giving the students good orientation and enlightenment on the aims and objectives of entrepreneurship as well as involving them fully in all the entrepreneurial programmes will aid the attainment

of the MDG project of self reliance and sustainable development.

Findings from table 4 revealed that there is no significant difference between the mean rating of males and females lecturers opinions on the entrepreneurial skills needed by university students. This finding is in line with the report of FRN (2004) which stated that various skills when acquired will help to build entrepreneurial expertise among graduates as it helps them be self reliant so as to contribute immensely to the development of himself and the society where he lives and operates in.

In table 5, it was seen that there was no disparity in the opinions of males and females lecturers in relation to the problems facing the acquisition of entrepreneurial skills. Many researchers like Isah, Erwart and Fabunmi (2009), and Iheonunekwu (2003) agreed that most of the Nigerian schools are in a sorry state characterized by dilapidated structures, overcrowded classrooms, unavailability of basic teaching and learning materials. Also in agreement, United Nations Education Scientific and Cultural Organization UNESCO (2006) added that a major challenge facing entrepreneurship education in Nigeria is lack of fund resulting to poor fiscal allocation to the educational sector which has never been in conformity with the UNESCO standard of 26% of the total National budget to education.

The findings from table 6 showed that there is no significant difference between the mean ratings of males and females lecturers opinions on the measures to be employed in helping the students to acquire entrepreneurial skills for self reliance. All the above corroborates with the work of Osaam (2009) who asserted that staff of the right quality and quantity should be selected for the holistic and functional entrepreneurship programmes in schools. All the above will help the students increase their commitment to entrepreneurial skills development.

RECOMMENDATIONS

The following recommendations were made based on the findings:

1. Government and other stakeholders in education should expose the students to other acquisition subjects such as Information Communication Technology and Vocational Technical Education in addition to entrepreneurship education. These will make them acquire the skills that will help them be self reliant so as to contribute to both self and national development.
2. Efforts should be made by the government to improve the teachers motivational packages which will

in turn enhance their participation and commitment to the teaching of entrepreneurship education.

3. Government should also provide human, material and financial resources needed for proper implementation and acquisition of the needed entrepreneurial skills by these students.

CONCLUSIONS

The period of government employment is becoming a dream except for those who have acquired certain specialized skills. From the foregoing, it has been observed that those who want to survive and compete favourably in the labour market must be exposed to the acquisition of entrepreneurial skills that help them be self reliant so as to contribute their quota to national development. Therefore, emphasis should be laid on entrepreneurship education where the recipients are made to acquire more and additional saleable skills as well as understand the requirements of the world of work. This work has gone a long way to identify the skills needed by the education students such as managerial, financial, creative, innovative among others. The problems that hinder the acquisition of these skills as well as the possible measures to be employed to help these students acquire the needed entrepreneurial skills. All these when acquired will enhance self reliance and self fulfillment.

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LEVEL OF INCOME, MARITAL STATUS AND HOME BACKGROUND VARIABLES AS PREDICTORS OF CRIMINAL TRAITS AMONG NIGERIAN PRISONERS

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ABSTRACT

The study investigated the relationship between each of the level of income, marital status and home background variables as they are related to the nature of the crime committed. This was with a view of ameliorating crime rates in Nigeria. The study employed the survey research design. The population for the study comprised of all criminals inmates in Nigeria prisons. A purposive sampling technique was employed in selecting 150 inmates prisoners from Agodi Prison, Ibadan in Oyo State Nigeria and Kosere Prison, Ile-Ife in Osun State Nigeria. An instrument titled "Socio Economic and Educational Background of Convicted Prisoners" (SOEBCP) was designed by the investigator to elicit information from the respondents. An analysis was carried out using simple percentages and chi-square statistics. The results showed that there is a significant relationship between level of income and nature of crime committed ($\chi^2 = 56.025$, $p < 0.05$). Also there is a significant relationship between home background variables and nature of crime committed ($\chi^2 = 85.197$, $p < 0.05$). However, there is no significant relationship between marital status variables and nature of crime committed. ($\chi^2 = 35.468$, $p > 0.05$). The study concluded that crime as a deviant behaviour must be prevented if not totally checked in order to avoid resultant effect such as loss of life and property.

KEYWORDS: income, marital status, homebackground variables, criminal traits, prisoners

INTRODCUTION

The word "crime" is derived from a certain academic field of study known as criminology. Criminology is the scientific study of crime, criminals and criminal behaviour. Criminologist conduct research that examines factors related to crime. They also study individual to learn how and why people become criminals. Crime can be defined as a vice afflicting the well being of the society. It is a cankerworm eating the fabric of the entire nation. (Canadian Criminal Justice Association 1989, Collin 1981). In another way, crime is referred to many type of misconduct forbidden by law. It is an illegal attitude. The list of acts considered crimes is constantly metamorphosing for instance, crime practice and how it is been considered as an offence is vastly dynamic and not static. An act is viewed as a crime if enough evidence exists to make law executors believe that a violation of the criminal law has taken place. However, the law does not consider an accused person a criminal unless a judge finds him guilty. A criminal may be imprisoned based on the law of the community in which the crime was committed or trial was held.

Crimes are often divided between acts that most people would consider evil and acts that lawmakers decide should be regulated in the interest of the community. The first group includes such major crimes as arson, assault breach of the peace, burglary, kidnapping, larceny, murder, rape and robbery. Categories of crimes

involve severe punishments. The second group includes violation of income tax law, liquor control regulations, pure food and drug laws, and traffic laws which are generally punished by fines or other relatively light penalties. Hence, crime is basically categorized into various types: i. crime against people or property ii. crime against felony or misdemeanors iii. crime against public order or morality iv. white collar crime and v. organized crime (Feather and Cross, 2000, Hartingel, 1979, Room and Toni, 1992, Tower, 1999, Zastrow 1996, and Waller & Waller 2004).

To curb this milieu, the first agent of socialization has a lot of role to play. In the days of old, criminals were found to come from illiterate and semi-illiterate families. But today, the situation has changed, most of the criminals are from broken homes, educated families, either rich or poor. One then begins to wonder whether socio-economics and educational background variables of a child determines if he will be a criminal or not. Without any doubt, the family is the most significant single agent of socialization in all societies. It has the main responsibility for socializing children in the crucial early year of life. The family is where children establish their first close emotional ties, learn language and begin to internalize cultural norms and values. To young children the family is all encompassing.

Committing crimes are not restricted to adult alone, children and youths also commit an anti-social act, it is called delinquency. When these crimes are committed by an adult, he/she is criminally straightened and prosecuted, but when a juvenile commits a crime, he is completely excluded from criminal prosecution because he is seen as incapable of committing crime or anticipating the outcomes or consequences of their actions. According to the Nigeria law, person aged eight to eighteen (8 – 18) years are referred to as juvenile and are presumed capable of committing crimes, whose consequences they may not anticipate. A lenient view therefore, taken by the law in dealing with them; some of which are putting the children in corrective institutions like the Approved schools and the Remand Homes. Hence, they are socialized and corrected because they cannot be sent to the prison at their age. Such persons are called juvenile delinquents.

Over the past two decades, a significant emphasis has been laid on the impact of family structure on child's behaviour and his development. Formal researchers have an accumulating body of evidence that children raised in different family contexts display different patterns of outcomes across a wide range of developmental domains. Children raised in one-parent families have been found on average, to do less well across a wide range of measures of well being than peers in two-parent families, while parent separation has been found to be associated with an array of adverse outcomes for children (Awujoola, 2007).

Jaffe (2007) further stated that there are negative consequences of child abuse like behavioural, emotional and physical effects. The behavioural effects comprises of problems in school and work, delinquency, teen pregnancy, suicide attempts, criminal or antisocial behaviour, substance abuse, aggressive behaviour, spousal and child abuse. Emotional effects include low self esteem, depression and anxiety, eating disorders, relationship difficulties, alienation and withdrawal personality disorders. Physical effects are injury, death, lifelong health problems and cognitive difficulties. Knowledgeable observations have concluded that the evidence fails to support a conclusion that parent families cause crime.

Parental rejection may affect the way in which children regard both themselves and others, but failure to provide consistent guidance deprived the children of opportunities to gain approval to behave in accordance with parental rules. If parents treat their offsprings with disdain, the children are likely to regard themselves as unworthy of care and may come to believe that the way they are treated is how they should treat others. (Austin & Irwin, 1990, Barnes & Michael, 1992, Coleman and

Thorson, 2002) The Nigerian society today presents a typical picture of a society where disintegration and disorganization has gained a firm root. The rapid rate of urbanization and the craze for rapid technological development has led us to abandon some of the traditional modes of life. Hence, there is great rush and migration into urban towns, which invariably led to socio-cultural disintegration and breakdown of effective communication, economic pressure, dis-socialization, insecurity, conflicts in value system, confusion of social roles, to mention a few of the dimension, which is a definable and meaningful force, which seems to be modus operandi. It is not surprising therefore to see that the nation is engulfed in a social malady. Law violation by both adults and juveniles has become widespread and constituting one of the greatest national concerns.

It is surprising that youths are very much involved, the situation has not been helped by the fact that many criminals have been sentenced to death. There is hardly any day one cannot see on the pages of our daily papers about rise in crime rates. Lawlessness and disorderliness (indiscipline) has become a cankerworm, which has eaten deep into the bloodstream of every Nigerian.

The alarming rise in the incidence of delinquent behaviour and crimes in the country should attract a combined attention of social scientists, psychologists, as well as all meaningful Nigerians so that the basic underlying factors affecting deviance could be found. It is only when such is done can we find a lasting solution to the problem of crime and alarming incidence of delinquency in this country. (Durojaye, 1999, Fayombo, 2001).

STATEMENT OF PROBLEM

Evidences indicate that the rate of criminal acts in Nigeria is on the increase. According to the police report in recent times, minimum of fifty youths in a year face trial at the Iyaganku court in the city of Ibadan alone, which is just one of the major cities in Oyo State not considering adults whose crime rate is very high (Prisons warrant 2010). The problem leads to poverty, low intelligence, conflict in the family, broken homes, lack of affection from parents, humiliation and lack of success in the school, and inferiority feelings arising from real or imagined physical deviations, parent educational background and so on.

There is therefore an urgent need to examine which of socio-economic or home background variables or both are capable of causing or promoting crimes rate in Nigeria and probably suggest possible solutions; hence this study.

RESEARCH QUESTIONS

- (1) Is there a significant relationship between the level of income and nature of crime committed?
- (2) Is there any significant relationship between the level of marital status and nature of crime committed?
- (3) Is there any significant relationship between the home background variables and nature of crime committed?

METHODOLOGY

This study employed the survey research design. The population consisted of all the inmate prisoners in Nigeria prisons. Purposive sampling technique was employed in selecting 150 convicted inmates (sentenced to various terms of imprisonment) drawn from Agodi Prisons, Ibadan in Oyo State and Kosere Prison, Ile-Ife in Osun State. A self-constructed questionnaire for prison inmates (convicted) was constructed by the researcher. The instrument consists of two sections. Section 'A' contains personal data of the inmates, which

includes inmates' age, sex level of education, occupation before arrest (if any) and so on. Section 'B' deals with actual information on the convicts view on crime, which have four points like – scale rating of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). The respondents are to tick the appropriate corresponding response. The instrument was validated before use and the reliability coefficient yielded 0.76. Permission to involve prison inmates for the study was obtained from the Prisons superintendent through personal connection. The researcher was allowed thrice in a week to have access to the convicts. The data collected were collated and analysed using frequency distribution (percentage) and chi-square statistics.

RESULTS

Research Question 1

- (i) Is there a significant relationship between the level of income and nature of crime committed?

Table 1: Distribution of Respondent on Income

Income		Stealing	Robber	Arobbery	Assault	Murder	Forgery	Reperer	Fraud	Man Slup	Total	Chi-square value	P - Value
LESS 10,000	Count	0	0	1	2	0	1	0	0	0	4	56.025	0.005
	Expected count	1.0	1.0	.5	.4	.2	.2	.2	.3	.2	4.0		
	% of Total	0%	0%	7%	1.3%	.0%	7%	0%	0%	0%	2.7%		
10,000 20,000	Count	21	21	10	6	3	1	6	4	6	78		
	Expected count	18.7	20.3	8.8	8.3	4.2	3.6	3.6	5.7	4.7	78.0		
	% of Total	14.0%	14.0%	6.7%	4.0%	2.0%	7%	4.0%	2.7%	4.0%	52.0%		
20,000 30,000	Count	5	12	1	4	1	1	1	2	2	29		
	Expected count	7.0	7.5	3.3	3.1	1.5	1.4	1.4	2.1	1.7	29.0		
	% of Total	3.3%	8.0%	7.9%	2.7%	7%	.7%	.7%	1.3%	1.3%	19.3%		
40,000	Count	2	5	0	4	2	0	0	1	0	14		
	Expected count	3.4	3.6	1.6	1.5	.7	.7	.7	1.0	.8	14.0		
	% of Total	1.3%	3.3%	.0%	2.7%	1.3%	.0%	.0%	.7%	.0%	9.3%		
50,000 above	Count	8	1	5	0	2	4	0	4	1	25		
	Expected count	6.0	6.5	2.8	2.7	1.3	1.2	1.2	1.8	1.5	25.0		
	% of Total	5.3%	7%	3.3%	.0%	1.3%	2.7%	0%	2.7%	.7%	16.7%		
TOTAL	Count	36	39	17	16	8	7	7	11	9	150		
	Expected count	36.0	37.0	17.0	16.0	8.0	7.0	7.0	11.0	9.0	150.0		
	% of Total	24%	26.0%	11.3%	10.7%	5.3%	4.7%	47%	7.3%	6.0%	100.0%		

The table above shows the distribution of respondents on income of the inmates sampled. The table reveals that the 2.7% inmates were earning less than N10,000. 52.2% were earning between N10,000 and N20,000. 19.3% of the inmates sampled were earning between over N20,000 and N30,000. 9.3% were earning above N30,000 and N40,000 while 16.7% of the inmates sampled were earning income of N50,000 and above.

The chi-square tests shows result less than 0.05% ($\chi^2 = 56.025, p < 0.05$). This explains that there is significant

relationship between income and nature of the offence committed.

From the above table, it could be observed that 28.7% of the inmates sampled were jobless, 33.3% were artisans, civil servants were 7.5%, farmers were 4.0% , drivers were 14.0%, traders were 10.0% and were peculiar with certain types of work.

Research Question 2

- (ii) Is there any significant relationship between the level of marital status and nature of crime committed?

Table 2: Distribution of Respondent on Marital Status

Marital Status		Stealing	Robber	A.R	Assault	Murder	Reperer	Forgery	Fraud	Manshute	TOTAL	Chi-square valve	P - Value
Single	Count	20	18	9	7	2	2	5	7	8	78	35.468	0.062
	% of Total	13.3%	12.0%	6.0%	4.7%	1.3%	1.3%	3.3%	4.7%	5.3	52.0%		
Married	Count	15	28	6	7	6	5	1	4	1	63		
	% of Total	10%	12%	4.0%	4.7%	4.0%	3.3%	7%	2.7%	7%	42.0%		
Divorced	Count	0	0	2	0	0	0	1	0	0	3		
	% of Total	0%	0%	1.3%	0%	0%	0%	.7%	0%	0%	2.0%		
Widowed	Count	1	3	0	2	0	0	0	0	0	6		
	% of Total	7%	2.0%	0%	1.3%	0%	0%	0%	0%	0%	4.0%		
TOTAL	Count	36	39	17	16	8	7	7	11	9	150		
	% of Total	24.0%	26.0%	11.3%	10.7%	5.3%	4.7%	47%	7.3%	6.0%	100.0%		

From the above table, it is clear that 52.0% were single, 42.0% were married 2.0% were divorce, while 4.0% were widowed. The crimes committed were spread over all categories of marital status. From the table above, $\chi^2 = 35.468$ $P > 0.05$ which means that there is no

significant relationship between marital status and the nature of the crime committed.

Research Question 3

(iii) Is there any significant relationship between the home background variables and nature of crime committed?

Table 3: Distribution of Respondent on Background

Background		Stealing	Robbers	A.R	Assault	Murder	Reperer	Forgery	Fraud	Manshute	TOTAL	Chi-square valve	P - Value
Single Parent	Count	0	0	1	2	0	0	0	0	0	3	85.197	0.007
	% of Total	0%	0%	7%	1.3%	0%	0%	0%	0%	0%	2.0%		
Both parent	Count	8	6	4	1	2	4	0	3	1	29		
	% of Total	5.3%	4.0%	2.7%	7%	1.3%	2.7%	0%	2.0%	7%	19.3%		
Widower	Count	16	5	5	5	4	1	3	4	3	46		
	% of Total	10.7%	3.3%	3.3%	3.3%	2.7%	7%	2.0%	2.7%	2.0%	30.7%		
Polygamous	Count	5	3	0	1	1	1	2	4	3	20		
	% of Total	3.3%	2.0%	0%	.7%	7%	7%	1.3%	2.7%	2.0%	13.3%		
Monogamous	Count	1	7	1	0	0	0	0	0	0	9		
	% of Total	7%	4.7%	7%	0%	0%	0%	0%	0%	0%	6.0%		
Guidance	Count	2	8	5	5	0	1	0	0	1	22		
	% of Total	1.3%	5.3%	3.3%	3.3%	0%	7%	0%	0%	7%	14.7%		
Widow	Count	4	6	1	2	0	0	2	0	1	16		
	% of Total	2.7%	4.0%	7%	1.1%	0%	0%	1.3%	0%	7%	10.7%		
Divorced	Count	0	4	0	0	1	0	0	0	0	5		
	% of Total	0%	2.7%	0%	0%	0%	7%	0%	0%	0%	3.3%		
TOTAL	Count	36	39	17	16	8	7	7	11	9	150		
	% of Total	24.0%	26.0%	11.3 %	10.7%	5.3%	4.7%	47%	7.3%	6.0%	100.0%		

The above table shows the distribution of respondents on background of the inmates sampled (Parents) 2.0% were from single parent, 19.3% came from both parents family, 30.7% were from widow, 13.3% came from polygamous home, 6.0% were from monogamy families, 14.7% were children who stayed with guardians, 10.7% were widowed, while 3.3% were products of divorced families. The chi-square test here shows the significant level less than 0.05. It is 0.007 which means that it is less than our significant level of 0.05. Therefore parental background has significant

relationship with the nature of crime committed. ($\chi^2 = 85.197, p < 0.05$)

SUMMARY OF THE RESULTS

1. There is a significant relationship between the level of income and nature of crime committed.
2. There is no significant relationship between marital status variables and nature of crime committed.
3. There is a significant relationship between home background variables and nature of crime committed.

CONCLUSION

Crime is a deviant behaviour that must be prevented if not totally checked. The resultant effects of criminal acts were social, economic, loss of lives and property. In general criminals usually end up in jail, for some months, years of life sentence if guilty and may also be executed for such criminal acts.

It therefore becomes necessary that parents, the society, the government and non-governmental organizations should make concerned efforts to prevent, control and eradicate the menace of criminals and crime in general in our society.

RECOMMENDATIONS

Based on the findings in this study, the following recommendations were made. These recommendations have to do with the ways and means of crime prevention in Nigeria.

- i. Government should provide jobs
- ii. Prisons should be reformed. It should be for training not for punishment
- iii. Prisons should be discouraged to allow proper training.
- iv. The minimum wage should not be less than N40,000
- v. Society should accept the ex-convicts into the society
- vi. Our education should involve practical, and should be made free.
- vii. Parents should look after their children's welfare.
- viii. Inmates should not be allowed to stay too long in prison because this can make them to be more hardened.
- ix. More security agents should be provided.
- x. The cost of living should be cut down.
- xi. Abuse of human rights should be discouraged.

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PERCEPTION OF NIGERIAN STUDENTS TOWARD THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN ENHANCING LANGUAGE LEARNING

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ABSTRACT

The 21st century has come with rapid advancement of technology. This has brought many changes into various spheres of our lives. ICT plays an important role in ensuring that the needs for these new changes are met. Consequently, many language educators are urged to integrate ICT into their language classes. One of the purpose of this, is for it to serve as a means of creating experiences for enhancing learning. This paper, therefore, tries to find out the perception of students towards the use of ICT in enhancing learning and English as Second Language (ESL) learning in particular. The challenges in using ICT for language learning in Nigeria are also examined. Four out of the 16 institutions existing in Kano state have been randomly selected. Then 140 students have also been randomly selected. A questionnaire is used. The data is analyzed using simple percentage and descriptive analysis. The findings have shown that the respondents believe that ICT can be used to enhance communicative competence and develop more language skills. Some of the challenges for using it in Nigeria are problems of power/electricity failure and of connectivity.

KEYWORDS: perception, learners, ICT, Nigeria, language learning.

INTRODCUTION

“The use of computers and the internet no longer need to be positioned in fixed places, mobile technologies allow interaction via text messaging and access to the internet wherever and whenever one wants” (Lim and Oakley, 2013).

It is largely agreed, today, that ICT has become an essentially significant tool to be utilized not only by teachers but also by learners in order to ensure a better and more effective language learning experience. In fact, its correct manipulation in language learning experience can be stimulating and engaging for learners, thereby empowering them to control the experience themselves. However, certain factors may serve as barriers to its effective implementation in the learning (and teaching) process(es). With this in mind, this study attempts to find out the perception of Nigerian students towards its role in enhancing learning in general and language (English) learning in specific. It is also going to unfold the factors affecting its proper utilization in the learning process in Nigeria.

STATEMENT OF THE PROBLEM

In many Nigerian institutions of learning, particularly at the secondary and primary schools levels, the outdated methods of chalk-blackboard teaching and paper-pencil learning still operate. There is no innovation in the teaching and learning processes despite the fact that today ICT is providing many teaching and learning

opportunities that affect learning in many positive ways. This is to say that while other teachers and learners in many countries are already benefitting from this age of technology those in Nigeria are left behind.

PURPOSE

This study examines:

1. The perception of Nigerian students towards the role of ICT in enhancing learning and ESL learning in particular.
2. The factors affecting the use of ICT in the learning process in Nigeria.

RESEARCH QUESTIONS

1. What are the perceptions of Nigerian students towards the role of ICT in enhancing learning and ESL learning in particular?
2. What are the factors affecting proper integration of ICT in the learning process in Nigeria?

SIGNIFICANCE OF THE STUDY

The human aspects of sustainable development depends on people understanding each other, sharing experiences and ideas. Hence, communication is the key to any form of development and this is achieved through language. In most cases development comes not from the effort of a single person but rather from the combined efforts of

many individuals. Language is the only sustainable weapon that can bind people from different nationalities together to work as one in order to achieve many developments. English language, being an international language, is crucial in sustainable development in Nigeria and globally. It is a key factor to unending developments in the area of education, economy, agriculture, technology et cetera. One of the purpose of education is development (technical development and professional enhancement, for example) and education in many countries such as Nigeria can be achieved through English language. This is the reason why in Nigeria, for example, a firm knowledge of English language is an assurance of 'climbing the ladder of success'. In fact it is one of the two subjects (the other being Mathematics) that is made compulsory for every student to pass in the West African School Certificate examination for him/her to be admitted into any Nigerian university and subsequently offers a speed access to employment. Also in the economic sector, for example, English is crucial for economic growth as it can help economists to trade more widely on an international scale. Today, there is an increased need for English language skills not only to students offering English as a course but to others in, for example the banking, film and pharmaceutical industries and even those vocational workers such as electricians, carpenters et cetera. This study may help people from different fields to engage in independently learning the English language through different ICT resources in order to acquire the basic language skills and increase their competence in the language which can lead to sustained developments in various fields and alleviation of poverty.

In language education specifically, the findings of this study are expected to be of relevance to policy makers, curriculum planners, language educators and language learners. This is because it will provide useful insights into the positive (and perhaps, negative) impacts of ICT on language learning.

Hence, the findings can encourage policy makers to include its use in educational policies for improving the quality of education. Curriculum planners can use the findings to plan for its proper integration in the curriculum. To language educators, the study will serve as an eye-opener on the relative influence of ICT in language learning thereby helping them to prepare for its proper implementation in classroom teaching. More importantly, the language (ESL) learners may use it to decide on when, where and how to use it in the learning process.

LITERATURE REVIEW

Potentials of ICT in Enhancing Language Learning

According to Adomi and Kpangban (2010), the adoption and use of ICTs in schools have a positive impacts on teaching, learning and research. It is widely used in the teaching and learning of ESL. English teachers all over the world are trying to involve ICT in their teaching in order to make students' learning more effective and motivating, (Yang, 2001; Young, 2003). This is because ICT has been found to have the potentials of building intrinsic (and extrinsic) motivation and fostering interactivity, (Warschauer and Meskil, 2000; Cannizzaro and Daniella, 2001; Gambrell, 2006; Oakley and Jay, 2008).

The American Psychological Association; APA (2005) has stated that when learners are exposed to learning tasks using ICT, positive attitudes can be triggered towards language learning. This is almost similar to the findings of a study conducted by Norlida and Supyan (2002) which shows that there are positive changes in the students' motivation, anxiety level and confidence when they are exposed to learning via ICT. These might have been due to the fact that ICT provides a variety of learning opportunities, (Yunus, 2007).

Educators, according to Ahmad (2010), recognize its ability to create both independent and collaborative learning environment in which students can learn English more easily. In fact, the finding of a study conducted by Yunus, Salehi and John (2013) has shown that teachers have a positive perception that the use of visual aids in reading literary texts arouse students' interests towards reading such texts. Moreover, ICT is of great importance in improving communication skills for Computer-mediated communication (CMC) provides ESL learners with the opportunities to communicate not only locally (nationally) but globally for they feel less threatened to communicate, (Gonglewski, 2003 in Ngoa, 2005; Tu et al, 2007; Larson, 2008; Sweeny, 2010; Gumbo and Mawire, 2013).

In the area of language learning, Melor (2007) in Yunus et al (2014) has claimed that the internet and the World Wide Web are able to provide supplemental language activities which assist students with learning specific language areas. With regard to this, many studies have shown that ICT can play an important role in helping ESL learners to improve their spelling (Torgeson and Elbourne, 2002), reading (Wise, Ring and Olson, 2000; Fasting and Lyster, 2005; Brooks et al, 2006), writing (Goldberg, Russell and Cook, 2003; Hartley, 2007; Shang, 2007; Handsfield et al, 2009; Rathore, 2011), speaking and listening (Warchauer and Healey, 1998). Grammar will be learnt subconsciously by ESL learners

through the use of ICT (Gumbo and Mawire, 2013). Pronunciation and vocabulary quizzes, games and puzzles in ICT virtual library catalyzes ESL learning by students, (ibid).

These two writers' study has summed it up by showing that with proper utilization of ICT by English language teachers, students' language learning experiences can be enhanced thereby preparing them for successful live careers.

Factors Affecting the Use of ICT in Learning

Many factors affect the use of ICT in the learning (and teaching) process(es) despite its positive impacts on and its potentials in enhancing learning. Various studies have identified numerous factors/reasons that slowed the adoption of ICT in the learning process.

A study conducted by Bozdogan and Ozen (2014) shows that lack of knowledge skills, technical problems and lack of confidence negatively influence its use in teaching and learning. In somewhat similar views, lack of confidence, lack of access to resources, problems of connectivity and affordability are seen as obstacles to proper utilization of ICT in the learning process, (Davis and Danning, 2001; Oliver, Bradley and Boyle, 2007; Bingimlas, 2009). Another study conducted by Khan, Hasan and Clement (2012) on barriers to the introduction of ICT into education in developing countries shows that lack of ICT supported infrastructure, insufficient funds, poor government/school vision and plan, political factors such as lack of interest in allocation of fund to ICT by political leaders, negative teachers' attitude/beliefs are major hindrances to the use of ICT in education. In yet another study conducted in Harare secondary school, lack of clear sense of direction on how to use ICT to enhance the learning of students, inadequate resources and support as well as lack of technological skills among teachers have been identified as barriers to effective integration of ICT in the school, (Ndawi, Thomas and Nyaruwata, 2013).

In Nigeria, Kadiri (2012), in his study, claims that the inherent challenges to the use of ICT in education are due to the fact that educational policy and planning as well as contents have not been reviewed to suit the computerized world of the 21st century. Other factors as identified by him are capacity building and financing. However, the findings of Maduekwe's (2006) study show many barriers affecting the use of ICT in education among which are power factor, which ranked first and attitudinal factors, which ranked least. Other factors arranged according to their rankings arranged to their rankings in the study include: economic, political,

socio-economic, health, training, personal, psychological and cultural.

METHODOLOGY

The study is purposively conducted in Kano state of Nigeria, this being for convenience. Students from tertiary institutions have been selected because of their intellectual maturity and level of exposure to ICT infrastructures due to the time-period they have been in the educational system. There are fourteen (14) higher institutions of learning in the state out of which four (4) are randomly selected. One hundred and forty (140) students ---thirty-five (35) from each institution--- have been randomly selected.

The researcher uses a self- structured questionnaire in order to generate information related to the study. The ratings in the questionnaire are made on a 5-point Likert-type scale. The data collected are analyzed using simple-percentage and description analysis.

DATA PRESENTATION AND ANALYSIS

In this section, strongly agreed and agreed are regarded as simply agreed and strongly disagreed and disagreed are regarded as disagreed in the description of the findings. Likewise very frequently and frequently are presented as frequently and very rarely and rarely as simply rarely.

Table 1: Students' perspectives on the most common use of ICT by learners

ITEM	SA	A	U	D	SD
Communicating with friends, colleagues and others	72 51%	47 34%	- 0%	19 14%	2 1%
Surfing the internet to get information	54 39%	49 35%	- 0%	20 14%	17 12%
Learning (through online courses, reference tool etc)	19 14%	20 15%	6 4%	51 36%	44 31%

Table 1 shows that students perceive the most common use of ICT to be communication. As many as 119 (85%) agreed that ICT is mostly used for communication with only 21 (15%) disagreeing. A good number (103/74%) also agreed that ICT is used for getting information while 37 (26%) disagreed to that. On the contrary, only few students (39/29%) agreed that ICT is commonly used for learning with as much as 95 (67%) having an opposite view while 6 (4%) are undecided. This shows that most students use ICT for communication and searching for information and not for learning as more than 70% use it for the first two purposes with less than 30% using it for the latter.

Table 2: Students' perspectives on the general impacts of ICT on learning

ITEM	SA	A	U	D	SD
increases motivation	35 25%	88 63%	- 0%	11 8%	6 4%
building learner's confidence	18 13%	36 26%	42 30%	39 28%	5 4%
promotes independent learning	26 19%	81 58%	12 9%	20 14%	1 1%
increases active involvement of learners	26 19%	83 59%	11 8%	19 14%	1 1%
makes learning convenient/easy for learners	38 27%	80 57%	2 1%	15 11%	5 4%
increases learner's interest in the learning task	27 19%	91 65%	- 0%	22 16%	- 0%
leads to better academic performances	17 12%	63 45%	20 14%	38 27%	2 1%
makes learning difficult	5 4%	7 5%	5 4%	82 59%	41 29%
makes learning boring	3 2%	9 6%	5 4%	88 63%	35 25%
promotes time-wasting	- 0%	12 9%	8 6%	92 66%	28 20%

The above table shows students' perspectives on the general impacts of ICT on learning. Most of the respondents have positive perception on the impacts of ICT on learning as follows: 123 (88%), 118(84%), 118 (84%), 109 (78%), 107 (77%), 80(57%) and 54 (39%) have agreed that ICT can increase learners, motivation, makes learning convenient/easy, increases learners' interest in the learning task, increase active involvement of learners, promotes independent learning, leads to better academic performance and build learners'

confidence respectively. Others disagreed to the above with 42 (30%), 12 (9%), 11 (8%), 2 (1%) and 20 (14%) undecided as regards items number 2,3,4,5 and 7 respectively. On the other the only few that agreed that ICT makes learning difficult, boring and time-wasting constitute only 8/9% but almost all other respondents disagreed with 5 (4%), 5(4%) and 8(6%) undecided respectively. This shows that students believe that ICT has more positive impacts than negative ones.

Table 3: Frequency for the use of ICT in learning

ITEM	VERY FREQUENT	FREQUENT	RARE	VERY RARE	NEVER
searching for word meaning	26 19%	92 66%	12 9%	7 5%	3 2%
practicing vocabulary exercise	15 11%	49 35%	49 35%	16 11%	11 8%
writing blogs in English	2 1%	4 3%	9 6%	30 21%	95 68%
reading news in English/English newspaper	33 24%	41 29%	27 19%	21 15%	18 13%
searching for sample of English essays	11 8%	32 23%	54 39%	43 31%	- 0%
checking for pronunciation of English words	2 1%	16 11%	63 45%	27 19%	32 23%
learning grammar	13 9%	46 33%	49 35%	21 15%	11 8%

The findings in this table show how frequent students use ICT in learning ESL. As many as 118 (85%) respondents use ICT to search for word meaning, 19 (14%) rarely use it for that while 3 (2%) do not use it at all. Those who frequently use it to practice vocabulary exercise constitute 46%, 49 (35%) never use it while 27 (19%) rarely use it for that purpose. Very few (6/4%) frequently use it to write blogs in English, 39 (27%) rarely use it while as many as 95 (68%) never use it for that. 74 (53%), 48 (34%) and 18 (13%) frequently,

rarely and never use ICT for reading news in English/English newspaper respectively. The responses as regard the use of ICT to search for sample of English essay show that the same number (43/31%) frequently and rarely use it for that purpose with as many as 54 (39%) not using it at all to do same. Also, 18 (12%) and 59 (42%) frequently use ICT to learn pronunciation and grammar respectively. However, 90 (64%) and 70 (50%) rarely use it while 32 (23%) and 11 (8%) use it for those purposes accordingly. The table confirmed

what was obtained in table 1, that students do not normally use ICT for learning. In learning ESL, the most common use of ICT is to search for word meaning as more than 80% frequently used it for that purpose. Next to this use, is the use of ICT for reading news in English/English newspaper as a little above 50% used it to do so. However, the use of ICT for all other purposes listed in the table is below average, that is, below 50%.

Table 4: Students' perspective on the benefits of ICT in learning ESL

ITEM	SA	A	U	D	SD
helps improve both English and ICT skills	24 17%	93 66%	- 0%	17 12%	6 4%
convenience to get information related to English language	31 22%	87 62%	6 4%	13 9%	3 2%
increases motivation towards learning ESL	18 13%	93 66%	- 0%	24 17%	5 4%
builds ESL learners' confidence in using English to communicate	29 21%	76 54%	12 9%	19 14%	4 3%
improves reading skills	28 20%	67 48%	6 4%	27 19%	12 9%
enhances learners' English writing ability	33 24%	71 51%	5 4%	29 21%	2 1%
improves ESL learners' grammar	13 9%	68 49%	4 3%	39 28%	6 4%
develops learners' listening skills	16 11%	83 59%	6 4%	20 14%	15 11%
increases ESL learners' English vocabulary	20 14%	92 66%	- 0%	27 19%	1 1%
enhances communicative competence	23 16%	101 72%	- 0%	14 10%	2 1%

Results tabulated in table 4 show that most of the respondents believe that ICT is beneficial in the process of learning ESL. Some of the benefits as indicated by respondents' agreement are: helps improve both English language and ICT skills (117/83%), convenience to get information related to English language (118/84%), increases motivation towards learning ESL (111/79%), builds ESL learners' confidence in using English to communicate (105/75%), improves reading skills (95/68%), enhances learners' English writing ability (104/75%), improves ESL learners' grammar (81/58%), develops learners' listening skills (99/70%), increases ESL learners' English vocabulary knowledge (112/80%), enhances communicative competence (124/88%) respectively. However, the following numbers/percentages disagreed accordingly to the preceding statements: 23 (16%), 16 (11%), 29 (21%), 23 (17%), 39 (28%), 31 (22%), 45 (32%), 35 (25%), 28 (20%) and 16 (11%). Some of the respondents, 6 (4%), 12 (9%), 6(4%), 5 (4%), 4 (3%) and 6 (4%) are undecided as regard to the statements in items 2, 4, 5, 6, 7 and 8 respectively.

Table 5: Students' perspectives on the factors affecting effective use of ICT in language (ESL) learning

ITEM	SA	A	U	D	SD
lack of access to infrastructure	22 16%	84 60%	- 0%	32 23%	2 1%
lack of/inadequate ICT facilities	19 14%	77 55%	- 0%	42 30%	2 1%
frequent power/electricity interruption	43 31%	86 61%	- 0%	11 8%	- 0%
high cost of ICT facilities	11 8%	67 48%	- 0%	36 26%	26 19%
lack of technology skills	28 20%	63 45%	11 8%	29 21%	9 6%
lack of computer literacy	13 9%	24 17%	15 11%	58 41%	30 21%
problem of (internet) connectivity	31 22%	69 49%	- 0%	35 25%	5 4%
poor ICT policy	16 11%	40 29%	49 35%	26 19%	9 6%
non-integration of ICT into the school curriculum	21 15%	67 48%	8 6%	32 23%	12 9%
lack of proper of guidance from teachers	28 20%	89 64%	- 0%	23 16%	- 0%
lack of learners' self-motivation and interest	- 0%	18 13%	20 14%	80 57%	22 16%

Table 5 illustrates the percentage of respondents on statements related to their perspectives on the factors affecting effective use of ICT in language learning. Many respondents, 106 (76%) agreed that lack of access to infrastructure in an obstacle to the use of ICT in language learning while 34 (24%) disagreed to that. As many as 96 (69%) are of the view that lack of/inadequate ICT facilities is the factor affecting the use of ICT in language learning while 44 (31%) are of the opposite view. Most of the respondents (129/92%) believe that frequent power/electricity interruption is a problem to the proper utilization of ICT in language learning while only 11 (8%) disagreed. High cost of ICT facilities and lack of technology skills are seen as barriers to effective use of ICT in language learning by 78 (56%) and 91 (65%) respondents respectively while 62 (45%) and 38 (27%) have opposite views accordingly as regard to that. 11 (8%) of them are, however, undecided as to whether lack of technology skill is a factor worth considering. 100 (71%) agreed that problem of internet connectivity is a factor affecting the use of ICT in language learning while only 40 (29%) disagreed. Poor ICT policy, non-integration of ICT into the school curriculum and lack of proper guidance from teachers are agreed, by the respondents, to be barriers to the proper utilization of ICT in language learning by 56 (40%), 88(63%) and 117 (84%) respondents respectively while 35 (25%), 44 (32%) and 23 (16%) disagreed accordingly. 49 (35%) and 8 (6%) are undecided to the first two views above respectively. However, lack of learners' self-motivation and interest is not regarded as a factor affecting the use of ICT in language learning for as many as 102 (73%) disagreed to the statement while only 18 (13%) agreed with 20 (14%) undecided.

CONCLUSION

The findings of the study has shown that most students do not use ICT for learning, however, a lot of them have positive perceptions that ICT can be used to create new experiences thereby enhancing learning in general and ESL learning in particular. They believe that ICT can be used to increase motivation and interest in learning, promote independent learning and active involvement of learners in the learning process. Moreover, in ESL learning students have a good perception that ICT can enhance communicative competence, develop more language skills such as writing, reading, listening and speaking and also very much develop learners' vocabulary. On the other hand, students have identified many factors that affect the use of ICT in learning. The most prominent ones are frequent power/electricity interruption, lack of proper guidance from teachers, lack of access to infrastructure and problem of internet connectivity. The researcher is of the opinion that these factors might have been the reason why students, in Nigeria, do not use ICT for the purpose of learning. But then, the researcher again poses the question: if these factors are the ones affecting the use of ICT in the learning process why not in communication since most of the respondents use it for the latter purpose? Further studies may explore this.

There should be an integration of ICT into the language classroom. Various projects (including students' centred ones) which integrate English for international communication with education for sustainable development and the use of information technology should be implemented by those with the authority to so. This will help to develop the capacity of people to communicate on individual and cooperative actions that can work toward an economically buoyant and environmentally sound future for all.

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STAFF TRAINING PROGRAMMES AND PUPIL'S ACQUISITION OF ENTREPRENEURIAL SKILLS IN BASIC EDUCATION IN CROSS RIVER STATE NIGERIA

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ABSTRACT

The teacher is no doubt the pivot on which qualitative education and development hang while entrepreneurship skills is a major driver of innovation and economic growth. This study aimed at determining the influence of staff training program on pupil's acquisition of entrepreneurship skills in basic education in Cross River State, Nigeria. Three research questions and three null hypotheses were formulated to guide this study. Stratified sampling technique was used and sample sizes of three hundred teachers were selected from the three educational zones. A reliability estimate of 0.68 and 0.72 was obtained. Pearson product moment correlation statistics was used for data analysis. The results revealed that there is a significant influence of teacher's attendance at workshop, conferences and seminar on pupil acquisition of entrepreneurship skills. Summary and conclusion were drawn in line with the findings. It was therefore recommended that Government should organize regular training for teachers as this will encourage further the spirit of enquiry and creativity as this will help teachers fit into the social life of the community and to enhance their commitment to national objectives.

KEYWORDS: teacher training, entrepreneurship skills, economic sustainable development, pupil's acquisition & Cross River State.

INTRODUCTION

Basic Education according to the federal republic of Nigeria (FRN 2004) shall be of a 9 year duration, comprising 6 years of primary education and 3 years of junior secondary education. Apart from being free and compulsory, it shall also include adult and non-formal education programmes at primary and junior secondary levels for adult and out-of-school youths. Basic education is the foundation for sustainable life-long learning. It provides reading, writing and numeracy skills. It comprises of a wide variety of formal and non-formal educational activities and programmes designed to enable learners to acquire functional literacy. Basic education is aimed at equipping individuals with knowledge, skills and attitude that will enable them live meaningful and fulfilling lives, contribute to the development of the society, derive maximum social, economic and cultural benefits from the society and discharge their civic obligations completely (FGN 2004:13).

The national policy on education fundamentally stipulated building of a free and a democratic society; a just and egalitarian society; a united, strong and self reliant nation; great and dynamic economic opportunities for all citizens (FGN 2004). To have a functional education- education that will enable the students to be self reliant, self employment that will

create wealth and help to develop the immediate community and the Nigerian society. According to the National Policy on Educational (FGN 2004), entrepreneurship education will be effectively managed when students are trained to be literate, be able to count, have manipulative skills trained in trades and craft of the community at the primary level, and also prepared for higher education by being provided with technical vocational and other relevant skills for employment at the secondary school.

Entrepreneurship education prepares individuals to be self-reliant and self sufficient for it offers knowledge skills and attitudes which would make beneficiaries to be gainfully employed. Entrepreneurs have creative ideas they use their management skills and resources to meet identifiable needs in the market place. Creativity is related to entrepreneurship. Entrepreneurship can also be seen in other words as a form of creativity which as well can be labelled as a business or entrepreneurial creativity because of the influence on new businesses, thus, making them look original and useful.

According to Udeh (1999), entrepreneurship consist of generating business ideas, identifying investment opportunities, making decisions towards exploiting the opportunities, formulating organizational objectives, conducting market research and survey, combining

service resources, establishing an enterprise, starting the business etc. there is no gain saying that entrepreneurship education acquisition will assist the pupils to optimally utilize their potentials and resolve their psycho-social problems. A close examination of our national objectives for primary and secondary education explains why entrepreneurship education is a fulcrum upon which the success of the implementation of skills acquisition can be hinged. No wonder we see Ghanaian's practicing their trades and crafts after graduating from primary school, they are taught various vocational and technical subjects from which they acquire different skills that make them self-reliant and less dependable. However, the contention is that for entrepreneurship education to be effective, it must not only be about factual knowledge and the limited skills acquirable in the classroom, but should also be about stimulation in new ventures and the increasing capacity of the entrepreneur to pursue even greater success, Osakwe (2011). This is to say that acquisition of entrepreneurship skills by primary/secondary school students can be effectively achieved through professionally trained and skilled teacher to teach these children to meet the national demands for skill acquisition.

The teacher is no doubt the pivot on which qualitative education and development hang. Any attempt made towards educational development and qualitative education must involve a dynamic and well-articulated teacher training programme that will prepare teachers for the indispensable leadership role they are expected to play. Adebeyeje (1999). Accordingly, Fafunwa (1985) viewed teacher training in this context as the teaching and learning experiences provided not only within teacher institutions but also outside them with the basic aim of preparing and grooming potential teachers for teaching activities.

Edem (2003) state that staff development does not only refers to teachers training, it also embodies a lot of other learning/training opportunities such as workshops, seminars, conferences, demonstration lessons, exchange visits, interest study groups, teachers meetings, classroom visits and supervision by school heads. Aswathappa (2002) posit that a multitude of methods of training are used for retraining and development such as conferences, workshop and seminars.

More so, Okoi (2006) is of the opinion that educational managers have recognized that training and development offer a way of developing skills to enhance teachers productivity in the school, therefore, just like the performance of sportsmen depend on constant training so does the performance of teachers in any school. Sergrovanni and Elliott (2000) state that, the

laboratory approach otherwise called workshop, is implicitly and explicitly demonstrated as an important aspect of teacher training staff training programme in form of workshop approach they said, is all about training and development to this effect, workshop approach usually has some characteristics. These include, the participant is actively involved in contributing to solving a problem, or conducting an analysis, the activity generally requires study of an actual situation, a real problem, or uses live data, either self-volunteered or from observation of others, feedback is provided to permit each participant to compare his reaction with those of others and data or impressions are discussed and analyzed to develop generalizations and implications for practice Okoi (2006) maintained that during workshop, staff are exposed to new knowledge; ideas, skills and abilities. Ozigi (1997) also stated that workshop is a safe place to experiment and practice new behaviours. It exposes teachers to other perspectives and active dialogue and that; there is also inspiration, motivation and vision to change behaviour.

Teachers' ability to contribute rationally to existing knowledge implies that they must be professionally competent and informed. Chase (1999) posit that teachers attendance is seminar helps in bringing teachers up in line with the needed specialization in various aspect of education. He added that the idea behind seminar is to confront participants with methodology of their chosen career and also to familiarize them with practical problems that might crop up in their routine work. Williams (2004) is of the opinion that teachers on the job should be given on job-training after 3years in service and that retraining in the form of seminars has several benefits for teachers such as up-dating their knowledge of teaching, learning new skills in methods, leaning modern methods and techniques and being up-to-date with the teaching job.

Okeke (2012) in his view, in any given establishment, the workers must be well motivated in order to put in their best. According to him, they need to be constantly encouraged to attend conferences pertaining to their job expectations in order for them to update their knowledge and put in their best in their performance. He further went on to say that the enrichment of teaching profession by conferences becomes more pertinent and more noticeable with the challenging development in the society; that knowledge of many years becomes increasingly inadequate to cope with current problems in teaching. There is a paradigm shift in global development agenda and Nigeria and Cross river State in particular cannot pretend not to be affected by its current and emerging impact. It is for this and other significant reasons that nations have placed the highest development priority on building a critical mass of their

human capital. Also government around the world are thus focusing on strategies to increase access to and improve the quality of education (Ademu, Hakeem, Usuman-Gbadebo, Aniebonam, Bada and Chief Aloy, 2005).

STATEMENT OF PROBLEM

The simple truth today is that no nation can effectively succeed in solving her century development challenges unless the national vision, aspiration, mission and strategies are fundamentally anchored in the realm of knowledge creation and teachers training. NEEDS recognized that about half of Nigerians are children. They are the bridge to a prosperous future. Therefore their education must be given the priority it deserves. Thus, it become imperative that provisions must be made, actions taken to improve entrepreneurial skills for these children in order to enable them live a meaningful and fulfilling lives and to contribute to the development of the society. There is therefore, the need for well trained, certificated and qualified teachers if this is to be achieved.

PURPOSE OF THE STUDY

The purpose of this study is to determine whether;

1. Teachers attendance at workshop relate to pupils acquisition of entrepreneurial skills.
2. Teacher's attendances at seminar relate to pupils acquisition of pupils entrepreneurial skills.
3. Teachers attendance at conference relate to pupil acquisition of entrepreneurial skills.

RESEARCH QUESTIONS

1. To what extent does teacher's attendance at workshop relate to pupils acquisition of entrepreneurial skills?
2. How does teacher's attendance at seminar relate to pupils acquisition of entrepreneurial skills?
3. How does teacher's attitude at conference relate to pupils acquisition of entrepreneurial skills?

STATEMENT OF HYPOTHESES

1. There is no significant relationship between teachers attendance at workshop and pupils acquisition of entrepreneurial skills.
2. There is no significant relationship between teachers attendance at seminar and pupils acquisition of entrepreneurial skills.
3. There is no significant relationship between teachers attendance at conference and pupils acquisition of entrepreneurship skills.

METHODOLOGY

This study adopted a survey research design. The study area comprises of three educational zones and stratified sampling technique was used in selecting teachers and

pupils in the three educational zones. A sampled of three hundred teachers and three hundred pupils were selected. One hundred (100) teachers and 100 pupils were selected from each educational zone. Instrument titled staff training questionnaire (STQ) and pupils acquisition of entrepreneurial skills questionnaire (PAESQ) was used for data collection. Fifteen items statement were used for staff training questionnaire based on teacher's attendance at workshop, seminar and conferences, while ten item statements were used for pupils acquisition of entrepreneurial skills. A reliability estimate of 0.68 and 0.72 was first obtained using Cronbach Alpha reliability estimate.

RESULT AND DISCUSSION

The result of the data obtained in this study is presented below:

Hypothesis one

There is no significant relationship between teachers attendance at workshop and pupils acquisition of entrepreneurial skills.

Table 1: Pearson product moment correlation analysis on the relationship between attendance at workshop and pupils acquisition of entrepreneurial skills

Variables	N	\bar{x}	SD	r-val
Teachers attendance at workshop	300	14.25	2.37	0.281
Pupils acquisition of entrepreneurship skills.		14.75	2.36	

$R(300) = 0.28, p < 0.05, \text{critical } r .113$

The result of this table revealed that there is a significant relationship between teachers attendance at workshop and pupils acquisition of entrepreneurship skills. $R(300) = 0.281$, this does not support hypothesis one.

Hypothesis 2

There is no significant relationship between teachers attendance at seminar and pupils acquisition of entrepreneurial skills.

Table 2: Pearson product moment correlation analysis on the relationship between attendance at seminar and pupils acquisition of entrepreneurial skills

Variables	N	\bar{X}	SD	r-val
Teachers attendance at seminar	300	14.78	2.22	0.147
Pupils acquisition of entrepreneurial skills		14.75	2.36	

$R(300)=0.147, p < 0.05, \text{critical } r = 0.113$

The result of table 2 revealed that there is a significant relationship between teachers attendance at seminar and

pupils acquisition of entrepreneurial skills. $r(300)=0.147$, $p<0.05$. this also does not support hypothesis two.

Hypothesis Three

There is no significant relationship between teachers attendance at conference and pupils acquisition of entrepreneurial skills.

Table 3: Pearson product moment correlation analysis on the relationship between attendance at conference and pupils acquisition of entrepreneurial skills

Variables	N	\bar{X}	SD	r-val
Teachers attendance at conferences	300	14.48	2.73	
Pupils acquisition of entrepreneurial skills		14.75	3.36	0.307

$R(300)=0.307$, $p<0.05$, critical $r=0.113$

The result of this table revealed that there is a significant relationship between teachers attendance at conference and pupils acquisition of entrepreneurial skills, $r(300)=0.307$, $p<0.05$. this also does not support hypothesis three.

DISCUSSIONS

The result of hypothesis one revealed that there is a significant relationship between teachers attendance at workshop and pupils acquisition of entrepreneurial skills. The result of this finding is in line with the findings of Sergiovanni and Elliott (2000) who stated that, the laboratory approach otherwise called workshop, is implicitly and explicitly demonstrated as an important aspect of teacher training. Staff training programme in form of workshop approach usually has some characteristics include, the participant is actively involved in contributing date and solving a problem. Okoi (2006) maintained that during workshop, staff are exposed to new knowledge, ideas, skills and abilities. Ozi (1997) in support of the result of this funding stated that workshop exposes teachers to other perspectives and active dialogue and that, there is also inspiration, motivation and vision to change behavior of the child toward the acquisition of entrepreneurial.

Hypothesis two revealed that there is a significant relationship between teachers attendance at seminar and pupils acquisition of entrepreneurial skills. the result of this finding is in consonance with the findings of Williams (2004) who in his opinion stated that teachers on the job should be given on the job-training after 3 years in service and that retraining in the form of seminars have several benefits for the teachers such as up-dating their knowledge of teaching, learning new skills or methods, learning modern methods and

techniques and being up-to-date with the teaching job. Chase (1999) posit that teachers attendance in seminar helps in bringing teachers up in line with new technological changes and the needed specialization in various aspect of education including entrepreneurial education. The result of hypothesis three also revealed that there is a significant relationship between teachers attendance at conference and pupils acquisition of entrepreneurial skills. Okeke (2012) stated that the enrichment of teaching profession by conferences becomes more pertinent and more noticeable with the challenging development in the society. That the knowledge of many years becomes increasingly inadequate to cope with current problems in teaching.

CONCLUSION

Teacher training is synonymous with teacher education; this is so because, teacher training programme provides basic training for the teachers to either update their knowledge, increase their skills or equip them with teaching techniques/methodologies. While education is one of the most important foundations for economic development, entrepreneurship is a major driver of motivation and economic growth. Therefore, in order to live effectively today, the graduate of universal basic education must possess adequate innate cognitive skills and interpersonal skills which would enable him/her become more entrepreneurial. Based on these, this paper reveals that with the pupils' acquiring entrepreneurial skills at tender ages, the will be able to identify their line of engagements on time so as to be able to reduce the problems of unemployment vis-à-vis poverty alleviation and reduction.

RECOMMENDATIONS

The following recommendations were made:

- ❖ Government should organize regular training such as seminar, conferences, workshop and symposium for teachers as this will encourage further the spirit of enquiry and creativity as this will help teachers fit into the social life of the community and to enhance their commitment to national objectives.
- ❖ Early vocational training and career awareness would expose the pupils to productive and useful activities that will lead to sustainable development, increase productivity, create employment and accelerate economic growth.
- ❖ Government and teachers should expose the pupils to trades and crafts such as soap manufacturing, basket weaving, interior and exterior decoration show repairing and making, dress making and pastry making.

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EDUCATION AS A PANACEA FOR NATIONAL CAPACITY BUILDING STRATEGY, FOR SUSTAINABLE DEVELOPMENT AND POVERTY ALLEVIATION IN NIGERIA

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ABSTRACT

This Paper examines education as a panacea for national capacity building for sustainable development and poverty alleviation in Nigeria. To the perspective and analytical observer of the Nigeria scenario, there are many problems in the education system which threaten its survival, development, relevance and utility. The paper discusses the role of education and its subsectors (pre-primary basic, secondary, tertiary and non-formal education) in enhancing sustainable development and poverty alleviation with a view to exploring the readiness of the country in their march towards, actualizing the set goals for economic development. This paper, in consequence, suggests key factors and the way forward for enhancing Nigerians national capacity building through education for sustainable development and poverty alleviation. To remain relevant in the global space, Nigeria must begin to make education a high priority in strategic planning, policy formulation and implementation for sustainable development and poverty alleviation.

KEYWORDS: Education, Capacity building, Development, Poverty alleviation, Nigeria

INTRODUCTION

Education is as old as human existence on earth. Upon all the primary human life survival tools and skills, education stands out as the most singular powerful instrument of life, sharpening and retooling all the others, along the years. Education today still remains a global matter in all the nations, because of the intellectual power it produces which governs all aspect of life and sustainable development. Since 1960 when Nigeria gained political independence, the country has had governments with low capacity for people-driven and inclusive development programming options. In many of these governments, decisions on the type, location and timing of a development intervention was a function of the whims and caprices of policy makers who hardly understood the interface between development and conflict, especially in the heterogeneous society of Nigeria. Numerous development projects were poorly conceived and as a consequence, impacted negatively on the people. Needless to say that, development challenges bordering on issues of human rights, academic, political and economic inclusion were part of the causal factors of the Nigerian civil war.

The history of inadequate planning capacity in Nigeria has had destabilizing effects on development at the micro (individual), meso (community), and macro (country) levels. In particular, the politics of the exploitation of oil, the control and appropriation of the huge revenues accruable to this sector, and the political economy of systemic corruptions have remained the mainstay of the centrifugal forces that sustain conflict in the context of development. Development and conflict counts as part of

an integrated picture of the social realities that shape Nigerian educational and political economy. Nigeria's choices of development must be moderated in such a way that they are sustainable and ultimately contribute to building peace and reducing the risk of violent conflict (IPCR 2003).

Capacity building strategy deals with the policies, and factors that determine the level of productivity of a country (World Economic Forum, 2013). A country's level of productivity determines the level of prosperity it can attain as well as the rates of return obtained by investment in the country. A globally competitive economy therefore, is one that is able to achieve and sustain high rates of productivity over time through enterprises that are able to compete favorably with any enterprise anytime and anywhere around the globe. Primary and higher education are not only indicators of strategies, but are also key drivers of sustainable development and poverty alleviation for national capacity building. In other words, a country wishing to develop well-functioning institutions, efficient good market, and innovation, for example, must begin with developing a sound educational system that provides the right kind of education and training. Thus, a country's ability to absorb new technologies, to produce goods and services that can reach standards of quality and performance acceptable in international markets, to engage with the rest of the world in ways that are value creating, is intimately linked to the quality of its schools, to the priority given to training in mathematics and science, and to the existence and accessibility of specialized research and training centres. (WEF, 2006).

Thus, there is a strong relationship between the quality of a country's education system and its overall national capacity building. Highly educated workers represent a source of innovations needed to enhance labor productivity if a country's education system is unable to turn out quality graduates into its workforce, the country's productivity will be negatively affected. Therefore, this paper has been simply and precisely structured, using the thematic approach in order to identify the many type of issues the plague our education system. More importantly, suggestions have been proffered on possible and realistic remedies, strategies, and solution. The significance of this study is to form a major contribution to the knowledge bank. It may also be relevant to all stake-holder, educational planners, school administrators, academic and non academic staff, student, private sectors as well as government at all levels. In our search for credible options, and to win friends and support for the education system, we must remind leaders and followers alike that a country become wealthy only when its people are wealthy, and that development occurs only when its citizens are properly educated and empowered to participate fully in the democratic, productive national capacity building for sustainable development and poverty alleviation.

Education, therefore, plays a critical role. It equips citizens with requisite knowledge, skills and competencies. What students require to be productive and to succeed in the global economy are a blend of core academic subjects such as mathematics, physics and economics; skills such as critical thinking, problem solving and creativity; as well as literacy's such as information literacy. Digital literacy and media literacy. Thus, education institutions are challenged to adjust their programme structures, curricular, teaching methods and learning environments to adapt to these new demands. The sector must transform itself to improve its capacity to play this significant role throughout the students' learning journey, beginning with sound early childhood education through basic education to senior secondary and higher education, (Okpala 2014).

Early childhood Care Development and Education (ECCDE)

ECCDE is one of the strongest tools that Nigeria can use to build a strategy for sustainable development and poverty alleviation for future workforce. If children (0-6 age-groups) have access to good nutrition, health care and early stimulations, they will have good foundation necessary for physical and cognitive development in the subsequent years. This will in turn, improve the lives of Nigeria's next generation. Indeed, ECCDE is the most effective strategy to break the inter-generational transmission of poverty and to improve productivity and social cohesion in the long run (World Bank, 2011). If children are not given this opportunity during this critical period, when brain development is most active, it may become more difficult

and more expensive to make them become good learners later in their lives (Okpala, 2014).

Inadequate preparation for schooling and low learning achievement in primary school level could be traced to lack of preparedness for learning. Children who have not learned to read, write or do basic calculations have little chance of benefitting from higher primary school grades, their commitment to education is likely to diminish and they are more likely to drop out of school (Glick & Sahn, 2010; Liddel & Rae, 2011, cited in EFA GMR 2012). Thus, the low productivity of primary education in developing countries might be raised dramatically by substantial investments in the physical and mental development of preschool children. Research suggests that spending on pre-primary education brings the greatest return on investment (Goodnight, 2006, World Bank, 2011). Such investments yield economic returns of 7 to 18 percent, which is much higher than the returns generated by investing in financial capital (World Bank, 2011). For example, in one of the American preschool programmes, the public gained \$12.90 for every dollar spent on the program due to dollars not spent on incarceration, lower spending on education, taxes paid to public coffers because of higher earnings, and savings in public assistance costs (Calman, 2005).

In a globally competitive world, Nigeria should no longer allow children to enter school unprepared to learn and succeed. To this end, Government should make concerted effort to raise the current enrolment rate of 20%, and schools providing such education should focus on relevant content and method of delivery for children at that stage. According to Keat (2012), pre-schools should use play in a fun and purposeful way to stimulate the learning of languages and social-emotional skills as well as invoke a sense of curiosity and love for learning in children.

Basic Education

Basic education is an important phase in a child's education, when a child lays the foundation for future educational opportunities and lifelong skills. The knowledge and skills learned during basic education enables people to participate (socially, economically and politically) in their communities. Basic Education is also seen as a basic human right that frees human beings from a state of ignorance and helps to reduce the negative effects of poverty, relating in particular to health and nutrition (Webster, 2000). Universalizing quality basic education, have catapulted countries to rapid growth. One of such countries is the Republic of Korea, which rapidly expanded its education system from a gross enrolment of 70% in the 1980s to almost 100% by the late 1990s and linked skills development with broader strategies aimed at stimulating the economy (EFA GMR, 2012). In Nigeria, access to basic education has increased considerably at the national

level although it has not reached the desired 100 percent mark and number of out of school children remains high. According to a data released by UNESCO, an estimated 61 million children of primary school age are being denied their right to education globally and, Nigeria alone is home to an estimated 10.5 million (HME, 2013). WEF (2013) also reported that quality of primary education in Nigeria is as low as 2.9 and ranked 119th while enrolment into primary education ranked 144th. Thus, the Nigerian basic education programme must continue to work towards improving quantity and quality of basic education in order to increase access and provide the right education for Nigerian Children. Primary school education must be focused on education to help children build confidence and desire to continue learning. Children must also be helped to acquire the knowledge, skills, values and habits they need to thrive in a future driven by globalization and technological advancements.

Senior Secondary and Higher Education

Senior Secondary school is a crucial period in a child's learning journey during which a learner's character, career aspirations and readiness to take on responsibilities are shaped. Hence, quality secondary education is vital for creating a bright future for individuals and nations alike. As Nigeria strives to reach the goal of basic education for every child, demands for access into senior secondary school are increasing dramatically. Thus, Nigeria must continue to work hard to increase enrolment rate into senior secondary schools. This is particularly important because globalization and international competition increases demand for a more sophisticated labor force. Therefore, basic education is not enough to drive sustainable development. Workers who have received little formal education can carry out only simple manual tasks and find it much more difficult to adapt to more advanced production processes and techniques and therefore contribute less in coming up with or executing innovations (WEF, 2012). Quality higher education is therefore crucial for countries that want to go beyond simple production processes and products.

The above implies that students should be encouraged and supported to pursue education to tertiary level. Tertiary education refers to all postsecondary education including universities, polytechnics, colleges of education, technical training institutes, nursing schools, research centres, distance learning centres, etc. All these forms of tertiary education supports the production of higher order capacity necessary for sustainable development and poverty alleviation.

Non-Formal Education

Nigeria has an alarming number of adult illiterates. According to a UNESCO Report, the number of illiterate adults in Nigeria is 35 million (HME, 2013). Thus, Nigeria

is classified among the nine countries with the highest population of illiterates in the world. The group otherwise known as the E9 countries includes Nigeria, Bangladesh, Brazil, China, Egypt, India, Indonesia, Mexico and Pakistan. These nations account for about 70% of the world's population (UNESCO, 2012). Learning outcomes from non-formal learning activities have significant value which countries can leverage to reap the benefits of economic growth. It is also a means of actualizing the 'lifelong learning for all' agenda and reshaping learning to better match the needs of the 21st century knowledge economies and open societies. It is therefore important to extend education to people outside the formal schools system.

It is acknowledged that government is making significant efforts to address the illiteracy challenge. One of such efforts is the revitalization of youth and adult literacy programme to which the government had committed a total of USD 6.4 million as a fund-in-trust with UNESCO. The programme is directed towards revitalizing the delivery of adult literacy with the aim of attaining the EFA goal 4 (Reducing adult illiteracy by 50%). Government is, however, encouraged to strengthen its internal strategies to reduce illiteracy through its local agencies, with a view to making every Nigerian a productive individual. (Okpala, 2014).

Challenges of Education For Sustainable Development And Poverty Alleviation

- Existing policy framework cannot adequately support education in a global economy due to the following, among others:
 - the core principles and reasons behind policies are not sufficiently transparent.
 - inadequate fidelity in policy' implementation. i.e., some relevant parts of the education system do not support policies
 - policies are not given enough time to show results due to policy summersaults
- Education is not adequately funded due to scarce resources and inadequate public
 - private partnership in funding education. As a result,
 - teachers' conditions of service is not good and motivating enough to make them undertake the heavier task of preparing students for an entirely new world;
 - education infrastructure such as access roads, classrooms, laboratories, etc. are in poor condition. Thus, the current learning environment cannot meet the demands of 21st century learning; etc.
- Teachers are inadequately trained. Educator preparation programmes in Nigeria are not yet preparing their graduates to possess, teach and assess 21st century knowledge and skills. As a result, they

cannot become change agents for embedding 21st century knowledge and skills in core subjects.

- There is little emphasis on science and technology as well as technical and vocational education and training. These areas are not developed enough to aid success in global competition
- There is continuous brain drain to rich and low performing institutions outside the country.

National Capacity Building Strategy In Education (The Way forward)

Driving Nigeria's sustainable development and poverty alleviation demands educational excellence. In order for the Nigerian education system to reach the level of excellence required to reinvigorate the Nigerian economy and improve its capacity building, the following are imperative:

Globally Competitive Policies

There is need to make educational policies in Nigeria more responsive to challenges of the 21st century. Goodnight (2006) suggests policy options that can keep the education system on its toes and 'deliver answers' to the globalization challenge. Indeed, the issues of national capacity building should be made a priority in strategic planning and policy formulation in Nigeria. In doing this, Nigeria must make more effort in benchmarking highly globally competitive countries in order to formulate educational policies based on strategies that are proven to produce best results.

In this globalised economy, Nigerian educational policies should focus on issues such as:

- creating access to education i.e. making education and training widely available a point in an individual's life time.
- adopting new technologies to aid teaching and learning and increase access to education
- improving learning environments to meet the needs of educating for the global economy
- increasing focus on science, engineering and mathematics as well as Technical and vocational education and training (TVET) in order to create highly skilled technical workforce
- recruiting, rewarding, training, and honouring a new generation of talented teachers.
- ensuring that teacher preparation schools/faculties are strengthened to prepare teachers that can lead the change required for success in the 21st century, among others
- providing more advanced research and development infrastructure
- building research networks among higher education institutions in Nigeria and collaborating with international institutions
- building competitive learning systems encouraging Nigerian students to participate in international tests

-building closer cooperation between universities and industries

-building administrators, teachers and evaluators who can execute policies and innovations in education.

World-Class Teachers

The nature of teaching has changed significantly, creating an exciting and challenging time for teachers and teacher educators. Duncan (2009) believes that teaching has never been more difficult, it has never been more important, and the desperate need for more student success has never been so urgent than it is in the 21st century. Good teaching is at the heart of successful learning and development of competitive minds. Good teachers are those who can use technology to drive learning as well as weave 21st century skills into core subjects through new pedagogy. In fact, the teachers should be of the transformational type associates with new professionalism or new leadership. These are teachers empowered to transform their practice from within at their classroom level, school level, and inter-school and cluster levels. (Okpala, 2014).

Such teachers create and innovate by constantly reflecting on their practice through an established culture of learning and evolving sound teaching and learning principles from their daily work. This culture of learning enables them to view their practice from fresh perspectives each day, ask new questions and seek innovative responses to their own questions. For such teachers, each classroom encounter is an opportunity to demonstrate the learners a culture of learning emanating from an enquiring mind. The learners would see as models to emulate in their projects, group activity; community initiatives experimental groups. All of these enquiry skills prepare the learner to continue to learn and see the teacher as the new professional who serves as a resource for their continual enquiry. Within the schools that such teachers operate, a firm culture of community is rooted in the practice of school enabling them to learn from one another (Fraser, 2007).

Improved Curriculum and Instruction

In transmitting the required skills for success in the 21st century, teachers must adopt teaching methods and materials that will motivate and inspire today's learners. The 21st century learner wants to be engaged with exciting, relevant content and opportunities for learning through experience and by doing. Learners' abilities come in many forms such as visual-spatial, logical-mathematical, kinesthetic and musical, among others. In this century, learners need to be supported to enjoy success no matter where their talents lie. To this end, education institutions are challenged to adjust their programme structures, curricula, teaching and learning methods to adapt to the new demands. Educators are also responsible for monitoring changes in technologies, determining if they apply to their learners and seeking ways to use

technologies to compliment and support instructional methodologies. This is particularly important as students, outside the classroom, are often engaged with such things as playing interactive games as well as communicating and collaborating with people on Facebook. Thus, technology-rich classrooms will help reduce the gap between what students do for fun and what they are required to do in class. This will consequently increase student engagement and academic achievement (Okpala, 2014).

High Quality System Leadership And Accountability

Nigerian educational system needs to begin to pay serious attention to the issue of leaders and accountability at all levels of the educational system (schools, educational parastatals, ministries, etc). For example, teachers, who possess instructional leadership skills, should be made head teachers/principals in schools. These leaders should focus their time on instructional leadership and foster excellence in their schools. School leaders should be accountable to students; questioning if school is staying relevant to their lives while policy leaders will be accountable to employers and citizens; questioning if the system is effectively preparing young people to help meet national aspirations (CISCO Systems, 2008).

In fact, leaders in the education system should be leaders who can ask and seek answers to the following critical questions used by The National School for Boards Association in America to gauge the competitiveness of their education system:-

- What are our goals for enhancing the competitiveness of our students? What assumptions, data, and comparisons are we using to set these goals and how do we achieve them?
- Is the breadth and depth of our curriculum sufficient to teach our students what they need to know? Are our textbooks up to date?
- How are we integrating 21st century skills into core subject matter curricula?
- Do our math and science teachers possess specialized training or expertise in the subject areas that they teach?
- How many Advanced Placement courses do we offer? What are the scores of the students who take AP exams?
- What are we doing about students at risk of dropping out? Are we able to identify them?
- Do we have connections with the university community that can help to enrich our curriculum?
- What opportunities, both in class and extracurricular, do we offer to engage students in STEM (science, technology, engineering, and mathematics) fields? Should we be offering more?
- Are we working with our business community to ensure that what students are learning is relevant and applicable to the work force?

Increased Investment in Education

People are the primary resources of every nation. Improving the quality of citizens and making them

productive individuals plays a critical role in improving the capacity building strategy of Nigeria. Thus, it is important to make education a priority in national budget. Moreover, research has shown that investment in education is more profitable than investment in financial capital.

CONCLUSION

As mentioned earlier, this paper examined education as a panacea for national capacity building for sustainable development and poverty alleviation in Nigeria. There is certainly critical need for reorientation, sensitizations, national rebirth and rebranding in the educational system in Nigeria for sustainable development.

The preparedness of the Nigerian educational system to provide necessary support for sustainable development still leaves much to much to be desired. The system is yet to be of such quality that would turn out people who have the right mix of knowledge, skills, literacies and attitudes into the Nigerian workforce and, therefore, can not effectively help the country improve her national capacity building. This is as a result of supportive policy framework, inadequate funding and lack of qualified teachers among others. It is therefore, important that the suggestions made for enhancing education for sustainable development and poverty alleviation should be given serious consideration, bearing in mind that education not only enhances the productive life of individuals but also the entire economic leverage of a nation.

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*Track Two: National Capacity Building Strategy in Economics,
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MALE INVOLVEMENT IN FAMILY PLANNING SERVICES FOR POPULATION DEVELOPMENT

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ABSTRACT

This study sought to determine the relationship between male partner participation and the uptake of FP services, as men are focused as obstacles to women's contraceptive use and as an untapped group of potential users themselves. A descriptive cross-sectional survey of male partners was done, cluster sampling method was used to select the subjects. Structured questionnaires were used to collect data. Results indicate that majority of the respondents (89%) had the correct information except for a few who thought it to be a brutal method of denying women to bear children. The knowledge of men of what FP is was high while practices were low, only 26% of male respondents accompanied their partners for FP services. FP clinics were not men friendly and many men perceived FP services to be for women only and most of the FP clinics were run by female health workers. The recommendation is that the government sets strategies for capacity building to increase male involvement through IEC and change of attitude. The strategies include, to set up male friendly reproductive health clinics and to create awareness that FP services are for both the man and the woman and also by emphasising a couple counselling approach.

KEYWORDS: male partner, male participation, awareness, attitude and practice, capacity building

INTRODUCTION

Family Planning (FP) services are an important component in reducing fertility and achieving population stabilisation and the overall well being of the family. But access is not the only problem. Many women who said they wanted to delay their next pregnancy for several years were not using any modern method of contraception. Policy makers assume that improving access to contraceptives would close the gap between what women say they want and what they do. But, according to Charles Westoff of Princeton University's Office of Population Research, surveys indicate that even if contraceptives were freely available, about half the women who want fewer children would spurn them. 31% of these women rejected modern contraception due to fear of medical side effects, although Kenyan researchers said that objection is based on myths and misconceptions. Other reasons were religious prohibition (9%) and personal opposition (8%). Less than 1% cited lack of contraceptive access. 6% cited opposition from their husbands. Studies have shown that male partner participation in FP increases the uptake of the services. Male involvement in family planning (FP) means more than just increasing the number of men using condoms

and having vasectomies; male involvement also includes the number of men who encourage and support their partner and their peers to use FP for example accompanying mother to MCH/FP clinic, and who influence the policy environment to be more conducive to developing male-related programs. In this context "male involvement" should be understood in a much broader sense than male contraception, and should refer to all organizational activities aimed at men as a discrete group which have the objective of increasing the acceptability and prevalence of family-planning practice of either sex.

In the past, family-planning programs have focused attention primarily on women, because of the need to free women from excessive child-bearing, and to reduce maternal and infant mortality through the use of modern methods of contraception. Most of the family-planning services were offered within maternal and child health (MCH) centers and most research and information campaigns focused on women. This focus on women has reinforced the belief that family planning is largely a woman's business with the man playing a very peripheral role.

Successful nations emphasize changing people's attitudes about the role of women, ideal family size, age of first pregnancy, and the benefits of using modern contraceptives. They explain how reduced family size enables couples and nations to save more and invest in education, infrastructure, health and industry.

Involving men and obtaining their support and commitment to family planning is of crucial importance in the Africa region, given their elevated position in the African society. Their involvement would therefore not only ease the responsibility borne by women in terms of decision-making for family-planning matters, this would also accelerate the understanding and practice of family planning in general (ibid). In countries where men have participated in FP issues it has been noted that the contraceptive prevalence rate (CPR) tremendously improved and the total fertility rate (TFR) declined. For instance, a study done in the Islamic Republic of Iran showed that men's positive attitudes and beliefs regarding reproductive health (RH) have led to the success of the family planning programme. The family planning (FP) and reproductive health (RH) programmes in Iran have reduced the population growth rate in the country and the maternal mortality rate has fallen below 100/100,000 live births, (WHO, 2006).

In Kenya despite the impressive achievement of the contraceptive program and it being actively addressed, the problems of guaranteeing predictable and sustainable contraceptive security persist. The unmet need of FP is significant and men are considered the dominant member in any family decision making process including decision to use FP methods. Therefore, men's behaviour and attitude have significant impact on the health of women and children, yet very few RH programmes have sought to involve men more. Most reproductive health services in Kenya have traditionally been provided in settings that are predominantly women oriented such as FP clinics (MOH, 2007). To support this, the existing FP structure does not prioritize contacting male partners on FP issues and women health care workers predominantly manage the structures.

In Butula district, the CPR stands at 29%, TFR at 5.6 children per woman. The infant mortality rate is estimated to be 80/100000 live births and maternal mortality ratio of 68/1000 and growth rate of 3.4% (AMREF, 2010; MOH, 2009).

Population increase has a negative effect on prospects for poverty reduction and sustainable development, thus the focus is to increase FP uptake by empowering both men and women in the quest to contribute to population reduction. A report by U.N. in 2012 warned that the world was running out of time to make sure there is enough food, water and energy to meet the needs of a rapidly growing population. The world's population, then at 7 billion, was expected to reach 9 billion by 2040, with 3 billion of them middle-class consumers, increasing the demand for resources exponentially, and at a risk of condemning up to 3 billion people into poverty. The report urged governments to agree on a set of sustainable development goals which would complement the eight Millennium Development Goals to 2015 and create a framework for action after 2015. Investing in better health including reproductive health will reduce maternal and infant mortality rates and in turn improve a country's prospects for productivity and development.

FACTORS INFLUENCING MALE INVOLVEMENT IN FAMILY PLANNING

Men's Knowledge in Family Planning

Although the wife's education level was associated with the type of method used by the couple, the husband's education level has more influence on the use of male sterilisation and condoms. For example, men with any secondary or higher education were more likely than those with none to rely on either of these methods.

The study examining knowledge of men about family planning and its use by the convenience sample of men in Ghana showed that, socio – cultural factors contribute to low level of male involvement. Factors like education, religion, type of marital relationship and exposure to mass media increases knowledge, (Akafuah et al., 2008).

Access to information about RH services is important as it allows individuals to make decisions. The right to information is a human right and enables people to make informed decision. The government has an obligation to provide information, education and counselling about effective methods of contraception to men and women (IPPF, 2007).

The failure to include men in RH programmes leaves them less informed or misinformed about contraception, feeling incompetent or inhibited to discuss it with their partners. Studies show that when men are provided with information about RH, they are likely to be increasingly supportive of their partners. FP decisions and contraceptive use are dramatically higher among couples who have discussed family planning with each other, (Ndong et al., 1999). The limited opportunities of

women to make decisions in most societies restrict their aptitude to improve economic conditions and access services to enhance their well-being, (Zuckerman and Elaine. 2002) Women with fewer children, have time for empowerment, encouraging more economic and political participation, both of which are critical to pulling society out of poverty. It is therefore beneficial to include men in RH programmes if this will increase the uptake of FP services and relieve women from the burden of caring for large numbers of children.

Family planning knowledge in Kenya is almost universal, the male and female are able to develop a national approach to planning their families and therefore contraceptive use has sharply increased in Kenya. CPR was 18% in 1989, 27% in 1993, and 32% in 1998. Despite the achievement, much unmet need for FP persists. 24% of women that would like either to space or limit births are not using a method of FP, (KDHS, 2010).

The Kenya Vasectomy Promotion Project, sponsored by John Hopkins University and the Association for Voluntary and Safe Contraception (AVSC), was designed to increase potential acceptors' knowledge of vasectomy. Messages stress that the vasectomy procedure is simple and safe, that men who have vasectomies remain healthy and virile, and that "wives love it because they no longer fear an accidental pregnancy." Wives in the (femiplan) television commercials: "He's really strong . . . We have great sex!" Radio, television, and newspaper adverts also direct men to visit Kencom House, the male-only clinic in Nairobi, where specially trained male service providers and counselors make men feel welcome

Attitudes Towards Family Planning

There is a strong belief that attitudes and biases held by policy makers, programme managers, health care workers and other types of providers can act as barriers to men's utilization of RH services. These barriers may exist because of the social or cultural values of providers, and include the belief that men are not interested in RH issues or simply the assumption that family planning is a woman's responsibility, (Wegner et al 1998).

In Nepal, sex preference can be another issue related to high fertility rate as preference for a son is held high because of continuity of the family name, performance of funeral rites and the expectation that sons provide security in old age.

In Ghana, the wife's attitude toward contraception is strongly influenced by her husband's attitudes and education (Bankole & Singh, 1998). A study done in

Uganda showed that negative attitude derived from limited knowledge, misconceptions and myths surrounding the FP methods often prevent men and women from making a decision to adopt FP methods, (Kasedde, 2000). The author pointed out myths like vasectomy is equal to castration. Men and women in Uganda believe that vasectomy involves removal of the testicles and that it renders a man being unable to achieve an erection; they also believe that vasectomy means loss of manhood, a man who has undergone vasectomy would also be unable to ejaculate and so would suffer weight gain; possible shrinking of penis and loss of interest in sex. Still from Uganda another study was done using data from 2006 Uganda Contraceptive Prevalence Survey which interviewed women in 5 largest cities, found that husband's approval of contraceptive use and mainly intra uterine contraceptive device (IUCD) was the most important determinant. It was also found that the use of IUCD as contraception was higher among women whose husbands approved of their using contraception than for those whose husband did not (Joesoef et al., 2008).

Family planning methods are surrounded by myths and misgivings e.g. that (IUCD) may get lost in the womb or a child may be born with it stuck on the head. Health care providers have a professional obligation to provide care in a respectful and non judgmental manner. Every interaction between health care staff and clients, from the moment they enter the health care setting until they leave should be non-judgmental and the health care provider should not have an attitude. This makes the client choose the right methods that suits her, (MOH, 2005).

FP practices among men

In Haiti, it showed that FP practices were affected by many reasons. Among them, inconsistency supply of methods (particularly injectable) serious quality of care issues example long waiting times, poor counselling, interpersonal skills on the side of service provider, desire for additional children, method failure and contraceptive side effects, (WHO, 2007).

A study in Nigeria showed that all respondents were aware of contraception and only 69.9% were practicing a form of contraception with their spouse. The most commonly used method was condom at 46% Depoprovera injection, 27% IUCD, 11% oral pills, (Goret press, 2007). And a study conducted in Swaziland by Wallender, noted that men desired more children and considered a great number of children as ideal for Swazi family, (IPPFAR, 2000).

Unsafe abortion continues to be a major public health problem in many countries. A woman dies after every

eight minutes somewhere in the developing countries due to complication arising from unsafe abortion. Global and regional estimates of the incidences of unsafe abortion and associated mortality (MOH, 2005).

Impact of Male Involvement in Family Planning

Decision making

Terefe and Larson's report of a project for Ethiopian men is one of the very few studies to be actually concerned with evaluating the effectiveness of men's involvement as a health-promoting strategy (Terefe and Larson, 1993). It was designed to test whether involving men in family planning discussions with their wives made a difference to the use and uptake of modern contraception methods. An experimental group, which included 266 couples, was compared with a control group of 261 women. Both groups received home visits by female health assistants and traditional birth attendants. Subjects were questioned at baseline and at 2 and 12 months. At 12 months, almost twice as many experimental subjects were using a modern contraception method as controls. The fact that men were participating did seem to make an important difference to contraceptive uptake by their spouses.

Husband's approval

According to Bankole and Singh, (1998) in their study in Ghana, the husband's attitudes and approval plays a big impact on the wife's attitude toward contraception use. A study in Kenya using 2010 KDHS also showed that husband-wife communication, particularly the wife's perception of her husband's approval of family planning, is highly associated with current contraceptive use (Lasse & Becker, 2007). In Kenya reproductive health services have been provided, but guaranteeing predictable and sustainable contraceptive security persists. The men's behaviour, attitude and availability of RH programmes that involve male have significant impact on men involvement in family planning. This is also reflected in Marachi Central.

Achieving MDG 4 and 5

Eight MDGs were developed and adopted at the UN Millennium summit in the year 2000 to fight extreme poverty. Kenya as a country has put strategies to reduce child mortality through endeavoring to increase FP uptake with a purpose of improving maternal and child health. Investments in better health, including [reproductive health](#), are essential for individual security and for reducing mortality and morbidity, which in turn improve a country's productivity and development prospects. For sustainability, the male partner plays a crucial role.

METHODOLOGY

Study Design

This study was a cross – sectional descriptive design that has an advantage over the other types in that the subjects are interviewed at a single point in time, and this gives estimates of point prevalence.

Study Site and Target Population

Butula District is one of the twenty three districts in Western Province of Kenya and it is found in the Busia County. The district borders Mumias district in the North East, Nambale district in the North, Busia district in the North West, Samia district in the west and Ugenya district to the South. The district covers 247.2km². It is divided into 6 locations, 22 sub – locations with 131362 people.

Traditional position of men and women in the society at household level is largely maintained that is the man being the head of the house and the main decision maker. During the poverty eradication strategy paper of February 2001, it was acknowledged that the level of poverty could be lower if adult men and male youths played a role in agriculture. It was also observed that males invest less from sugarcane returns, (BDDP, 2008). The target population of this study were the males of reproductive age and sexually active in Marachi central location which had a population of 33,937 where males were 15,612 (46% of the total population).

Sampling methods and Instruments

The sampling method used in this study was cluster sampling since Marachi central location has many villages (46) and 6535 households and simple random sampling. A list of all the villages was compiled then 10 villages were randomly selected by picking the 5th village where by the last cluster picked the remaining village. The number of households in these villages was added cumulatively to reach the desired sample size of 421 which was distributed into the 10 villages' households per village. The instrument used in this study was a questionnaire comprising of structured questions and a Likert scale which was developed specifically for this study and pre-tested to ensure validity and reliability.

Data Collection Procedure

The major method of data collection used was questioning. The researcher used verbal questioning which involved researcher administered questionnaires to gather data from the respondents and was helped by trained community health workers (CHWs). Data collected was comprised of primary data for this study.

Reliability and Validity

The researcher pre-tested the questionnaire and used standardized protocol of asking questions for all respondents without changing their meaning so as to increase consistency of information collected hence ensuring reliability and validity.

Ethical Considerations

A high level of privacy and confidentiality was observed, identification of participants was kept anonymous to the public and the findings of the study will only be submitted to the university and the District Public Health Nurse (DPHN's) and the chief.

LIMITATIONS

Culture, and language barrier affected questioning because most men believed that FP was a woman's affair. The questionnaire was written in English so when some of the questions were translated in the local language, it is likely that there may have been loose of the real meaning thus getting the wrong information.

DATA ANALYSIS AND PROPER STATISTICAL ANALYSIS

This study used both descriptive and inferential statistics. Raw data was coded and entered into the computer for analysis by use of EPI/excel/SPSS.

Descriptive statistics; this was used in the study to describe variability and dispersion of responses. Measures of central tendency were used to describe expected summary of statistics while measures of variability were used to describe distribution of results. Frequency distribution tables were used to present analysis of variables.

Inferential statistics; Two-way analysis of variance (ANOVA) was used to test interaction among variables of study. This is because the study had one dependent variable and three independent variables. Data was presented in graphs and charts.

PROBLEM STATEMENT

Worldwide more than 129 million women want to prevent pregnancy but they and their partners are not using contraceptives. Reasons for this are many. Fear of social disapproval or partners' opposition pose formidable barriers, as most decisions that affect family life are made by men. Abraham Rugo from the Institute of Economic Affairs agrees. He thinks many people have large families to care for, they don't realize the connection between family size and prosperity, The United Nations Population Fund began the school for husbands program in 2011 in Niger, to help bring down the birth rate. In Niger, you're a big man if you have a big family, yet this is becoming a huge problem. Even the president talked about it being shameful for people

to have 20 kids if they're not able to feed them (NPR National Public Radio).

One male workshop participant said "there are not enough options for men." "We can only choose between using condoms or having a vasectomy, and I tell you, both options are not attractive to me," he said. "But if only they would come up with a pill for men, I would take it at once."(December 10, 2011, Philippine Daily Inquirer)

Worldwide 350million couples lack access to effective and affordable family planning 80,000 women die every year from unsafe abortion. Family planning can prevent 25 – 30% of all maternal deaths, (John Hopkins et al, 2007).

In Sub-Saharan Africa, the contraceptive prevalence rate (CPR) is very low estimated at 13% for married women, the total fertility rate (TFR) is 5.5 children per woman and the risk of maternal mortality ratio is 1:16, these factors compare unfavourably with developed countries where CPR is high, the TFR has declined to 1.6 and maternal death risk is 1:2800. The millennium development goals (MDGs) call for $\frac{3}{4}$ reduction of child mortality and maternal mortality rate in the years 2000 – 2015. In Kenya, use of FP is moderate, with 39% of married women using some form of contraception, unplanned pregnancies are still common and 24.5% women of reproductive age were found by KDHS to have unmet need for FP, (MOH,2007).

In Butula district the CPR is at 29% with TFR of 5.6 and growth rate of 3.4% and Marachi Central location being in the district has the same CPR and yet has 3 facilities offering the FP services, (DMOH, 2010).

JUSTIFICATION

Population growth is strongly influenced by fertility. Today's population of 7 billion people is growing and will continue to grow – how much and how quickly depends to a large degree on reductions in fertility. The most recent data suggest that the population will reach 9 billion by 2050, and 10 billion by 2100. These projections assume that fertility will go down in the least developed countries, which is contingent on an expansion of access to family planning in those countries. But access is not the only problem in Kenya most family planning activities are influenced by male partners. Community Health Worker Beatrice Khalayi Shibunga, who goes door-to-door to offer family planning information in the slums of Korogocho, Nairobi says "Some women are forced to use contraceptives without the knowledge of their husbands," and Elizabeth Lule, Director of Family Planning at the Gates Foundation, says that women

often choose injectable contraceptives because they can use them covertly.

There are things that guys never talk about, like benefits of birth control, the care a woman should take when pregnant, and breast-feeding. But in the School for Husbands program in Niger they are talking about it. Six months after the School for Husbands began in 2004, there are now Schools for Husbands in villages across Niger and more women are asking about family planning. When the schools started, only 5% of women in Niger reported using contraception. Now that figure is up to 13%. At the Second International Conference on Family Planning, held in Dakar, Senegal, at a workshop on "Men Behind Family Planning," a speaker from Nigeria explained that while men have "high awareness" of the need for and importance of family planning, they have "poor knowledge" of the various modern methods of family planning and how these work. Men are "unwilling to use family planning" mainly because they were apprehensive and insecure, and didn't know how exactly they fit in the scenario, he said.

In Sub-Saharan Africa, FP research and intervention place a disproportionate emphasis on women and largely ignore the role of men; as a result, male participation in FP is low.

Kenya strives to meet the Millennium Development Goals (MDGs) number four; to reduce child mortality and number five ; to improve maternal health by the year 2015 (MOPHS , MOMS 2010). FP is one of the strategies in the Health Sector to achieve these goals.

However, low involvement of male partner participation still poses a challenge in the implementation and success of its strategies. It is noted that such efforts will be in vein if male partners do not participate in FP services.

This study aimed to provide information to the District Health Management Team (DHMT) in order to plan for interventions related to promoting wider contraceptive practice among men in Marachi Central location and Butula District as a whole and reduce MMR and to determine the relationship between male partner participation in FP and the uptake of FP services.

RESULTS AND DISCUSSION

Some of the most innovative work has aimed to involve men in protecting their partner's reproductive health as well as their own. Through their greater access to resources and power, men often determine the timing and conditions of sexual relations., family size and access to health care. Previously, the population field tended to focus almost exclusively on the fertility

behavior of women paying little attention to men's roles in its study of the macero dimension and implications of population growth and fertility rates. As a consequence family planning programmes served women almost exclusively. Men generally want more and better information and access to services.

Table 1: Demographic Data

DEMOGRAPHIC DATA			
Variables		N	%
Marital status	Married	237	66.9
	Single	73	20.6
Religion	Catholic	242	69
	Protestant	97	27
	Muslim	14	4
Level of education	None	9	2.5
	Primary	150	42.4
	Secondary	126	35.6
	College and above	68	19.2
Number of children	1 – 4 children	122	34.6
	Above 4 children	231	65.4

As per the data on the table above in the variable of marital status majority of the men were married at 66.9%, 20.6% were single while 12.5% comprised of divorced, cohabiting and widowers. For religion majority were catholic at 69%, protestant were 27% while 4% were Muslim. Level of education majority had primary education at 42.4% followed by secondary at 35.6%, college and above 19.2% and the least were who never stepped in a classroom at 2.5%. On the number of children the respondent had is one to four children was 34.6% while above four children had majority percentage of 65.4%

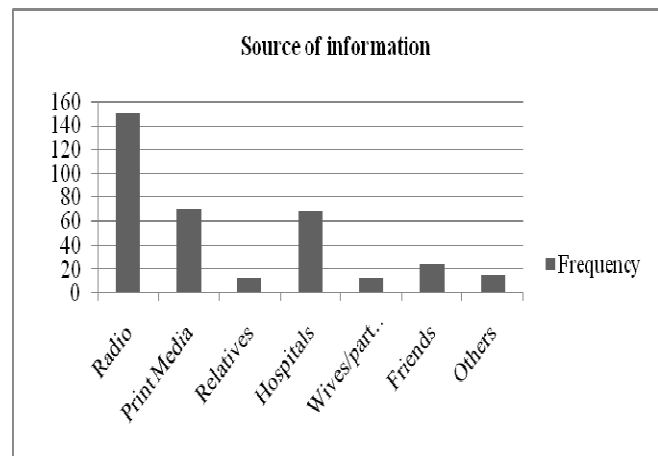


Figure 1: Source of Information

The source of information on family planning was got mostly from the radio 150 respondents followed by print media like newspapers and posters at 70, hospitals came in third with 68 respondents got information from them.

The rest of the respondents got information from relatives, spouses, friends and others at 52 respondents.

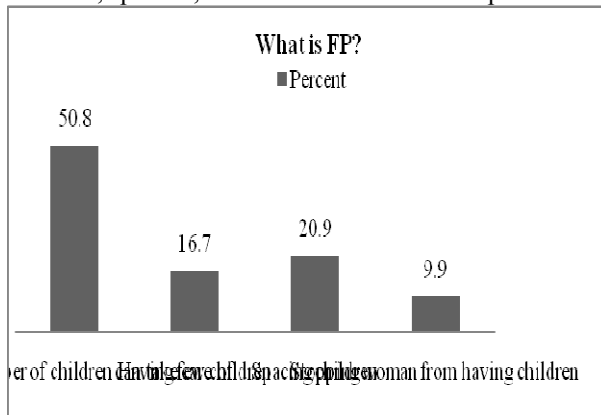


Figure 2: Meaning of FP

The respondents had the knowledge on what FP was, according to this graph 50.8% knew the definition of FP as having the number of children you can take care of, spacing of children was at 20.9%. Having few children and stopping woman from having children was at 26.6%.

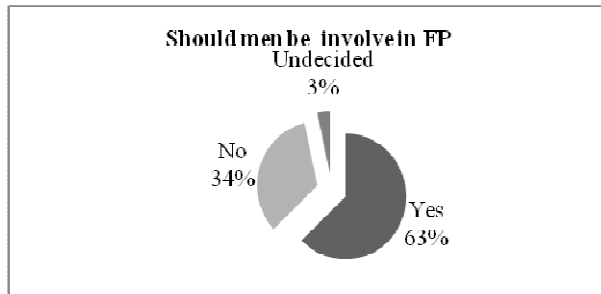


Figure 3: Should Men be Involve in FP?

According to their responses the majority were of the idea that men should be involved in FP at 63% while 34% thought that men should not be involved in FP citing it's a woman affair.

Table 2: Attitudes on FP

Attitudes on FP				
Variables	Agree		disagree	
	N	%	N	%
	Spouse seek FP services without permission from husband	196	56.3	152
Men who accompany wife to clinic are bewitched	79	22.4	269	76.0
Men should accompany their partners to FP clinics	89	25.5	260	74.7
Its taboo for men to discuss with women about FP	249	70.3	99	27.9
Men and women should undergo counseling at the same time	147	41.5	201	56.8
FP clinic are for children and women	118	33.4	230	65.0
FP information first given to men then women	254	71.8	94	26.6

According to the likert scale the men have an attitude towards family planning for instance the ones who agreed to accompany their spouse to FP clinic is only 25.5% while a whole 70.3% think it's a taboo to discuss with women about FP. If we check the number of women seeking FP services without permission from their spouse is high at 56.3%.

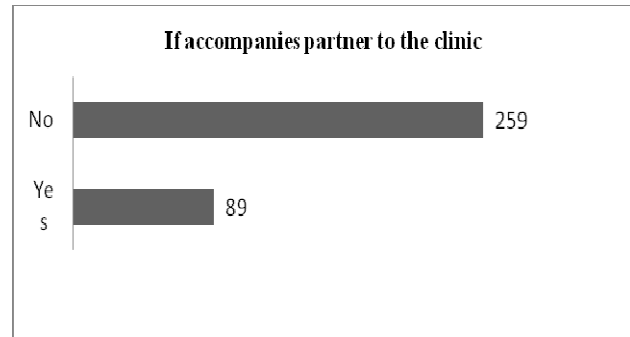


Figure 4: If accompanies partner to the clinic

Majority of the men never accompany their women to the FP clinic at the rate of 259(73.4%) while those who accompany them are a mere 89(25.2%).

CONCLUSION

The knowledge of men concerning FP was high while practices were low based mainly on culture and religion and the lack of understanding of the advantages of FP on the family and the Nation as a whole.

FP clinics are not men friendly and most men perceived FP services to be for women only.

The attitude of men on FP is poor. Majority of African men perceive FP as a woman affair and if they accompany their wives to the FP clinic they will be perceived as weak or over ruled by their women.

RECOMMENDATIONS

- Population and development policies require putting in place IEC strategies to address male attitudes whose decision making undermine women rights on areas that directly affect their health. A well-designed and well-focused IEC campaign can have a positive impact on men by increasing their knowledge and improving their attitudes toward FP; this impact, in turn, will increase joint decision-making.
- The government should setup male friendly reproductive health clinics and encourage men to be involved in FP services, then most families will have the number of children they can take care of and this will help in eradicating poverty in the community.

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SOCIAL CAPITAL FORMATION: THE MISSING LINK AMONG FOOD CROPS FARMERS IN OSUN STATE, NIGERIA

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ABSTRACT

Nigeria situation on food production is precarious as its significant percentage is left with only the bilious taste of insufficiency both in food production and consumption, especially among rural households. They are most vulnerable to this dwindling situations; this dirge persists till today. There is growing evidence that social capital is an additional input in the household's production function and as such, element for sustainable development due to the roles it plays in managing risks, shocks, and opportunities for increased food crop production and improving household welfare. It has been observed that not all social capital leads to growth or development. Some social capital may be beneficial while some may be deleterious depending on the motives behind its formation. Data collected from 233 respondents through multistage sampling was analyzed through composite score analysis, probit and ordered probit regression models. Findings revealed that more than half (66.10%) of the respondents derived intermediate benefits from social group membership. Significant determinants of social capital formation are: age, year spent in school, household size, primary occupation and indigene status. This study concludes that socio-economic characteristics and human capital endowments make significant contributions to social capital formation and the benefits derived from social group membership.

KEYWORDS: Social capital, food crops farmers, ordered probit model, composite score, Nigeria

INTRODUCTION

Social capital can be viewed as a variety of different entities which have two elements in common; that is, it consists of some aspects of social structure and as well as facilitates with certain actions either personal or corporate within the structure (Putnam, 1993). Another view also involves social environment which enables norms to develop and shape social structure. The value of connectedness and trust that exist between people is one of the keys that can sustain development because it lowers the cost of working together and facilitates cooperation (Pretty, 2003). Individuals therefore invest in collective activities knowing that others will also do so. According to Oyen (2000) and Woolcock (2001), an individual acquires social capital through participation in informal networks, registered organizations, associations of different kinds and social movement; it can also represent the sum of these experiences. Therefore, social capital holds strong position to confront poverty and vulnerability (Yusuf, 2008; Okunmadewa *et al.*, 2007), resolve disputes (Schafft and Brown, 2000), and share beneficial information (Yusuf, 2008; Okunmadewa *et al.*, 2007; Isham and Kabkonen, 1999) as well as increase agricultural productivity (Liverpool *et al.*, 2011; Adepoju *et al.*, 2011; Liverpool and Winter-Nelson, 2010; Okunmadewa *et al.*, 2007; Aker, 2007).

The social capital of a society includes the institutions, the relationships, the attitudes and values that govern interactions among people and contribute to economic and social development. Social capital, however, is not simply the sum of institutions which underpin society but also the glue that holds them together. It includes the shared values and rules for social conduct expressed in personal relationships, trust and a common sense of civic responsibility that makes society more than just a collection of individuals (World Bank, 2002). Social capital cannot be left out in the development or in the growth of an economy which makes it a multi-dimensional concept. According to Hu and Jones (2006), social capital is taken to mean very simply durable social networks because the word 'capital' is generally used as a 'stock concept to suggest present sacrifice for future benefit'. With the insight from the social capital definition; we can bring out a basic role of social capital as a factor that helps to bring a cordial relationship with the purpose of resources formation. Among other roles, it also helps in the development of a community through various associations which individually develops with their rules and regulations. This is evident from the submission of Rupasingha and Goetz (2007) who demonstrated that social capital is vital in poverty alleviation, and that strategies such as improving the educational level of the poor and the creation of new jobs do not necessarily guarantee a

reduction in poverty; hence, these efforts must be complemented with the development of social capital if the strategy is to be effective.

Social capital is pervasive and can generate benefits in a range of subtle as well as more visible ways. Trust is the bedrock of most personal relationships, which in turn is a key determinant of human well-being; trust can also give people the confidence to lend small sum of money to a colleague or a friend-in-need, or to allow neighbors to borrow tools and appliances; and living in a trust worthy community reduces the need for expenditures on personal security and policing (Saguaro, 2003). This realization has stimulated interest among policy makers and development practitioners in village and community level organization as a vehicle for social, local and national development; social capital formation therefore cuts across many sectors (Fidmac and Klarita, 2004).

PROBLEM STATEMENT

The general decline in agricultural productivity has translated into gross incapacitation of the sector in meeting the rising food demand and by extension led to incessant food shortages, soaring food prices and massive importation (Imodu, 2005; Onyenweaku and Nwaru, 2005). Tanko *et al.*, (2012) averred that Nigeria's food deficient situation has been worsened by declining food productivity owing to inefficient production techniques and poor resource base among others. It has also been observed that not all social capital lead to growth or development. However, some social capital may be beneficial while some may be deleterious depending on the motives behind its formation; on these motives, social capital destruction is rapid than its formation because it is a behavioral act which entails a series of underlined processes. A negatively motivated social capital can result in many hindrances on the path of the group member, community and the economy at large (Jane *et al.*, 2004). Hence, the need to: analyze the determinants of social capital formation among food crops farmers; examine the level of benefits derived from social capital formation and determine the factors influencing the level of benefits derived from social group formation. This study therefore hypothesized that there is no relationship between households' socio-economic characteristics and the level of benefits derived from membership in local level institution(s) (social groups).

METHODS AND PROCEDURES

The Study area is Osun State, specifically, Egbedore Local Government Area (LGA) of Osun State; its' headquarters is located in an ancient town named Awo. It is located in a warm tropic region of the rain forest of the South Western Nigeria. The choice of this area is premised on the high concentration of farming activities

compared to other areas in Osun state. Majority of farmers engaged in production of food and cash crops such as Cocoa, Kolanut, Palm-products, Orange, Banana, Maize, Yam, Cassava, Cocoyam e.t.c. Respondents for the study were selected through a multistage sampling technique. The first stage involved a purposive selection of Egbedore LGA because of its core rurality, prevalent farming activities, available fund and time; random sampling technique was used to select twenty eight (28) villages from the identified villages in the LGA. Then, Proportionality factor was used to select 240 food crop farmers through random sampling technique; this is because of the variation that exists in the respective population of the villages selected; but data from 233 respondents were found useful for this study because of inconsistent response. Data collected through a well-structured questionnaire was analyzed through composite score which was used to examine the level of benefits derived by respondents from social group membership while probit regression model was used to analyze the determinants of social capital formation among the crop farmers. Also, ordered probit model was used to examine the factors influencing the level of benefits derived by the respondents from social group membership and formation.

PROBIT MODEL

Probit model constrains the estimated probabilities to be between 0 and 1 and relaxes the constraint that the effect of the independent variable was constant across different predicted values of the dependent variable. This was normally experienced with the Linear Probability Model (LPM) (Sebopetji and Belete, 2009). The probit model assumed that while we only observe the values of 0 and 1 for the variable Y, there was a latent, unobserved continuous variable Y* that determined the value of Y. The other advantages of the probit model include believable error term distribution as well as realistic probabilities (Nagler, 1994). Therefore, we assumed that Y* can be specified as:

$$Y^* = X_i^T \beta + \varepsilon \quad (1) \quad \text{where:}$$
$$\varepsilon \sim N(0, 1), \quad Y = 1 (Y^* > 0), \quad 0 \text{ otherwise.}$$

Y = dependent variable (Decision to participate in a social group = 1; 0, otherwise), X_i = vector of explanatory variables, β = probit coefficients; μ_i = random error. Probit regression model was used to estimate the decision to participate as a function of some determinants which are the explanatory variables.

ORDERED PROBIT MODEL

This is a regression model which generalises probit regression by allowing more than two discrete outcomes that are ordered. Ordered probit model is used to model relationships between a polytomous response variable which has an ordered structure and a set of regressor

variables. Using the composite score from the set of questions developed on benefits derived from social capital formation, the level of benefit derived from membership in social capital groups were categorized using ordered probit model into high benefit, intermediate benefit and low benefit which correspond to censoring values 2, 1, and 0 respectively. The standard ordered probit model is widely used and more acceptable compared to ordered logit because the former follows a symmetric normal distribution while the latter follows a logistic distribution to analyze discrete data of this variety (see Adepoju *et al.*, 2011; Abdel-aty (2001); Kawakatsuy and Largeyz, 2008); and it is built around a latent regression of the following form:

$$y^* = x'\beta + \varepsilon \quad (2)$$

where x and β are standard variable and parameter matrices, and ε is a vector matrix of normally distributed error terms. Obviously predicted grades (y^*) are unobserved. We do, however, observe the following:

$$\begin{aligned} y &= 0 \text{ if } y^* \leq 0 \\ y &= 1 \text{ if } 0 < y^* \leq \mu_1 \\ y &= 2 \text{ if } \mu_1 < y^* \leq \mu_2 \end{aligned}$$

where: μ_1 and μ_2 are the cut points (intercepts shifters) i.e. the threshold variables in the probit model. The threshold variables are unknown and they indicate the discrete category that the latent variable falls into which are determined in the maximum likelihood estimation procedure for the ordered probit.

The likelihood for benefit derived by an individual is

$$L = [\Phi(0 - X_i\beta)]^{z_{i0}} [\Phi(\mu_1 - X_i\beta) - \Phi(0 - X_i\beta)]^{z_{i1}} [1 - \Phi(X_i\beta - \mu_2)]^{z_{i2}} \quad (3)$$

$$z_{ij} = \begin{cases} 1 & \text{if } y_i = j \\ 0 & \text{otherwise } \text{or } j = 0, 1 \text{ and } 2 \end{cases} \quad (4)$$

where for the i th individual, y_i is the observed outcome and X_i is a vector of explanatory variables. The unknown parameters β_{is} are typically estimated by maximum likelihood.

Composite Score

A composite score was estimated from the responses to the 10 statements developed on a binary scale; that is scoring 1 point for Yes and 0 for No responses regarding the benefits derived was used to rate the respondents. With 10 statements; a respondent can score a maximum of 10 points and a minimum of 0 point. The categorization into high, intermediate and low benefits was achieved using a composite score as earlier used by Adepoju *et al.*, (2011), Yekinni (2007) and Salimonu (2007): High category = between 10 points to (Mean + S.D) points, Medium (intermediate) = between high and low categories and Low Category = between (Mean - S.D) points to 0 point. Hence, the composite score revealed the level of benefits derived by respondents from social group membership.

Social Capital Variables Definitions And Measurements

The social capital variables that were considered in the analysis include: density of membership, heterogeneity index, meeting attendance index, cash contribution, labour contribution and decision making index. The measurement of these six social capital indices is as explained as follow and this follows the approach earlier used by Grootaert *et al.*, (2002); Okunmadewa *et al.*, (2005); Adepoju *et al.*, (2011). The measurement of each is as described as follows:

Density of membership: this is captured by the summation of the total number of associations to which each household belongs. In other words, membership of associations by individuals in the household is summed up.

Heterogeneity index: this is an aggregation of the responses of each household to the questions on the diversity of members of the three most important institutions to the households. On each of the three associations, each household answered questions on whether members live in same neighbourhood, are same kin group, same occupation, are of same economic status, are of same religion, same gender, same age group and same occupation. Hence, for each of the factors a yes response is coded 0 while no response is coded 1. A maximum score of 10 for each association represents the highest level of heterogeneity. The scores by the three associations for each household are then divided by the maximum score of 30 to obtain an index. This index is then multiplied by hundred (a zero value represents complete homogeneity while 100 represents complete heterogeneity).

Meeting attendance index: this is obtained by summing up the attendance of household members at meetings and relating it to the number of scheduled meetings by the associations they belong to. This value was then multiplied by 100.

Cash contribution: This was obtained by the summation of the total cash contributed to the various associations which the household belong. The actual cash contribution for each household is rescaled by dividing this amount by the maximum fee amount in the data and multiplying the resultant fraction by 100.

Labour contribution: this is the number of days that household members belonging to institutions claimed to have worked for their institutions. This represents total number of days worked by household members. This is also rescaled to 100 using the same process as for cash contribution.

Decision making index: this was calculated by summation of the subjective responses of households on their rating in the participation in the decision making of the three most important institutions to them. The

responses were averaged across the three groups and multiplied by 100 for each household.

Aggregate social capital index: this is obtained by the multiplication of density of membership, heterogeneity index and decision making index (following Grootaert, 1999).

RESULTS

Probit Estimates Of Social Capital Formation

The result of the probit model used to investigate the determinants of social capital formation among the food crop farmers in the study area is presented as follow: Three categories of social capital formation expressed by the type of local level institutions which households belong - social, agricultural and cooperative based organizations formed the dependent variables while the explanatory variables considered in the models were based on literature. The result of the marginal effect of probit analysis as presented in Tables 1, 2 and 3 revealed that age is directly related to membership of social-based organization and inversely related to being a member of agric-based organization; which is significant at (p<0.01) and (p<0.05) levels respectively; however, an increase in age will increase the probability of social capital formation through social-based organization membership by 0.0144 and decrease the likelihood of belonging to agric-based organization membership by 0.0019; this can be due to the fact that ageing as expected, negatively affects the required ability of individuals to engage in farming activities efficiently; hence, opt for social-based organization. Years of formal education is directly related to membership of social-based organization as well as being a member of cooperative-based organization; which is significant at (p<0.1) probability level each; however, an increase in years spent in school will increase the likelihood of social capital formation through social-based organization membership by 0.0163 and cooperative-based organization membership by 0.0008. Meanwhile, household size has an inverse relationship with membership of social-based organization and directly related to being a member of agric-based organization; which is significant at (p<0.1) level each; however, an increase in household size will decrease the probability of social capital formation through social-based organization membership by 0.0442 and increase the likelihood of social capital formation through agric-based organization membership by 0.0096; this suggests that the higher the household size, the less the likelihood of participation in social-based organization and the more the likelihood of participation in agric-based organization because of accessibility of labour which further emphasizes the importance of adequate labour in agricultural activities. In the same vein, primary occupation of household head is inversely related to social capital formation via

membership in social-based organization and positively related to being a member of agric-based and cooperative-based organizations; which is significant at (p<0.05), (p<0.1) and (p<0.1) levels respectively; however, participation in the predominant livelihood activities in the study area will decrease the probability of social-based organization membership by 0.0158 and increase the likelihood of belonging to agric-based and cooperative-based organizations by 0.0046 and 0.0576 respectively; this can be due to the fact that the prevalent occupation in the study area is farming and other farming related activities. And, indigene status of the respondents is inversely related to social group formation through membership in social-based and agric-based organizations; and directly related to cooperative-based organization; which is significant at (p<0.05), (p<0.1) and (p<0.01) probability levels respectively; however, a non-indigene status will decrease the probability of social-based organization membership and agric-based organization membership by 0.00002 and 0.00004 respectively; and increase the likelihood of belonging to cooperative-based organizations by 0.00001; this suggests that participation of majority of respondents in cooperative-based organization was premised on access to credit opportunity attached to this local level institution.

Table 1: Probit estimate for membership in social-based organization

social-based organization	Coefficient	z-statistics
gender	0.2084	0.50
age	0.0144	2.99***
years spent in school	0.0163	1.80*
household size	- 0.0442	-1.74*
consumers-workers ratio	0.0578	0.99
primary occupation	- 0.0158	-2.19**
secondary occupation	0.0241	0.23
working members	- 0.0982	- 0.47
indigene status	- 0.00002	- 2.07**

LR chi² (9) = 17.87, Log likelihood = - 81.5424,
prob> chi² = 0.0002, Pseudo R² = 0.4370,

* ** *** - significant at 10%, 5% and 1% respectively

Source: Data analysis, 2014

Table 2: Probit estimate for membership in agric-based organization

agric-based organization	coefficient	z-statistics
gender	- 0.8082	-1.55
age	- 0.0019	-2.17**
years spent in school	0.0255	0.82
household size	0.0096	1.88*
consumers-workers ratio	0.0314	0.43
primary occupation	0.0046	1.66*
secondary occupation	- 0.04391	- 0.39
working members	0.01802	0.08
indigene status	- 0.00004	- 1.89*

LR-chi² (9) = 19.23, Log likelihood = - 81.2648,
prob> chi² = 0.0000, Pseudo R² = 0.4523,

* ** - significant at 10% and 5% respectively

Source: Data analysis, 2014

Table 3: Probit estimate for membership in cooperative-based organization

Cooperative-based organization	coefficient	z statistics
gender	- 0.2528	- 0.56
age	- 0.0193	- 0.99
years spent in school	0.0008	2.07**
household size	0.1077	0.75
consumers-workers ratio	- 0.0799	- 1.17
primary occupation	0.0576	1.73*
secondary occupation	- 0.0013	- 0.01
working members	- 0.0779	- 0.36
indigene status	0.00001	2.67***

LR chi2 (9) = 16.58, Log likelihood = - 79.813784,

prob> chi² = 0.0006, Pseudo R² = 0.4292,

* ** *** - significant at 10%, 5% and 1% respectively

Source: Data analysis, 2014

Categories of Benefits Derived from Social Group Membership Based on Composite Score Approach

Based on the estimated mean score of 4.29 and standard deviation (SD) value of 0.86, the result in Table 4 revealed that the modal category is the intermediate benefit (66.1%). This is followed by low benefit (27.04%) and 6.86% accounts for the respondents who derived high benefit from social group formation. This result may suggest that there is a flow of benefits from the intended beneficiary to other unintended beneficiaries as a result of 'trust' factor. The result further corroborates the existing literature on the level of benefit derived from group participation (Adepoju *et al.*, 2011; Yekinni, 2007).

Table 4: Categories of benefits derived from social group formation

categories of benefits	Frequency
High benefit	16 (6.86)
Medium benefit	154 (66.10)
Low benefit	63 (27.04)
Total	233 (100.0)

Source: Data Analysis, 2014, figures in parenthesis are percentage values

Ordered Probit Estimates of Factors Influencing the Level of Benefits Derived from Social Group Membership

Table 5 and 6 present the result of the ordered probit model and its marginal effect used to investigate the factors influencing the level of benefit derived from social group membership. The three categories of benefit derived – low, intermediate and high - formed the dependent variables as ordered 0, 1 and 2 respectively while 14 explanatory variables were considered in the model; however, only 13 were allowed in the model from which only 8 were statistically significant at various levels. The significant variables are age, years spent in school, household size, farming status, consumers-workers ratio, meeting attendance, labour contribution and decision-making index. The likelihood ratio chi-square of 121.64 with a

p-value of 0.0000 revealed that the model as a whole is statistically significant. And, the model estimated pseudo R-squared is 0.3412.

Age significantly affects benefit derived from social group at (p<0.1); however, the marginal effect analysis revealed that a unit increase in age of the respondents will reduce the probability to receive low benefit by 0.0013, intermediate level by 0.0026 and will increase the likelihood of receiving high benefit by 0.0023 as presented in Table 6. This can be due to the fact that ageing is likely to reduce the farmers' ability to work effectively on the farm but may likely have high affinity to participate in social groups and make informed contributions and as household head is ageing there is tendency to benefit more from the social group; hence, their involvement in social activities. Also, years spent in school (a proxy for human capital) is also statistically significant at (p<0.1); this suggests that an increase in years spent in school will increase the likelihood of receiving low and intermediate benefits by 0.0034 and 0.0045 respectively and reduce the likelihood of receiving high benefits by 0.0069. This also implies that respondents with high educational level are less likely to participate in social capital formation; this same result is in line with the findings of (Adepoju *et al.*, 2011). Similar pattern was also recorded for household size which is statistically significant at (p<0.05). Consumers-workers ratio is positively related to benefit derived from the social group and significant at (p<0.01); having an appreciable number of household members working increases the probability of receiving high benefit by 0.3321 while large dependency ratio reduces the probability of receiving intermediate or low level benefit.

Then, meeting attendance was found to be significant at (p<0.05) and negatively affect benefit derived from being a member of social group; the result revealed that the more the meeting attended by households, the more the likelihood of receiving low and intermediate benefits by 0.0002 and 0.0006 respectively and the less likelihood of receiving high benefit by 0.0010; suggesting that frequent meeting attendance does not guarantee members of social group from enjoying maximum benefit from the social group(s) to which they belong; this finding does depart from the findings of (Adepoju *et al.*, 2011)

Also, a unit increase in man-day will reduce the likelihood of receiving low benefit and intermediate benefit by 0.0011 and 0.0028, respectively while it will increase the probability of receiving high benefit by 0.0047. This implies that more labour contribution in social groups will increase the benefits derived and vice versa. It is also not surprising that labour contribution

directly affects social capital benefit and it is statistically significant at ($p < 0.01$); this result agrees with the findings of (Yusuf, 2008, Okunmadewa *et al.*, 2007) but deviates from the findings of (Tabi-Atemnkeng, 2009). Majority of farmers in the rural area operate on small scale farming and depend mostly on manual labour; therefore, they need contributory efforts on their farming activities, most especially during land preparation, planting, harvesting etc. Thus, there is the need to form social groups so that they can collectively assist one another on their farmlands whenever duty calls.

In the same vein, the more members of a social group are involved in decision-making, the more they derive benefit from being members of the social group, but as decision-making is positively related to social capital benefit derived and statistically significant at ($p < 0.01$), surprisingly, status in social group which emphasizes on executive membership and obviously enhances involvement decision making is not statistically significant; thus, the result revealed that a unit increase in participation in decision-making process will reduce the probability of receiving low benefit by 0.0014 while it will increase the likelihood of receiving intermediate and high benefit by 0.0019 and 0.0030 respectively as expected; this result agrees with the submission of (Okunmadewa, 2007; Balogun *et al.*, 2011 and Adepoju *et al.*, 2011). This result further implies that it is not

enough to be a member of a social group; active participation is a sufficient and necessary condition to derive the benefits of belonging to one.

Conversely, status in social group is statistically significant at ($p < 0.1$) when multiplicative social capital is considered and introduced into the model but not significant as additive social capital as evidently reported and confirmed in similar studies (see Adepoju *et al.*, 2011). However, being an executive member in social group will reduce the probability of receiving low and intermediate benefit by 0.1028 and 0.0518 respectively while it will increase the possibility of receiving high benefit by 0.1582; this result further corroborates the earlier submission made on the importance of executive membership in decision making process and the possibility of deriving maximum and expected benefits from social group formation.

The foregoing, therefore, permits the non-acceptance of the earlier stated null hypothesis that socio-economic characteristics do not influence or have relationship with the level of benefit derived from social group formation. Since some of the hypothesized variables were statistically significant, the alternative hypothesis is hereby accepted.

Table 5: Result of the ordered probit for categories of benefit derived from social group membership

Social capital benefit	coefficient	std. error	z-statistics
Age	-0.0126	0.0065	-1.83*
Gender	-0.1245	0.2106	-0.59
Years spent in school	0.0267	0.0152	1.76*
Household size	0.4601	0.2163	2.12**
Farming Status	0.5657	0.2139	2.64***
Status in social group	0.4651	0.3046	1.53
Consumers-workers ratio	1.2214	0.2978	4.10***
Indigene status	-0.2630	0.4328	-0.61
Meeting attendance	-0.0052	0.0050	-2.01**
Heterogeneity index	-0.0003	0.0046	-0.06
Labour contribution	0.0145	0.0049	2.95***
Decision-making index	0.0132	0.0041	3.21***
Cash contribution	-6.6312	7.1244	-0.93
Cut 1	0.7532	0.4763	
Cut2	2.4715	0.4974	
LR $\chi^2(13) = 121.64$, Prob > $\chi^2 = 0.0000$, Observation = 233 Log likelihood = -216.23, Pseudo R ² = 0.3412			
Age	0.0315	0.0226	1.39
Gender	0.1352	0.1784	-0.76
Years spent in school	0.0268	0.0123	2.17**
Household size	0.6291	0.2376	2.64***
Farming Status	0.7698	0.2839	2.71***
Status in social group	0.0163	0.0084	1.94*
Consumers-workers ratio	1.3217	0.3068	4.31***
Indigene status	0.4832	0.3259	1.48
Aggregate social capital	-0.0046	0.0035	- 1.31
Cut 1	0.1962	0.4429	
Cut 2	2.1347	0.4221	
LR $\chi^2(9) = 78.74$, Prob > $\chi^2 = 0.0000$, Log likelihood = -224.59, Pseudo R ² = 0.2215			

Source: Data Analysis, 2014

Table 6: Marginal effect of categories of benefit derived

Variables	Marginal effect for Y= low benefit	Marginal effect for Y= intermediate benefit	Marginal effect for Y= high benefit
Age	- 0.0013	- 0.0026	0.0023
Sex	0.0124	0.0201	- 0.0328
Years spent in school	0.0034	0.0045	- 0.0069
Household size	0.0040	0.0057	- 0.0112
Farming Status	- 0.0518	- 0.0623	0.1326
Status in social group	- 0.0483	- 0.0426	0.1042
Consumers-workers ratio	- 0.0212	- 0.0243	0.3321
Indigene status	- 0.0551	- 0.0311	0.2102
Meeting attendance	0.0002	0.0006	- 0.0010
Heterogeneity index	0.0004	0.00008	- 0.00013
Labour contribution	-0.0011	- 0.0028	0.0047
Decision-making index	- 0.0014	0.0019	0.0030
Cash contribution	0.0000021	0.0000048	- 0.0000023
Age	- 0.0018	- 0.0029	0.0043
Sex	0.0167	0.0219	- 0.0381
Years spent in school	0.0037	0.0033	- 0.0077
Household size	0.0046	0.0049	- 0.0098
Farming Status	- 0.0631	- 0.0637	0.1372
Status in social group	- 0.1028	- 0.0518	0.1582
Consumers-workers ratio	- 0.0251	- 0.0267	0.2982
Indigene status	- 0.0374	0.0324	0.2360
Aggregate social capital	0.000053	0.000056	- 0.0000102

Source: Data Analysis, 2014

CONCLUSION

The study concludes that there is a significant relationship between households' socio-economic characteristics and membership in social organizations; hence, the null hypothesis is not accepted while alternative is hereby hypothesis is accepted.

Based on the findings of this study, the following recommendations are of significant importance to policy making:

- Adequate funding of basic education for all should be given utmost attention in the budget by the government.
- Social organization membership should be encouraged for the purpose of easy access to credit and proper usage so as to derive maximum and expected benefits of group participation.
- Since the study revealed that most rural households in the study area see large household size as being consistent with adequate family labour; labour saving devices should be put in place while at the same time, birth control strategies and campaigns are being promoted.

CONTRIBUTION TO KNOWLEDGE AND SUGGESTION FOR FURTHER STUDIES

Many of the previous related studies have focused more on the effect of social capital on access to credit and welfare but this study bridged the knowledge gap by investigating the determinants of social capital formation and factors driving the level of benefits derived from social capital formation which previous related studies have not dealt with. Findings from the

study revealed that socio-economic characteristics and human capital endowments of respondents make significant contribution to social capital formation as well as the benefit derived from membership in social group; further research can also be made to identify the type of social group that may likely influence the maximum benefits derived by households from social group formation.

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CAPACITY BUILDING OF SMALLHOLDER SWEETPOTATO FARMERS IN PAPUA NEW GUINEA

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ABSTRACT

Sweetpotato is the most important food crop in Papua New Guinea. In recent years, it has become an important cash crop for smallholder farmers driven by the need to generate income in a developing market economy. Demand for sweetpotato is increasing, especially in coastal markets, because of income growth and increasing urbanisation. However, meeting growing demand requires a transformation from subsistence to commercial farming. This has been challenging for the smallholder farmers, value chain players and policymakers because the majority of smallholder farmers do not have the resources and necessary technical and business management skills to meet the market requirements for quality and the consistency in supply. Most of these issues may be addressed by equipping smallholder farmers with the necessary skills through education and training. This paper summarises the research, development and extension activities undertaken to identify the training needs and build the capacity of smallholder sweetpotato farmers, as well as the lessons learned and policy implications for further improvement. The main conclusion is that the smallholder farming systems are complex, and are becoming more diverse, a flexible and coordinated national approach to RD&E is required to help smallholder farmers achieve productivity gains and improved livelihoods.

KEYWORDS: capacity building, value chain analysis, agricultural extension, sweetpotato, Papua New Guinea.

INTRODUCTION

Papua New Guinea (PNG) is a largely agrarian society. Although the country is richly endowed with mineral and petroleum resources, more than 80% of its population are dependent on agriculture for their livelihood. PNG was ranked 157 out of 187 in the 2013 Human Development Index (UNDP, 2014). Sweetpotato is the most important food crop in PNG, accounting for 43% of all food energy consumed (Bourke and Vlassek, 2004). In recent decades, demand for sweetpotato has increased as a result of economic growth and increasing urbanisation in coastal cities such as Lae and Port Moresby – the two largest cities in PNG. However, the potential to take advantage of the expanding marketing opportunities for improving farm income has been constrained by the high costs of marketing and, at times, by significant product losses. A series of research projects, funded by the Australian Centre for International Agricultural Research (ACIAR), have attempted to address these issues to improve marketing efficiency, postharvest management and value addition of sweetpotato in PNG (Chang et al., 2013; Chang and Mais, 2014). In this paper, we summarises the research, development and extension (RD&E) activities undertaken to identify and address those issues, as well as lessons learned and policy implications for further improvement.

METHODOLOGY

A participatory action research approach was adopted in this research to encourage stakeholder participation and collaboration, and to ensure project sustainability. One key element of action research is “learning by doing”, which results in empowerment and capacity building amongst participants. There were three phases to the research. Phase 1 focused on research, Phase 2 on capacity building and transfer of knowledge, and Phase 3 on stakeholder consultation. In Phase 1, a value chain analysis was conducted to identify constraints to, and opportunities for, improving effectiveness and efficiency in the sweetpotato value chain. This involved implementing consignment trials to identify where and why product losses occurred, and personal interviews and focus groups of key value chain operators to understand the issues and opportunities facing them. Value chain operators interviewed included women farmers’ groups, marketers, truck/bus drivers, managers of trucking and shipping companies, microfinance institutions, and institutional buyers. We also conducted a farm survey in the PNG highlands, and consumer surveys in Lae and Port Moresby. Results from this research were presented to project collaborators at a stakeholder workshop, where feedback was received, priority issues and training needs were identified, and action plans were developed.

In Phase 2, four farmers' groups in the PNG Highlands were selected for capacity building and transfer of knowledge necessary to improve their participation and contribution in their respective sweetpotato value chains. A series of training workshops were provided to the selected groups in: financial literacy, marketing planning, costing and gross margins, postharvest management, and processing. Learning outcomes from the training were then assessed. The assessment, along with lessons learned, were used to fine-tune the training materials and delivery methods. As part of the training and capacity building process, arrangements were made for linking farmers to microfinance institutions and to traders, and for linking traders to supermarkets. In Phase 3, potential development partners were consulted to better understand the current status of the agricultural extension system and support services for assisting smallholder farmers in PNG, and their role in it. The other objective was to identify areas for collaboration with potential development partners.

Phase 4, which is due to commence in April 2015, will involve organising a stakeholder workshop to discuss the results from Phases 1-3, and to develop strategies and action plans for meeting the training needs of smallholder sweetpotato farmers, as well as setting the stage for improving the national RD&E system for the agricultural sector in PNG

Results from the activities completed in Phases 1 - 3 are summarised and discussed in the following sections.

RESULTS AND DISCUSSION

Phase 1. Understanding The Sweetpotato Value Chain In PNG

From the value chain analysis, key aspects of sweetpotato production, consumption, marketing and processing, and other key issues were identified. These are summarised below.

Sweetpotato Production

Total production of sweetpotato in PNG was estimated at around 3 million tonnes (Bourke and Vlassek, 2004), of which approximately 75% was produced in the Highlands. The supply of sweetpotato is continuous, non-seasonal and regular to irregular in most parts of PNG (Bourke et al., 2004). Although there is a tendency for sweetpotato to be available in larger quantities at certain times of the year, the supply of sweetpotato does not vary in a regular annual cycle across PNG as a whole, and as such demonstrates no apparent seasonality in production. This stability has been essential in the past for providing food security. However, there is concern that production may have become more variable and unpredictable because of climate change (Bourke and Harwood, 2009).

In the PNG Highlands, women play a significant role in sweetpotato production as it is a staple food crop and is also considered a "feminine crop". That is, sweetpotato cultivation is mainly a "women's job" from planting to harvesting (Benediktsson, 2002). The "men's job" in sweetpotato cultivation is limited to land preparation (clearing the bush, making garden beds and building drains and fences) at the beginning of the production cycle. Women are the main producers (and marketers) of sweetpotato. However, they face significant obstacles both inside and outside their homes. Gender training of household members and value chain operators needs to be put in place to change attitudes towards women. Furthermore, any research, development or extension effort to improve on-farm productivity and marketing efficiency must involve women. Improving facilities in local markets for women should also be a priority, to encourage greater female participation at the market.

Sweetpotato Consumption

Gibson (2001a) estimated the national average annual per capita sweetpotato consumption in PNG to be 260kg. Substantial differences existed in the diet of rural and urban households, with consumption being 299kg in rural areas and 42kg in coastal cities. By contrast, annual per capita consumption of rice in rural areas was 24kg, just over one third of that in urban areas (66kg). These differing consumption patterns occur due to lack of market penetration by imported foodstuffs, especially rice, in rural areas. Similarly, it is difficult to market locally produced foods into urban areas due to high transport costs. Transport and logistical problems have been identified as the number one issue for fresh produce marketing in PNG (Chang and Griffith, 2011). There is also a regional difference in staple food consumption. While sweetpotato is the main staple food for highlanders, banana, taro, sago, sweetpotato and rice constitute a much more diverse diet for people living in coastal cities. Furthermore, the main consumers of sweetpotato in coastal cities are more likely to be migrants from the Highlands (Benediktsson, 2002; Gibson, 2001b). Other coastal residents preferred rice to sweetpotato, on the basis of its convenience and novelty. Ongoing changes to dietary preferences are therefore a potential threat to future demand for sweetpotato.

Sweetpotato Marketing

Sweetpotato is a bulky, perishable commodity with a high weight-to-value ratio. Long distance marketing for sweetpotato is challenging, and demands a lot of resources and chain coordination (Chang et al., 2008). Typically, sweetpotato is harvested in the Highlands and packed tightly into white poly bags (weighing 80-100kg each), which are then picked up from the village by trucks or public motor vehicles (PMVs), dropped off

alongside the Highlands Highway, reloaded onto semi-trailers going down to Lae, unloaded and re-loaded again onto shipping containers at the wharf, and transported to Port Moresby by sea. Upon arrival in Port Moresby after 2-3 days at sea, the sweetpotato bags are collected by farmers or their relatives at the wharf, and are transported to warehouses near the main market (Gordons Market). This journey from the PNG Highlands to Port Moresby takes between seven and ten days. Marketing can therefore account for up to 75% of total costs, while postharvest losses can be as high as 30-50% if there have been substantial delays in transport (Irving et al., 2011). These delays are caused by the scarcity of PMVs or trucks, bad roads, landslides, roadblocks, and shipping delays from Lae to Port Moresby, as well as lack of organisation on the part of farmers.

These transport problems, and poor chain coordination, result in high risks and high transaction costs. Total marketing costs can account for more than 50% of total costs when sweetpotato is transported from a highland village to Port Moresby (Chang, 2009). Transport costs could be reduced significantly if farmers worked together and consolidated their bags, rather than going to the coastal markets by themselves with only a small number of bags. There were several reasons why farmers chose to market their own sweetpotato. First, the majority of farmers did not understand the various components of costs and prices. Many farmers went to the market without knowing if they could make a profit or not, given the significant price variations from day to day and from week to week. Second, farmers felt unable to trust other people where money was concerned, as misuse of funds was common, and there were few recourses to recoup the losses. Third, some farmers saw marketing to the coastal cities as an opportunity for travel, and associated it with the social status of having conducted a “big business”.

In PNG, most sweetpotato is priced by the bag when it is sold in bulk to wholesalers and retailers, and by heaps of varying sizes and qualities when it is sold to consumers at the open markets. This pricing scheme does not provide a clear price signal, making it difficult for farmers and buyers to compare prices and to assess and respond to changes in demand and supply conditions.

The sweetpotato value chain was fragmented and uncoordinated because farmers did not plan. Most production and marketing activities were unplanned, and there was little or no relationship, communication, or formal marketing arrangement with other value chain players. A well-coordinated value chain requires a marketing plan, as well as collaboration with other farmers and value chain players. Collaboration with

others is difficult because of the cultures of opportunism, tribalism and distrust in outsiders.

Sweetpotato Processing

Sweetpotato has many potential uses, including as a fresh food, as pig feed and as a raw material for food processing (Fuglie et al., 2006). In PNG, approximately 60-75% of sweetpotato is used as a staple food, and the remainder as pig feed. Sweetpotato is not used for processing. Some attempt to process sweetpotato in PNG was made in the mid-1970s when sweetpotato fries and flour were experimented with at the research station. However, the products failed to be commercialised because of high cost and lack of consistency in the supply of raw material. More attempts were made over the years, but only sporadically, mainly in response to political pressures to reduce reliance on imported potato and wheat, the raw materials for fries and flour processing, respectively.

RD&E for food processing was institutionalised in PNG when the Food Processing and Preservation Unit (FPPU) was established by the Department of Agriculture and Livestock (DAL) in 1984. The goal was to develop a food processing sector in PNG (Cegumalua, 2007). FPPU was used by Fresh Produce Development Agency (FPDA) for product research, development and extension, and by UniTech for teaching food technology students. Several products were developed successfully and a number of entrepreneurs and farmer groups were trained. Many more farmers received basic information and technical assistance over the counter (Cegumalua, 2007).

A review of FPPU in 2007 resulted in its closure, due to low levels of successful uptake of processing technology, lack of technical and management capacity amongst trainees to scale up, and poor management of FPPU facilities (Cegumalua, 2007). Interestingly enough however, the National Agricultural Development Plan 2007-2016, released in 2006, specifically identified “Developing a food processing industry for staple food crops and vegetables” as one of PNG’s development priorities (Ministry of Agriculture and Livestock, 2006).

Key Issues

Mapping the sweetpotato value chain indicated that value chain operators faced significant challenges in delivering a bulky and perishable product over long distances. However, the issues and concerns varied amongst operators. Smallholder farmers were most concerned about access to credit, availability and cost of transport, storage facilities and low prices. For wholesalers and institutional buyers, the main issues were quality and consistency of supply. For trucking

and shipping companies, the high costs of dealing with a large number of smallholder farmers, who lacked professionalism in their business dealings, was the key issue. Common complaints about the smallholder farmers were: they did not deliver or pick up on a schedule, they used inappropriate packaging, and they lodged unreasonable compensation claims when something went wrong with their produce, regardless of the reasons. For financial service providers, there were also high risks and high costs dealing with smallholder farmers. This was not only because their income was variable and unpredictable due to the biological nature of farming, but also because they were financially illiterate, having a “handout mentality” and a tendency to see loans as grants, rather than as debts that must be repaid. However, all these issues in dealing with smallholder farmers were not a major concern overall to these businesses, because sweetpotato constituted only a small proportion of their total business, and in most cases was unprofitable anyway. The overall result though is that farmers do not receive the services that they require.

The key message from the business sector is that if smallholder farmers want to do business with them, they must become more business-like and demonstrate that they are worthy business partners. For wholesalers and institutional buyers, this means that smallholder farmers must pay more attention to quality, change their packaging, and carry out proper sorting and grading. They must also honour their commitment to deliver. From the perspective of transport service providers, smallholder farmers must organise themselves and consolidate their sweetpotato bags into full container loads for pick-up from one central location. For credit providers, smallholder farmers need to become financially literate and learn how to manage money and cash flow, as well as change their attitude towards loans. These cannot be viewed as grants, and must be invested in profitable business activities so they can be repaid including interest.

Phase 2. Capacity Building Pilots

From the value chain analysis, it is clear that smallholder sweetpotato farmers faced many issues, and most of these issues may be addressed by equipping smallholder farmers with the necessary skills and knowledge through education and training. In this section, we summarise the activities undertaken to build the capacity of smallholder farmers to improve their performance in the sweetpotato value chain, which started with a needs assessment.

Needs Assessment

In the survey of 186 sweetpotato farmers in the Highlands, they were asked to indicate the kind/s of

training/information they have received and from whom, and what their training needs were. The majority of respondents believed that as far as the production and marketing of sweetpotato was concerned, it was their own experience and knowledge they relied on the most. However, extension workers and farmer organisations also played an important role in the dissemination of information and skills training on various farming operations, such as nursery making, transplanting, and chemical and fertilizer use for introduced vegetables. About 52% of respondents indicated a need to know more about sweetpotato production in general terms, while 28% needed information specific to marketing and postharvest activities. Forty-seven per cent of respondents indicated they had attended various training sessions, including farming in general, marketing, postharvest, and financial literacy. Thirty-four per cent of respondents wanted to have access to more training to develop their skills in accessing and selling produce to long-distance markets.

Training Workshops

A series of training workshops were provided to selected groups of sweetpotato farmers in the following areas: financial literacy; marketing planning; costing and gross margin analysis; and postharvest management. Training materials used included: slide shows of what grading and quality sweetpotato, and other fresh produce, should look like, and powerpoint presentations of basic theory and principles; posters that summarised the main points of a topic, as well as recommendations for change; booklets that explained the reasons for learning and the learning objectives of each topic; and video clips demonstrating the long distance sweetpotato value chain from harvest to arrival at the wholesale market in Port Moresby.

Workshop participants were first exposed to basic theory and principles related to each topic, followed by group exercises to give them the opportunity to work together and learn from each other, with one member elected as a group leader. During the workshop, each group stayed together for all exercises and breakout sessions. They were encouraged to practice what they have learned together after the workshop, for example in developing a marketing plan, bookkeeping, identifying potential buyers, and so on. They were also encouraged to meet regularly to talk about issues they considered important, and to work together to address them, where assistance from research team members would be available if necessary. Working together in a group in this way is similar in essence to a farmer field school, in that it is participatory and demand-driven.

Feedback from the workshop participants was positive. Many were able to use the knowledge gained to

improve their marketing practices, which helped in attracting more customers and increasing their income.

Lessons learned from piloting farmer training and capacity building

- It is imperative, within a participatory framework, to discuss and trial potential interventions with stakeholders, rather than attempt to implement interventions based on researchers' technical knowledge.
- PNG has a diverse culture and unique social structure. This means to enact changes in a community, local cultural and political factors need to be taken into account and relationships with the community leaders, and the whole community, need to be established to build trust. This process can considerably slow project progress, and should be factored in future project design.
- Women are keen learners. Since women carry out most production, harvest and postharvest activities, it is imperative to include them in future training workshops, and to target them for dissemination of extension material.
- It is quite clear that the majority of participants had an entrenched idea that whatever the problem may be, it is always someone else, not themselves, who must do something about it. Therefore, it will take more than one workshop or two to change this attitude, or to impart knowledge or a new way of thinking. More time and more resources are also required on the ground for real change to occur. This means that identifying both agents of change and local facilitators is crucial for success.
- Exercises during the workshops and follow-up after the workshop are also crucial to make sure the agents of change have learned what they were supposed to learn, and were actually equipped with the new technology/information, and were also able and willing to pass their new knowledge on to grassroots farmers.

Phase 3. Stakeholder Consultations

Potential development partners were consulted after the pilot training program, including the Department of Agriculture and Livestock, national agricultural research and extension organisations (National Agricultural Research Institute (NARI) and FPDA), provincial governments in Jiwaka and Morobe provinces, primary schools, women's groups, NGOs and private sector service providers. The main objective of the consultation was to understand the current status of the extension system and support services for assisting smallholder farmers in PNG, and their role in it. The other objective was to identify potential areas for collaboration. There was significant interest in building capacity in the business management skills of their staff and of farmers. Included below is a summary of what

we learned about the current status of the agricultural extension system in PNG, as well as alternative extension models and projects that were implemented to strengthen the capacity of service providers.

Agricultural Research and Extension Services for Farmers In PNG

In PNG, provision and support for agricultural extension is largely a government responsibility. This is shared between the three-tiers of government (national, provincial and district), the national agricultural research system (NARS), statutory commodity boards, and semi- or quasi-government organizations (Sitapai, 2011). The aim is to provide knowledge and skills to farmers to make their farming operations more productive, and to increase production. However, since 2000, several non-governmental organizations (NGOs) and community-based organizations (CBOs) have also become actively involved in the delivery of agricultural services. Most of these organizations are linked to donor and financial institutions, churches, farmer's groups, women's groups, or associations seeking to initiate local area development (Lahis, 2008). These organizations have emerged in recent years in response to the breakdown of government service delivery efforts of the past. Lack of human resource capacity in the national extension service is a major factor affecting the level and quality of service delivery in PNG (Sitapai, 2012). This is most apparent in the provincial extension service, where budget constraints have drastically reduced staff numbers over two decades. The capability and capacity of service providers in the private and quasi-private sector vary considerably. Most are weak in their analyses of community needs and in their formulation of desired project interventions that deliver real benefits to the people on a sustainable basis.

In addition, there appears to have been changing paradigms in extension in PNG over time, moving from a technology transfer (such as the Training and Visit (T&V)) model to human resource development (such as farmer field schools (FFS)), and from a top-down, supply-driven approach to a participatory, demand-driven approach. These changes reflect the fact that capacity is more important than technology in an increasing more complex environment in which farmers operate, and recognition that farmers have the local knowledge and experience to contribute to identifying and resolving their own problems – they are not merely recipients of new technology.

These different approaches are complementary rather than mutually exclusive. Resosudarmo and Yamazaki (2011) found that the T&V model, which focuses on technology transfer and is supply-driven, is useful when farmers are less educated and the technology transferred

is simple. However the FFS model, which focuses on human resource development and is demand-driven, is more useful for dealing with more complex issues such as integrated pest management and environmental sustainability. The ideal model is one that suits the local context and meets the needs of participants.

Different approaches to agricultural extension to farmers have been piloted in PNG in recent decade, driven mainly by donors (Sitapai, 2012). They include:

The Village Extension Worker (VEW) Program at FPDA. The VEW project, funded by German Development Services, began in 1998. This pilot extension program was targeted at female farmers, in recognition of their involvement in farming and the insufficient support available to them from existing (mostly male) extension staff (Kindiwa and Mullen, 2008). The project aimed to support female farmers with technical information, improved technologies and planting materials, as well as empowering and building and strengthening networks. It selected female leaders from different communities, providing them with basic training to serve as part-time agricultural extensionists (VEWs) in their home communities.

The program started with an introductory training course covering the role of VEW, gender awareness, and basic farm management (record keeping), as well as vegetable production (nursery making, composting, transplanting, and fertilizer and chemical use mainly for introduced vegetables), marketing and processing. VEWs were expected to pass on new skills and information to their contact farmers, normally 10-12 farmers, both female and male. Likewise, contact farmers were expected to pass on the newly acquired skills and knowledge to other farmers. After the introductory training course, further training for VEWs was provided upon demand, depending on community need. Each VEW was visited once a week by an extension officer to monitor the progress, answer questions, and provide technical advice when necessary. Some technical issues were referred to appropriate specialists at FPDA and agricultural advisors from DAL.

The pilot program was tested in the Western Highlands and Eastern Highlands provinces, and was later adopted as a regular program and extended nationwide to include other provinces (Morobe, East New Britain, Central and Milne Bay). With the expansion of the program and a change of focus of FPDA policy, the proportion of women VEWs had fallen from the initial 100% in 1999 to 38% in 2008 (Kindiwa and Mullen, 2008). However, the outreach of the program is limited because there are limited numbers of VEWs in each

province (not more than ten), and the turn-over of VEWs is slow as the training program for each cohort of VEWs could go for many years (Chang et al., 2014). Another drawback of the program is the focus on technical skills in farm production, without much attention to marketing and business skills (Kindiwa and Mullen, 2008). Farmers often complain about access to market and oversupply in the local market. The VEW program was modelled after the T&V extension model popularised by the World Bank from mid-1970s to 1990s, except for its initial focus on female farmers and the small-scale operation.

The Smallholder Support Services Pilot Project (SSSPP). This Asian Development Bank (ADB)-funded project commenced in 1999 and ended in 2007. Its aim was to strengthen provincial extension using a mixed model of public funded-private delivery and contracting-out of extension services to smallholders (Lahis, 2008). The key aspects of SSSPP were as follows: (1) interested communities were assisted to identify their priority needs and formulate action plans through participatory rural appraisal and planning (PRAP); (2) a pool of interested service providers were contracted to deliver services in response to community action plans; (3) farmers participated in the monitoring and evaluation of implementation, supported by external evaluation of contract outputs and outcomes; (4) public private partnerships and joint ventures were promoted in service delivery; and (5) adequate backstopping and capacity building of service providers was ensured. Reviews of SSSPP indicated that there was wide scope for adoption of the contracted mode of extension used. However, it would require a holistic government response to community development needs, beyond agriculture. It needs also to take into account the overall rural development needs on a cross-sectoral level. SSSPP was succeeded by the Smallholder Support Services Extension Project (SSSPE), which ran from February 2010 to July 2012. The future for this program is uncertain.

The Bris Kanda Program. Bris Kanda Inc. is a rural enterprise development organization, established in 2006 under a 10-year program assistance package provided by the New Zealand Government in the Huon District of Morobe Province. The organization's overall goal is to reduce poverty and vulnerability amongst target rural communities through improved and sustained income generation. It uses a participatory approach to identify weaknesses in smallholder production and supply chains, to find appropriate solutions, and to connect smallholders to relevant services. It is the first project intervention in PNG that promotes market-oriented agricultural extension and advisory services. A mid-term review of the program in

2010 rated the approach as the most innovative and timely, given the deficiencies in government efforts to promote rural development in recent years (Mohamed and Sitapai, 2010). The review concluded that strategic partners (who may include private or quasi-governmental service providers) are the pillars underpinning the approach to service delivery. The concept of engaging strategic partners who have a mandate to serve rural communities is expected to strengthen this approach, and fulfills the expectation of the government's public private community partnership policy.

Farmer Field Schools (FFS). The FFS extension model was trialed by the Cocoa and Coconut Institute (CCI) to encourage farmers to work together as a group to improve farm management practices to control cocoa pod borer (Sitapai, 2010). This group-based learning process is similar to what have been used in several countries to promote integrated pest management (IPM). FFS, which focuses on experiential learning and farmer-to farmer exchanges, have resulted in wider stakeholder participation and stronger commitment from participants because they are allowed to take decisions regarding options and outcomes through interactive processes.

Small and Medium Enterprise Access to Finance Project. This project, funded by the World Bank and GoPNG for 2011-2024, is designed to facilitate access to sustainable credit for Small and Medium Enterprises (SME), and to contribute to employment and income generation. There are four components to the project: 1) establishing a Risk Sharing Facility (RSF) to partially guarantee a portfolio of newly-originated loans to SMEs; 2) providing technical assistance to financial institutions; 3) building capacity for SMEs; and 4) upgrading the capacity of the Department of Commerce & Industry (DCI) to implement and monitor the project, and its capacity to implement an updated SME strategy and policy. It is recognised that SMEs in PNG face significant constraints in terms of business and financial management capacities. Capacity building for SMEs consists of four sub-components: (a) SME management and financial skills training; (b) SME mentoring and coaching; (c) training for women entrepreneurs; and (d) support for provincial government commerce staff. Although farmers have been urged to see farming as a business, capacity development and training programs that aimed at improving business skills normally target SMEs in the urban centres and do not include farmers.

Institutional Capacity Building for NARS Organisations

Several institutional capacity building projects were funded by AusAid, NZAid and the World Bank in the

past two decades, with the aim of improving governance of NARS organisations and other government agencies, and their service delivery to farmers and small to medium sized businesses. Some examples include:

- The Australian contribution to the National Agricultural Research System (ACNARS) for NARI, funded by AusAid.
- The Institutional Strengthening Project (ISP) for FPDA, funded by NZAid.
- Productivity Partnerships in Agriculture (for coffee and cocoa), funded by the World Bank.
- The Agricultural Research & Development Support Facility (ARDSF), funded by AusAid.

ARDSF is worth discussing in more detail here because it has set the stage for an improved RD&E system by the framework it has promoted and the enhanced policy and service delivery capacity of the NARS organisations it has instigated. ARDSF was implemented from 1997 to 2012 to assist the NARS organisations to realign their research strategies to focus on development, rather than merely generating, transferring, and adopting technologies. Adherence to the concept of Agricultural Research for Development (AR4D) is a paradigm shift from a linear model of research-technology transfer to accommodating the integrated and collective actions of stakeholders to improve technologies, policies and institutions (Mbabu and Hall, 2012).

POLICY IMPLICATIONS

Based on the reviews of the research and extension system in PNG (ANZDEC, 1993; McKillop, 1994; GoPNG, 2000; Dekuku et al., 2005; Ministry of Agriculture and Livestock, 2006), it is clear that reforms to the system are needed, in particular, to formulate a comprehensive national extension policy that is inclusive and pluralistic in service delivery and financing. The key challenges to be addressed for designing a new system are outlined in Sitapai (2012). They include: (1) focusing on best-fit approaches that are flexible, relevant, pluralistic and demand driven, rather than best-practices and quick fixes; (2) enhancing pluralism in advisory service provision to capitalise on the comparative advantages of different types of service providers and organisations; (3) increased accountability of rural clients through farmer organisations to ensure extension services are relevant and effective for rural people and their livelihood goals; (4) enhancing human resource development for extension to equip advisors and other rural development actors with the necessary skills to deal with the constantly changing and complex environment in which they operate; and (5) ensuring sustainability by moving beyond pilot projects to institutional development to strengthen policy-making and implementation capacity

in the relevant agencies. Despite those clear guidelines, innovative, practical and sustainable solutions are yet to be found. Key issues and the way forward will be discussed in a stakeholder workshop, which is due to commence in April 2015.

The stakeholder workshop will discuss the results from the Phases 1 - 3, and to identify impact pathways (including target locations, communities, organisations, etc, agents of change who can act as catalysts for change, development partners, service providers, and methods of delivery) and to develop action plans for upscaling capacity building and transfer of knowledge activities in the wider farming community. The results from implementing the action plans will then be presented to the policymakers by the end of 2015, and used as a basis for developing a national strategy for improving the RD&E system for the agriculture sector in PNG.

CONCLUSION

This paper summarises the RD& E activities undertaken in a series of projects aimed at improving the PNG sweetpotato value chain. The results indicated that there were serious issues facing smallholder sweetpotato farmers, in the areas of access to credit, transport infrastructure, and support services, as well as issues related to postharvest handling, market institutions, and chain coordination. Given the current stages of economic and human development in PNG, smallholder sweetpotato farmers lacked the necessary resources and skills to tackle many of the problems that they themselves have identified. To take advantage of a growing demand for high quality sweetpotato, smallholder farmers must acquire new skills, change their current marketing and postharvest practices, and work together in order to access markets more effectively. There is a role for government to provide extension and support services to build the capacity of smallholder farmers so that they can participate and contribute to economic development, as well as improve their livelihood. As the quality of support services is a pre-condition for successful capacity development, more resources are also needed to support extension and business development service providers to improve their service delivery. Therefore, a flexible and coordinated national approach to RD&E is required to help smallholder farmers achieve productivity gains and improved livelihoods.

BIOGRAPHY

Associate Professor Chang has a PhD in Agricultural Economics from the University of California at Davis. Her specialties include subsector analysis and industry planning, value chain and market development, and feasibility studies. Her most recent research focuses on

improving marketing, postharvest management and value addition of sweetpotato in Papua New Guinea. This involves identifying and addressing technical and socio-economic constraints using the participatory action research approach, and building the capacity of women's groups, market researchers, and extension personnel in PNG. Her research is funded by the Australian Centre for International Agricultural Research.

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COLLECTIVE BARGAINING: AN EVALUATION OF CONFLICT MANAGEMENT STRATEGIES IN THE UNIVERSITY OF LAGOS, NIGERIA

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ABSTRACT

This research work investigates the use of collective bargaining as an effective instrument for management of conflict in educational institutions. The study setting was the University of Lagos using the Academic Staff Union of Nigerian Universities (ASUU) and Non Academic Staff Union (NASU), UNILAG Chapter. Stratified random probability sampling method was used to select 120 respondents. Data was collected via the questionnaire, interviews, and literature search. Data were analyzed using descriptive statistics; frequencies and simple percentages with the aid of statistical package for social science (SPSS) version 15.0. The study reveals that: effective collective bargaining positively affects productivity; there exists an established procedure for conflict resolution in the universities; and that collective bargaining is a veritable instrument for the management of conflict in the universities. The paper recommended that the university should adopt conflict acceptance strategy and focus on its effective resolution strategies to convert the manifestation of conflict into benefits for the university.

KEYWORDS: industrial relations, collective bargaining, employee, trade unions, productivity

INTRODUCTION

The Nigerian industrial relations system has been overwhelmed by the incessant industrial conflicts which have manifested in strike actions by workers in different sectors of the economy. The relationship between employers and employees is inherently conflictual and as such cannot be overlooked by the social partners in industrial relations. To show that conflict cannot be avoided by any management either in public or private sector, Fasan (2011) explained that workers at all times will seek for what is commensurate to their input to their organizations in terms of labour and time while employers on their part will seek for the talent, skills and potentials of workers and in return reciprocate the workers efforts monetarily to such extent which could not affect their profit margins. These relationships between the employers and employees are naturally conflictual because what is gain to the workers in terms of wages are seen as cost by the employers, therefore making conflict between the workers and their employers inevitable in any organisations.

It has been rightly observed by Okuwa and Cambell (2011) and Alyu (2011) in Uma, Obidike, Eboh and Ogbonna (2013) that the most frequent problem in Nigeria in recent times is the incessant industrial action. They further observed that strike has permeated the fabrics of the society. According to them:

If it is not the National Union of Teachers (NUT), Academic Staff Union of Universities (ASUU), it will be health workers or other important sectors' union.

In 2000, 2001, 2002, 2003, and 2009, the Academic Staff Union and other government establishments embarked on industrial disputes for increase in salary, implementation of agreement, adequate funding, reduction in cost of living, amongst others.

Industrial conflict expressed in whatever form according to Armstrong (1999), poses cost to all industrial relations actors, which is why certain mechanisms and approach have to be used to reduce the effects of conflict in industry and to prevent the deployment of all forms of costly expressions. Sharing the same line of thought, Nwachukwu (2004) explained that the workers and their employers must always reach an agreement when bargaining to avoid the industrial conflict especially when the issue has to do with hours of work, salary and wages, annual leave, allowances, maternity leaves, retrenchment among others.

Anyim, Chidi and Ogunyomi (2012), while supporting Armstrong (1999), argued that industrial conflict or trade disputes has both costs and benefits on the three social partners in industrial relations; government, labour and management and even the society at large, especially as it has to do with the employment or non-employment of any person; as well as with the terms of employment or physical conditions of work of any person. Imeberman (1979) in Anyim et al (2012), noted that the cost of industrial disputes be it strike or otherwise will always outweighed the benefits, and

have a great bearing on the smooth and orderly development of a country's economy and the maintenance of law and order in the society.

The use of the strike weapon by workers constitutes part of the collective bargaining process. To drive home the importance of strike as a collective bargaining strategy, Sharma and Kumur (2014) explained that the right to strike is labors' ultimate weapon and in the course of the century, it has emerged as the inherent right of every worker and that it is an element, which is of the very essence of the principle of collective bargaining. They further opined that this method is used by labour to bring the employer to see and meet their point of view over the dispute between them. According to them, the cessation or stoppage of works whether by the employee or the employer is detrimental to the production and economic well-being of the society as a whole. In their view, it is for this reason that the labour legislation while not denying the right of workmen to strike, has tried to regulate it along with the right of the employer to lock-out and has also provided machinery for peaceful investigation, settlement, arbitration, adjudication of the disputes between them.

Anyim, Elegbede and Gbajumo-Sheriff, (2011b) went on to argue that collective bargaining is the main machinery that workers' representatives and their employers use to not only consider the demands of workers but also to resolve conflict, so as to achieve organization goals and objectives.

The relevance of collective bargaining has been discussed by various writers. For instance, Otobo (2005), stated that collective bargaining as a term was used by Sidney and Beatrice Webb to cover negotiations between workers group and employers as against individual bargaining. It is on similar note that Chamberlain and Kuhn (1965), opined that collective bargaining performs three functions; as a means of contracting for sale of labour (marketing concept); as a form of industrial government (governmental theory); and a method of management (industrial management concept). They further explained that collective bargaining is a means of buying labour in the labour market with the use of employment contract, having rule making process that governs trade unions and management relationship especially in the areas of reaching decision on matters of interest to all social partners.

While Anyim, Ikemuefuna and Ogunyomi (2011a), on their part opined that in all industrial relations systems there are disagreements and disputes among various contending interests and collective bargaining democratic principles are required to resolve the

disagreement and disputes as to have industrial harmony and peace. Fajana (2000) in Anyim et al (2011a), saw collective bargaining as the process of resolving industrial conflicts in every industrial relations system.

In the views of (Yesufu, 1982; Ubeku, 1983; Fajana, 2000; Henry, 2004; Onah, 2008), to avoid industrial conflict, collective bargaining is used in determining the working conditions and terms of employment between an employer(s) and workers' representative. In other word collective bargaining plays the major role of resolving industrial conflicts by permitting decisions on salaries, hours and working conditions to be made jointly between employee and employer representatives through collective agreement.

Lemay (2002), Okanachi (2003), Bamiduro (2008), in their own view saw collective bargaining as the mechanism that furthers basic union purpose on behalf of workers of protecting the workers as opposed to an individual worker representing him or herself. As far as they are concerned, collective bargaining de-emphasises individualism but encourages collectivism between employers and their employees. The International Labour Organization, ILO (1960), made it clearer when it insisted that collective bargaining is negotiation of working conditions and terms of employment between employers, a group of employers or one or more employers' organizations on one hand; and one or more representative of workers organizations on the other with a view of reaching agreement on working conditions and terms of employment and or regulating relations between employers and workers, and or regulating relations between employers or their organizations and a workers' organisation or workers' organisations". As far as the International Labour Organisation (ILO) is concerned collective bargaining is the core value that is linked to the freedom of association and the right to strike.

In support of the ILO Conventions, Rose (2008) insists that in collective bargaining, the representatives of employers and employees must jointly determine and regulate decisions pertaining to both substantive and procedural matters within the employment relationship through collective agreement. For Appah and Emeh (2012), collective bargaining establishes the set rules guiding relationship between parties during the life of a collective agreement, and also gives method of settling grievances that will occur from time to time.

Fajana (2002), stated that through collective bargaining, workers gather a great weight of influence to protect several heterogeneous interests in organisations. Various researchers (Hyginus 2010; Anyim, et al., 2011b; Okeye and Chukwuemeka, 2012; Onabanjo,

2013) opined that collective bargaining is a form of industrial jurisprudence and industrial democracy because it is used to resolve workplace conflict between labour and management and allow workers participate in the decision making process of the organisations.

All over the world as noted by (Anyim et al 2011b), industrial relations practice and collective bargaining emanated from the private sector and then moved into the public sector. The opposite is the case in Nigeria as collective bargaining practice started in the public sector due to the absence of private sector at the turn of the century. Despite this pioneering effort by the public sector, they (Anyim et al 2011b) questioned the effectiveness of collective bargaining in the Nigerian public sector. This is because, according to them, collective bargaining in the public sector in Nigeria which started with Hunt Commission of 1934 merely modified bargaining relationship, the structure and scope of collective bargaining. The government pays lip-service to the use of collective bargaining machinery, because at all levels, they have continued to set aside the use of collective bargaining in favour of wage commissions in granting wage awards. Wages in Nigeria public sector are determined by fiat, there by offering little opportunity for workers' contribution in the determination of terms and conditions of employment. Therefore, the use of fiat in Nigeria public sector is a mockery to collective bargaining machinery and hence not in line with the ILO Convention (1960).

It is the view of (Chidi, 2010; Anyim et al, 2011b), the use of ad-hoc commissions in addressing workers' demands such as wage determination and other terms and conditions is unilateral and undemocratic as it negates good industrial democratic principles. The fixing of minimum wages in Nigeria, has always been carried out without any effective tripartite collective bargaining, the latest being the #18,000 National Minimum Wage. This does not only undermine the relevance of collective bargaining in Nigeria public sector, but has also made it antithetical to democratic values. The consequences of these actions are the serious industrial conflicts we witness frequently in almost all sectors of Nigeria economy. The above supports Kester (2006), who opined that having no definite and effective wage determination policy results in spates of industrial unrest.

An effective collective bargaining may be a source of competitive advantage when applied to the resolution of any form of industrial conflict in organisations. Organisations with well-developed industrial relations systems that recognize unions for collective bargaining as a company policy are always able to manage their workplace effectively and hence maintain a reasonable

level of stable relationship with the workforce. Effective collective bargaining system enables free flow of communication among all industrial actors and this brings about better performance from them and thus enhances the achievement of overall organisational goal.

It is in the light of the above that this paper sought to answer the following research questions to see how well collective bargaining can be used as an instrument for conflict resolution and management.

RESEARCH QUESTIONS

- Does University of Lagos have an established procedure for conflict management?
- Does collective bargaining positively affect the productivity of the University of Lagos employees?
- Does University of Lagos use collective bargaining as an instrument of conflict settlement?

HISTORY OF UNIVERSITY OF LAGOS.

In a bid to beef up the workforce for a newly independent Nigeria for rapid industrial and economic development, the Federal Government in May 1959 set up the *Eric Ashby Commission on Post School Certificate and Higher Education in Nigeria*. The Ashby Commission's report, titled *Investment in Education*, recommended the establishment of a new university in Lagos (University of Lagos), the then Federal Capital, to offer courses in Commerce, Business Administration, Economics and Higher Management Studies to intensify the training of a professional workforce. The University of Lagos was established on 22nd October 1962 on the authority of the University of Lagos Act of 1962, two years after Nigeria independence on October 1, 1960.

The Act provided for an eleven-member Provisional Council for the University, a Senate to preside over academic affairs, and a separate Council for the Medical School. The University consisted of two separate institutions—the main university and an autonomous Medical School. The first academic session in the university commenced in 1962/63 with a student population of 72 in the three pioneer faculties: Commerce and Business Administration, Law and Medicine. In 1967, the government promulgated the University of Lagos Decree (Decree No. 3 of 1967) that established a single Council for the whole university. The University currently has a School of Postgraduate Studies, a Distance Learning Institute (DLI) and twelve faculties: with 12, 581 postgraduate students and 41, 615 undergraduate student enrolment as at 2012/2013 session.

The staff strength of the university as at the end of 2012/2013 session was 3,747 made up of 2,344 male and 1,403 female organised by four trade unions. The unions are: Academic Staff Union of Universities (ASUU), Non Academic Staff Union (NASU), Senior Staff Association of Nigerian Universities (SSANU) and National Association of Academic Technology Employees (NAATE)

RESEARCH METHODOLOGY

The setting of this research is the Nigerian federal government funded University of Lagos. A cross-sectional descriptive survey research design is adopted for this study. The population of the study is made up of

the members of the Academic Staff Union of Universities (ASUU) and the Senior Staff Association of Nigerian University (SSANU), University of Lagos Chapter both male and female with similar job nature and levels of work. Data was collected via the questionnaire, interviews, and secondary source. A sample size of 120 of the total population was selected through the stratified random probability sampling method. Data were analyzed using descriptive statistics such as frequencies and percentages with the aid of statistical package for social science (SPSS) version 15.0.

DATA ANALYSIS

Table1. Response form respondent

QUESTION	RESPONSE	FREQUENCY	PERCENTAGE (%)	CUMULATIVE PERCENTAGE (%)
Sex	Male	75	62.5	62.5
	Female	45	37.5	100.0
	Total	120	100.0	
Age	18-25	35	29.2	29.2
	26-35	41	34.2	63.4
	36-45	25	20.8	84.2
	46 and above	19	15.8	100.0
	Total	120	100.0	
Marital Status	Single	33	27.5	27.5
	Married	84	70.0	97.5
	Divorced	3	2.5	100.0
	Total	120	100.0	
Work Experience	Below four years	25	20.8	20.8
	Four – six years	25	20.8	41.6
	Six – Eight years	50	41.7	83.3
	Eight years and above	20	16.7	100.0
	Total	120	100.0	
Educational Qualification	BS.C/HND	35	29.2	29.2
	M.SC/MBA	55	45.83	75.0
	Ph.D.	30	25	100.0
	Total	120	100.0	

Source: field survey, 2014.

Table 1 indicates that the respondents is male dominated (with 62.5% as regards gender classification of the respondents. As regards age classification, respondents between the age 26 to 35years dominated the sample with 34.2% of age distribution. This directly implies that the respondents are mature and should be capable of providing objective responses. The population of the respondents is also dominated by married people representing 70% of the total respondents. The population is equally occupied with well-experienced individuals with years of experience ranging from six to eight years, domination 41.7% of the total population. The population is as well dominated with well-educated and enlightened

respondents with M.SC/MBA certification, representing 37.5 % of total population.

The implication of the above analysis is that there is high possibility of obtaining objective responses from respondents due to their level of maturity, experience and educational standards. This is justifiable basically due to the educational background and standards as well as experience of the larger respondents which depicts their relative exposure to the importance of this research study to organisational effectiveness. Simply put, the educational qualifications of the respondents will enable them appreciate the relevance of this research to their organisational effectiveness and thus made them provide unbiased responses to the questions contained in the questionnaire.

Table 2

QUESTION	RESPONSE	FREQUENCY	PERCENTAGE (%)	CUMULATIVE PERCENTAGE (%)
The existence of conflict is unavoidable in university of Lagos and its manifestation has effect on organizational performance.	SA	67	55.83	55.83
	A	52	43.3	99.13
	INDF.	1	0.83	100.0
	SD	-		
	D	-		
Total	120			
Conflict is a necessary determinant factor of employees' productivity	SA	56	46.67	46.67
	A	54	45.0	91.67
	INDF.	10	8.333	100.0
	SD	-		
	D	-		
Total	120			
Conflict basically affect employees' and organizational productivity	SA	25	20.83	20.83
	A	74	61.67	82.5
	INDF.	21	17.5	100.0
	SD	-		
	D	-		
Total	120			
Conflict and conflict management are useful areas of focus in order to better understand organizational performance.	SA	55	45.83	45.83
	A	65	54.17	100
	INDF.	-		
	SD	-		
	D	-		
Total	120			
Conflict in the university is influenced by several factors	SA	30	25.0	25.0
	A	85	70.83	95.83
	INDF.	5	4.17	100
	SD	-		
	D	-		
Total	120			
Conflict can be managed in all universities especially in your university	SA	54	45.0	45.0
	A	45	37.5	85.2
	INDF.	21	17.7	100
	SD	-		
	D	-		
Total	120			
Universities must also pay close and special attention to how conflict should be resolved and managed	SA	34	28.33	28.33
	A	65	54.167	82.497
	INDF.	21	17.7	100
	SD	-		
	D	-		
Total	120			
Collective bargaining is one of the tools through which conflicts arising from work environment could be resolved	SA	65	54.167	54.167
	A	54	45.0	99.167
	INDF.	1	0.833	100
	SD	-		
	D	-		
Total	120			
The University has formats for settlement of dispute between management and unions	SA	52	43.33	43.33
	A	66	55	93.33
	INDF.	2	1.667	100.0
	SD	-		
	D	-		
Total	120			
Collective bargaining is a Strategic /veritable instrument for effective resolution of industrial conflict	SA	54	45.0	45.0
	A	66	55.0	100
	INDF.	-		
	SD	-		
	D	-		
Total	120			
Collective bargaining replaces weak individual attempt by workers and management to manage industrial conflict	SA	44	36.67	36.67
	A	65	54.167	90.837
	INDF.	11	9.167	100
	SD	-		
	D	-		
Total	120			
There is prospect for collective bargaining in the university	SA	63	52.5	52.5
	A	57	47.5	100.0
	INDF.	-		
	SD	-		
	D	-		
Total	120			
Collective bargaining evolved as a means of introducing democratic principles into employer – employee relationship	SA	38	31.67	31.67
	A	65	54.167	85.837
	INDF.	17	14.167	100
	SD	-		
	D	-		
Total	120			
Management greatly interfere in the affairs of the unions in the university	SA	18	15.0	15.0
	A	22	18.33	33.33
	INDF.	39	32.5	65.83
	SD	11	9.167	74.997
	D	30	25	100.0
Total	120			
The interference of management in union affairs affects union activities	SA	18	15.0	15.0
	A	22	18.33	33.33
	INDF.	39	32.5	65.83
	SD	11	9.167	74.997
	D	30	25	100.0
Total	120			

The analysis on the above table shows that 99.13% of the respondents agreed to the proposition that the existence of conflict is unavoidable in all organisations and it poses either positive or negative effect on organizational performance. According to Fashoyin (1992), conflict is inevitable in organisations as a result of the inherent opposing interests of employers and employees in work relations.

Item two reveals that 91.67% agreed that conflict is a necessary determinant factor of organizational productivity, and 8.33% are of the opinion that it is indifferent.

In item three of the table above, conflict basically affect organizational productivity gains 82.5% responses from the respondents who agreed to the proposition, and the 17.5% responses was shown to be indifferent.

Item four of the questionnaire analysis shows that conflict and its management are useful areas of focus in order to better understand organizational performance owing to 100% agreement recorded from the respondents' responses.

Item five in the analysis pointed out that conflict in the public sector is influenced by several factors as 95.83% of the respondents agreed to the proposition, while 4.17% respondents' views were indifferent.

The sixth item proposed that conflict can be managed in all public sectors especially universities as shown in the table recorded 85.2% of the respondents who agreed that it can be managed, and 17.7% responses were indifferent.

The seventh item of the questionnaire analysis reveals that organisations must also pay close and special attention to how conflict should be resolved and managed, following the high percentage recording of 82.4% as agreed by the respondents, and 17.7% responses were indifferent.

Item eight of the table shows that 99.1% of the respondents agreed to the proposition which state that collective bargaining is one of the tools through which conflict arising from work could be resolved while 0.83% was recorded as indifferent. This is in line with the views of (Ubeku, 1983; Fajana 2000; Anyim et al 2011) that collective bargaining is used in resolving industrial conflicts and that is why industrial relations is viewed as simply the process of conflict resolution.

Item nine reveals that all respondents agreed that the university has formats for settlement of dispute between management and unions as 93.33% was recorded while

1.66% is shown to represent indifferent position by respondents.

Item ten reveals that all respondents agreed that collective bargaining is a veritable instrument for effective resolution of industrial conflict. This is a further confirmation of the conclusion drawn using item eight above.

Item eleven of the analysis reveals that 90.83% agreed that collective bargaining replaces weak individual attempt by workers and management to manage industrial conflict. This finding supports the age long view of the Webbs (Sidney & Beatrice Webb), that collective bargaining was simply the alternative to individual bargaining (Otobo, 2005, p.129).

Another interesting item is the item twelve of the analysis, which shows that all respondents agreed to the proposition that there is prospect for collective bargaining in the public sector. It is true that collective bargaining is undermined in the process of public sector wages determination, but in the area of conflict resolution, the prospect of collective bargaining is high as can be observed from the 2013 ASUU strike which was resolved through the instrument of collective negotiation.

Item thirteen shows that collective bargaining evolved as a means of introducing democratic principles into employer-employee relationship as 85.83% responses agreed and 14.16% of the responses were indifferent. According to Chamberlain and Kuhn (1965), collective bargaining as a system of industrial management affords the workers through their unions the opportunity to partake in those matters viewed as exclusive right to the management otherwise known as management prerogatives.

Item fourteen and fifteen show that 34.16% disagreed to the proposition, 33.33% agreed and 32.5% were undecided remaining indifferent to both the proposition that management greatly interfere in the affairs of the unions in the university and that the interference of management in union affairs affects union activities. This implies that there is no consensus in the opinion that management does not greatly interfere in the affairs of the unions in the university, and its interference in union affairs does not affects union activities, if any. The reason for this position may be that the interference may not be open but in a subtle way. In our discussion with some ASUU members, it is observed that the delegation of the administration usually attend congress on the days critical motions are to be voted on by members. However, the effect such visits has on the

outcome of such votes remained an area for empirical investigation.

In all, the interpretation of the table shows the following:

- It reveals that effective collective bargaining positively affects productivity.
- It shows that there exists an established procedure for conflict resolution in the universities.
- That collective bargaining is a veritable instrument for the management of conflict in the public sector.
- There is a lot of prospect for collective bargaining in the university.

CONCLUSION

Universities with an open, sound, qualitative and effective collective bargaining system, has a strong cornerstone of activities and vital strategic practice that will facilitate genuine relationships among its' industrial actors which in essence is appropriate for the achievement of organizational goal and gaining of organizational competitive advantage. This study shows that effective collective bargaining as an instrument for the management and resolution of conflict enhances university effectiveness in managing conflict, which in turn brings about stable relationship among actors in the university and thus enhance employees' and organizational productivity. The university should therefore adopt conflict acceptance strategy and focus on its effective resolution strategies to convert the manifestation of conflict into benefits for the university. Above all, universities should give priority to collective bargaining technique and process in the organization to ensure a quality negotiation system which is capable of building positive relationship between them and their workforce and therefore bring about greater chance of achieving organizational goal. University should be proactive in recognizing certain barriers that may pose threat to collective bargaining processes and strive to eliminate such barriers in order to facilitate genuine negotiation among their members in the workplace irrespective of positions, interests, and preferences. Consequently, because effective collective bargaining is an important phenomenon to proper functioning of the university, management and unions are to maintain and promote quality practices in this area.

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DYNAMIC INTERACTIONS AMONG BUDGET DEFICIT, ECONOMIC GROWTH AND POVERTY LEVEL TOWARDS CAPACITY BUILDING STRATEGY FOR SUSTAINABLE DEVELOPMENT AND POVERTY ALLEVIATION IN NIGERIA (1980-2012)

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ABSTRACT

The study investigates the dynamic interaction among budget deficit, economic growth and poverty level in Nigeria. This is with a view to providing empirical evidence on budget deficit operation in stimulating economic development through economic growth and poverty reduction in Nigeria. Secondary data were used in this study. Data on poverty rate, real domestic and budget deficit were sourced from Statistical Bulletin published by Central Bank of Nigeria (CBN) and the National Bureau of Statistic (NBS) Abuja. Vector autoregressive Model was conducted in determining the interaction effects among the three variables. The result showed that one per cent innovation in economic growth brought about a negative response by budget deficit at the initial period but became positive over time. Also, a shock to budget deficit and real consumption expenditure per capita produced a negative response by the economic growth, but however, became positive over time.

KEYWORDS: poverty level, budget deficit, economic growth, and error correction.

INTRODUCTION

Sustainable economic growth and development is one of the most challenging issues in both developed and developing countries of the world. The importance of an effective running of monetary and fiscal policies is to reduce balance of payment deficit, control inflation, reduce unemployment and sustained economic growth. Economic growth is primarily driven by improvement in productivity, which involves producing more goods and services with the same inputs of labor, capital, energy and materials. Government spending could stimulate economic growth and it is important to know that effective use of one resource depends upon appropriate use of the other.

Over the years, government has been working in achieving sustainable development and poverty alleviation through capacity building by investing in human capital development and infrastructures. However, the country has not attained her objective given the level of poverty in the country viz and viz the rate of increase in budget deficit. Therefore, a strategic capacity building and more proactive policy will be needed by the government through an empirical investigation in achieving sustainable development and poverty alleviation in Nigeria. The development of budget deficit is often traced to the Keynesian inspired

expenditure-led growth theory (Oladipo and Akinboola, 2011). The Keynesian agitate that the intervention of government in financing budget deficit is to motivate aggregate demand which will increase economic growth of an economy. Keynes believed that budget deficit result in an increase in domestic production which makes private investors better off. Over the years government spending has exceeded its available resources thereby leading to deficit. Most time budget deficit is consciously and deliberately implemented in order to attain economic development. The aim of government in financing budget deficit is to achieve full employment of resource, price stability, create conducive environment for both private and public investment, and create job opportunities which translate to economic growth and poverty reduction in an economy.

STATEMENT OF PROBLEM

Nigerian economy has been growing over time given the upward trend of GDP. In spite of this, the country has been facing a lot of economic crisis (indebtedness, high rate of inflation; poor investment performance, unemployment and increase in poverty rate). Moreover, with the volatile revenue base of the government, fiscal deficits still persist in the economy. However, the

possible adverse effect of fiscal deficits remains an issue in the mind of policy makers. Studies have shown that over 70 per cent of Nigerian population lives below one dollar per day (Ogun 2010). Precisely, poverty has increased from 27.2 per cent in 1980 to 42.7 per cent in 1992 and to 69 per cent in 2010. Also, government expenditure increased from 11,413.70 million naira in 1980 to 92,797.40 million naira in 1992 and increased greatly to 4,194,217.88 million naira in 2010. Therefore, it is fallacious to conclude that the increase in government expenditure is as a result of continuous increase in the level of poverty over the years without empirical findings. Also, economic growth over this period has been on the increase; however it cannot be concluded that increase in government expenditure that has led to budget deficit has contributed to the increase in economic growth without proper investigation.

Thus, studies like Chude and Chude (2013), Vincent and Clem (2013); Adewale and Oloni (2012), Folorunsho and Felix (2008), Ogunmuyiwa (2011), Adesoye et al (2010), Omoke (2010), Vincent et al (2012), and Paiko, (2012) among others, have examined the impact of government spending on economic growth, without considering the issue of poverty in relation to economic growth and budget deficit. Therefore, this necessitate further empirical findings on the interaction among budget deficit, economic growth and poverty in order to guide policy makers on the right path to economic development. Based on the above issues, it is then imperative to know the dynamic interaction that exists among budget deficit, economic growth and poverty level in Nigeria for the period 1981 to 2012. Therefore, the objective of this study is to analyze the interactive effects among budget deficit, economic growth and poverty level in Nigeria.

LITERATURE REVIEW

There are three views on the relationship between budget deficit and economic growth. These are the Keynesian, the Neoclassical and the Ricardian Equivalence Hypothesis schools of thought (REH). Keynesian was of the opinion that, positive relationship exist between budget deficit and economic growth while the Neo-classical opined that an inverse relationship exist between budget deficit and economic growth. Moreover the REH believed that a neutral relationship exists between budget deficit and economic growth. However, many postulates of these schools of thought have presented conflicting and inconclusive evidence of the relationship that exists between budget deficit and economic growth both at local and international level.

Bahmani (1999), using Johansen Juselius cointegration technique to examine budget deficit and investment considering quarterly data for the period of 1947-1992

concluded that, budget deficit crowd in real investment, which is in agreement with the Keynesian proposition. However, his findings was in conflict with the work of Vincent and Clem (2013) that examined the crowding-out effect of budget deficits on private sector investments within the Nigerian context, using data for the period of 1970-2006. The result indicated that budget deficits had a depressive effect on private investment in the country. The estimation results suggest that a 1% increase in fiscal deficit leads to 0.267% decline in private investment. The results also indicate that Nigeria's debt profile has had strong and negative impact on private investment in Nigeria.

Ranjan and Sharma (2008) showed that government expenditure exerted significant positive impact on economic growth in India during the period 1950-2007, and that the two sets of variables cointegrated. This was in line with the earlier work of Barro (1979) who observed a positive and significant impact of budget deficit on economic growth. In empirical study by Najid (2013), the relation between budget deficit and gross domestic product in Pakistan was investigated by employing a time series data for the period of 1971-2007. The result showed that there was bi-directional causality running from budget deficit to GDP and from GDP to budget deficit. This was a contrary view to the earlier work of Nur Hayati (2012) who established a no link of relationship between budget deficit and economic growth in the long run in Malaysia. This result was also supported by a study carried out by Ghali (1997) in Saudi Arabia. A contradicting study result came from the work by Gohar Fatima (2012). The study finds negative relation between budget deficit and economic growth in Pakistan. This finding was supported by the work of Ghosh and Hendrik (2009). They reported that, *ceteris paribus*, an increase in budget deficits slows growth of the U.S. economy.

Bose (2007) find positive relation between budget deficit and economic growth in 30 developing countries. In contrary, Laudau (1983) examined the effect of government deficit on economic growth for a sample of 96 countries and found that government deficit exerts a negative effect on real output. The empirical work of Adam and Bevan (2004) was on the relationship between fiscal deficits and growth (GDP) for a panel of 45 developing countries. Based on the consistent treatment of budget constraints, the study found evidence of a threshold effect at a level of the deficit around 1.5 per cent of GDP. The threshold involves not only a change of slope but also a change of sign in the relation regardless of the budget category excluded from the model, indicating that for an economy not on its steady state growth path, there is a range over which deficit-financing may be growth-enhancing. This was

supported by the work of Olugbenga and Owoye (2007)

The work of Olugbenga and Owoye (2007) investigated the relationships between government deficit financing and economic growth in a group of 30 OECD countries for the period 1970-2005 using regression analysis. Their analysis showed that a long-run relationship exists between government expenditure and economic growth, and also indicated existence of feedback relationship between government expenditure and economic growth.

In summary, based on the conflicting results obtained from the literatures reviewed on the budget deficit - economic growth nexus in Nigeria, this study deserves further empirical investigation. This is because most of the studies reviewed fail to investigate the various effects of budget deficit on poverty on one hand and the dynamic interactions among budget deficit, economic growth and poverty reduction in Nigeria on the other hand.

METHODOLOGY

Theoretical Framework

Recent literature on endogenous economic growth theory has provided some insight into the reason why some countries grow at different rate over periods of time. In most of these models, fiscal variables which are capable of yielding predictions of long run or steady state growth usually model economic growth (y) as a function of number of growth determinants. This study employs the popular endogenous growth theory as analyzed by Barro (1990) and Barro and Sola-i-Martin (1992) using AK model. Authors such as Brauninger (2002), De castro (2004) and Perotti's (2004) study of five OECD countries have pointed out that budget deficit influences economic growth using the endogenous growth model. Thus, the study makes use of the Cobb-Douglas production function:-

$$Y = f(AK^\alpha, L^\beta) \dots \dots \dots 1$$

Where $\alpha, \beta > 0$

Y represents output/real GDP, K and L stand for capital and labor, A is the efficiency parameter while α and β are the parameters representing the output elasticity of such inputs. Modifying the Cobb-Douglas production function by accommodating budget deficit, we have equation (2)

$$Y = f(AK^\alpha, L^\beta, Bd^\beta) \dots \dots \dots 2$$

Equation 2 is a modified Cobb-Douglas production function that accommodates the budget deficit (Bd), whereas the endogenous growth model looks at the investment and capital in a country.

Model Specification

A way to summarize the dynamics of macroeconomic data is to make use of vector autoregressive model. VAR models have become increasingly popular in recent decades. They are estimated to provide empirical evidence on the response of macroeconomic variables to various exogenous impulses in order to discriminate between alternative theoretical models of the economy. This simple framework provides a systematic way to capture rich dynamics in multiple time series, and the statistical toolkit that came with VARs was easy to use and to interpret. As Sims (1980) and others argued in a series of studies, VARs held out the promise of providing a coherent and credible approach to data description, forecasting, structural inference and policy analysis.

With vector autoregressive models it is possible to approximate the actual process by arbitrarily choosing lagged variables. Thereby, one can form economic variables into a time series model without an explicit theoretical idea of the dynamic relations. A VAR is an n equation, n variable model in which each variable is in turn explained by its own lagged values, plus (current) and past values of the remaining $n-1$ variables. A VAR can be thought of as the reduced form of a dynamic economic system involving a vector of variables z_t .

$$Az_t = b_1 z_{t-1} + b_2 z_{t-2} + \dots \dots \dots + b_p z_{t-p} + u_t$$

$$(3) z_t = (bd_t, gdp_t, rcx_t) \text{ and } u_t = \sum e_t \text{ where}$$

b_1, b_2, \dots, b_p are the coefficient of budget deficit, economic growth and poverty level. Therefore, z_t can be expressed as thus:

$$bd_t = b_1 bd_{t-1} + b_2 gdp_{t-1} + b_3 rcx_{t-1} + e_{1t} \quad (4)$$

$$gdp_t = b_4 gdp_{t-1} + b_5 bd_{t-1} + b_6 rcx_{t-1} + e_{2t} \quad (5)$$

$$(5) rcx_t = b_7 rcx_{t-1} + b_8 bd_{t-1} + b_9 gdp_{t-1} + e_{3t} \quad (6)$$

Therefore, equation 4 to 6 will be estimated in obtaining the dynamic effect that exists among budget deficit, economic growth and poverty reduction

Where gdp = real gross domestic product, bd = budget deficit, rcx = poverty level proxied by Real Consumption Expenditure per Capita as a measure which is superior to income measures (Okojie, 2002 and Ogun 2010.)

This study used essentially secondary data for its analysis. The data on the variables were obtained from the following sources: (i) Central Bank of Nigeria (CBN) Statistical Bulletin (2010), National Bureau of Statistics (NBS) various issues and World Development Indicator (2012).

EMPIRICAL RESULTS

Time Series Properties of the Data

From Table 1 below, it was confirmed that, all the variables (real consumption expenditure per capita, budget deficit and gross domestic product) were not stationary at level. However they became stationary after first difference since the series were integrated of order one i.e. I (1) at 5 per cent level of significance.

Table 1: ADF Statistics for Testing Unit Roots in the Variables

Series	Level	First Diff	Remark
Bd	-1.76	-7.45	I(1)
Log(Rcx)	-1.43	-6.15	I(1)
Log(gdp)	0.02	-4.42	I(1)

Table 2: Determination of Optimal Lag Length

	LogL	LR	FPE	AIC	SC	HQ
0	-119.349	NA	23.07821	11.6523	11.80152	11.68469
1	-44.5399	121.1199	0.044389	5.384747	5.981617	5.514283
2	-25.8486	24.92167*	0.018828*	4.461771*	5.506293*	4.688459*
3	-19.6022	6.543887	0.029057	4.724015	6.21619	5.047855
4	-14.1387	4.162634	0.05923	5.060829	7.000656	5.481821

*indicates lag order selected by the criterion at 5 per cent level of significance.

Therefore, the cointegration test was carried out using Johansen cointegration test with lag 2. This is because Johansen cointegration is a superior test that lies on asymptotic property that is sensitive to error in small sample. It is also robust to many departures from

Critical Value at 5% = 2.99,

Sources: computed from study data

Consequently, the presence of significant co-integration relationship among the variables could be determined, but in doing this the optimal lag length must be observed.

From Table 2, the Akaike Criteria (AIC), Schwarz Bayesian Criteria (SBC) and Hannan-Quinn Information Criterion (HQ) indicated that the optimal lag structure for the VAR upon which the cointegration analysis is based is two.

normality as it gives room for the normalization with respect to any variable in the model that automatically becomes a dependent variable. This result of the cointegration test is presented in Table 3

Table 3: Result of the Cointegration Test

Sample (adjusted): 1983 2010
Included observations: 23 after adjustments
Trend assumption: No deterministic trend (restricted constant)
Series: BD LOG(GDP) LOG(RCX)
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.538707	32.50699	35.19275	0.0948
At most 1	0.354245	14.71140	20.26184	0.2434
At most 2	0.183143	4.652696	9.164546	0.3237

Trace test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

The results of the co-integration test in Table 3 confirmed that there is no co-integration relationship among the macro economic variables included in the model. Therefore, we proceeded in obtaining the interactive effects among budget deficit, economic growth and poverty level using impulse response approach by estimating the VAR models stated in equations 4-6 with their first difference.

In Figure 1, one standard deviation in the model is calculated in percentage. For each of the variables, the

horizontal axis of the IRF shows the number of periods that have passed after the impulse has been given, while the vertical axis measures the responses of the variables. Evidently from Figure 1 (Panel b), it is observed that one per cent innovation in economic growth brought

about a negative response by budget deficit at the initial period but became positive over time. Also, (Panel h) is the response of real consumption expenditure per capita that responded negatively to economic growth at the

initial period became positive at the 5th period and fall to negative thereafter.

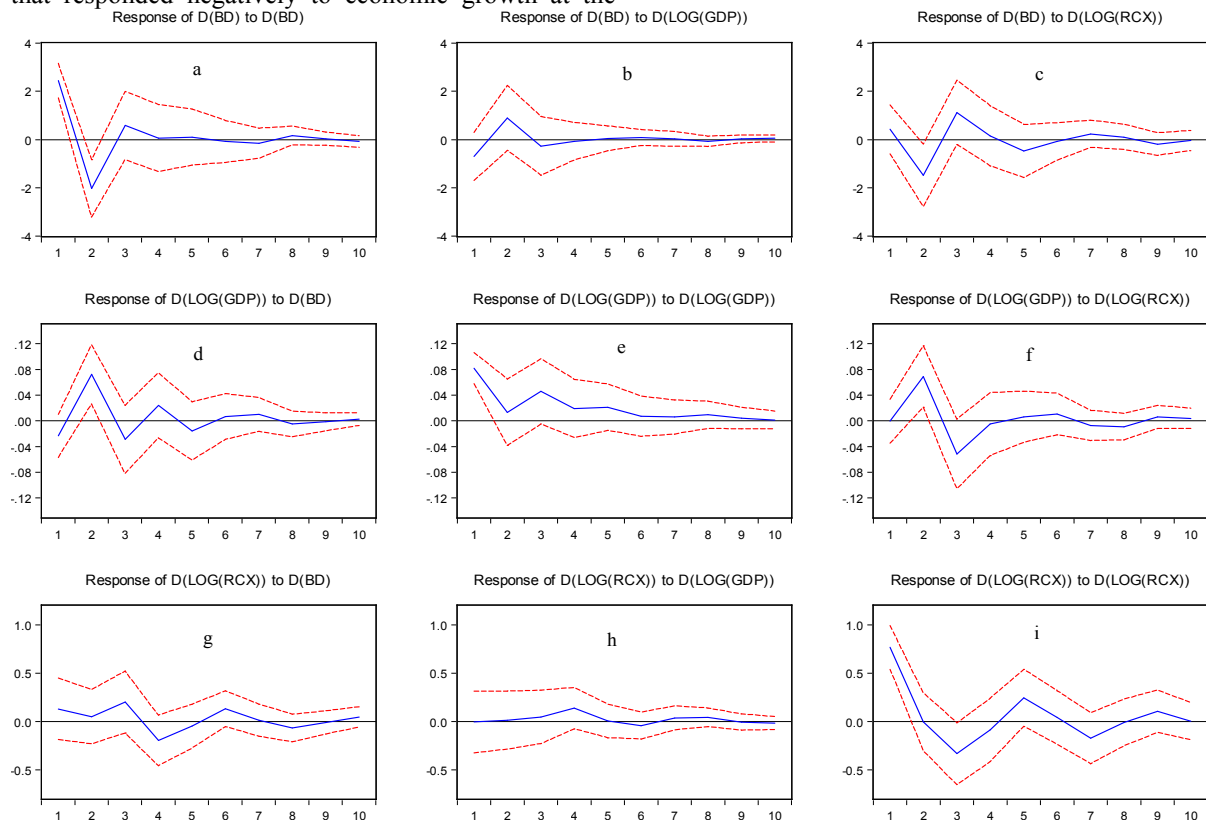


Figure 1: Impulse Response Functions
 Source: Author's Computation (2014).

From (Panel d and f) a shock to budget deficit and real consumption expenditure per capita produced a negative response by the economic growth, but however, became positive response over time. Moreover, is the fluctuating response of real consumption expenditure per capita between positive and negative horizon as a result of an innovation in budget deficit?

CONCLUSION/POLICY REMARKS

The implications from the above is that when budget deficit is financed in Nigeria, it may affect economic growth positively over time but the negative response by the real consumption expenditure shows that budget deficit in Nigeria has not been impacting positively on poverty level of the country which is the main objective of government interventions in an economy. This is a true picture of Nigerian economy since most time budget deficit are tailored towards recurrent expenditures and not capital project that may affect the poor in the long run. This also explains why the response of real consumption expenditure per capita to

economic growth has not shown any significant impact on poverty reduction in Nigeria.

Therefore, it is recommended that, budget deficit should be channelled towards capital projects that are capable of creating conducive environment for both public and private investment. This is necessary in order to create jobs and increase real per capita consumption expenditure. Doing these could bring about economic growth and poverty reduction in the country.

CONTRIBUTION TO KNOWLEDGE

This study has contributed to literature by investigating the dynamic interaction that existed among fiscal policy, economic growth and poverty level in Nigeria for the period 1981 to 2012. Moreover, it has also shed light on how budget deficit financing can be used as a strategy for capacity building for sustainable development and poverty alleviation in Nigeria.

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IMPACT OF FDI IN U.A.E OVER THE MAIN ELEMENTS OF SUSTAINABLE DEVELOPMENT: ECONOMY AND ENVIRONMENT

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ABSTRACT

During the past few years the Emirates has witnessed a buoyant economic growth by which it is considered as one of the most developing countries in the GCC¹. The country accounts 40 percent of its export towards oil and natural gas contributing it to a massive 38 percent of country's GDP¹. In order to diversify its economy and reduce its future dependence on oil revenues which are exhaustible, the UAE's government has placed several strategies in place. One of the strategies of the government is to attract FDI in the country by giving foreign investors some attractive incentives. However, there is a debate over the impacts of FDI on the host country. One of the main concerns in such debates is its effect on environmental degradation. In this paper, the aim of research is to show the contribution of FDI over the main elements of sustainable development: economy and environment, of U.A.E. The GDP per capita of the country is used as the indicator representing the economy of the country whereas the CO₂ emission in kilo tons is used as the indicator representing environmental condition of the country. Paper researches the direction of the relationship between the variables by using several econometric tests such as Augmented Dickey-Fuller (ADF), Johansen co integration and Granger Causality tests. The results showed that there is no causality between the growth rate of GDP and FDI, growth rate of FDI and Co₂. The only causality found is a uni-directional causality between the growths of GDP and the growth rate of CO₂. The direction is from growth rate of pollution to the growth rate of GDP. This paper concludes that government should make policy that will ensure that transnational companies use equipment that is environmentally friendly.

KEYWORDS: sustainable development, foreign direct investment (fdi), gross domestic product (gdp), co₂ emission, vecm, granger causality

INTRODUCTION

United Arab Emirates (U.A.E) has drawn the world's attention by winning EXPO 2020 in 2013. One of the key themes of the EXPO is sustainability. Sustainable development considers the country's development that promotes the scope of complete welfare for all generations by achieving the environmental and economic aims of society with lesser negative effects. Over the past few years, the UAE government has placed a lot of emphasis on sustainability. The vision of the Ministry of Environment is "We strive towards integrated management For Environment Ecosystem and Natural resources to realize Green Economy for the present and future generations"[6]

For sustainable development of any country, investment is considered to be vital and important ingredient. Foreign direct equity investment [FDI] is usually preferred over other forms of external finance because on one hand it does not create debt and on the other hand its return totally depends upon the performance of project funded by the investors. To harvest full benefit of foreign direct investment and contribute to the national capacity building within the framework of

sustainability, it is necessary that the main elements of sustainable development: economic growth and environmental preservation should be well coordinated with various national and international policy structures of foreign investment. Although there are few problematic policies for companies to contribute through foreign direct investment in UAE. Some of such barriers are the Companies Law and the Agencies Law which actually represents the largest legal barriers. The Companies Law states that foreigners and foreign companies are prohibited from owning more than 49 percent of a company established in the UAE (out of Free Zones) whereas the Agencies Law states that foreign importers must operate through an agent to import goods into the country, this agent must a company owned wholly by a UAE national or either simply a UAE national (without company).

In the past few years the Emirates has witnessed an increased economic growth by which it is considered as one of the most developing countries in the GCC. In UAE, the oil and natural gases contribute to the major percentage of GDP and in order to shift its economy and

reduce its future dependence on oil revenues which are exhaustible, the UAE's government has placed several strategies in place. One of the strategies of the government is to attract FDI in the country by giving foreign investors some attractive incentives. Investment help in strengthening the country's economy and it further plays a crucial role in the country's strategy towards building a sustainable economy and national capacity. However, there is a debate over the effects of FDI on the host country. One of the main concerns in such debates is its effect on environmental degradation. The study aims at projecting the contribution of FDI over the main elements of sustainable development such as economy and environment in the U.A.E. The indicators GDP per capita and the CO2 emission in kilo tons are used to represent the economy and environmental condition of the country.

Chart 1 below shows the trends of FDI inflows in the UAE during past 23 years. It is observed that FDI in UAE increased to 268303 AED Million in 2012 from 240284 AED Million in 2011. FDI in the UAE averaged 191759 AED Million from 2007 until 2012, reaching an all time high of 268303 AED Million in 2012 and a record low of 134017 AED Million in 2007. The figures are reported by the National Bureau of Statistics, UAE.¹⁰

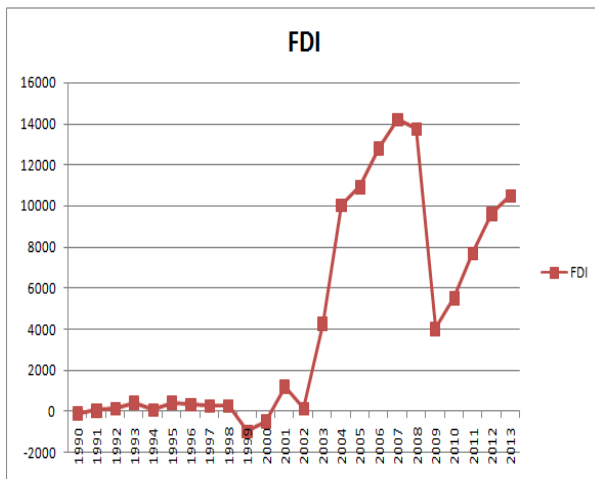
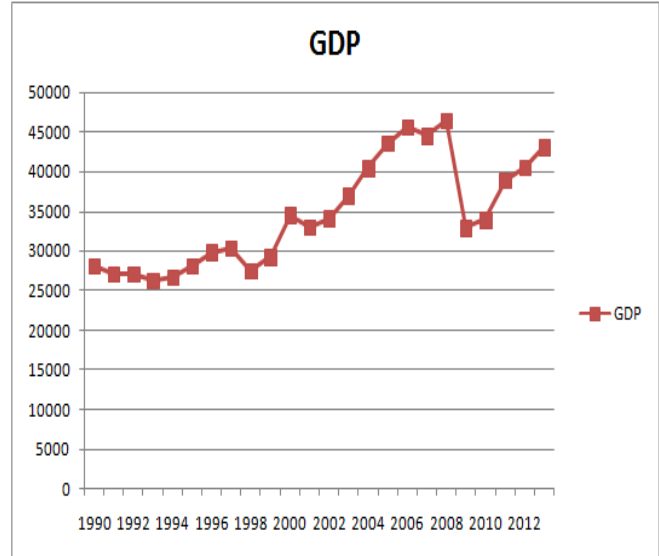


Chart 1 Trend of FDI inflows of UAE: 1990-2013 [\$ Million]
<http://data.worldbank.org/>

The country accounts 40 percent of its export towards oil and natural gas contributing it to a massive 38 percent of country's Gross Domestic Product (GDP) [8].



<http://data.worldbank.org/>
 Chart 2 Trend of GDP inflows of UAE: 1990-2013 [\$ Million]

The GDP in the U.A.E increased 5.20 percent in 2013 from the previous year. GDP Growth Rate in the country averaged 4.66 percent from 2000 until 2013, reaching an all time high of 9.80 percent in 2006 and a record low of -4.80 percent in 2009 due to the economic crunch. GDP Growth Rate in the U.A.E is reported by the National Bureau of Statistics, UAE.⁹

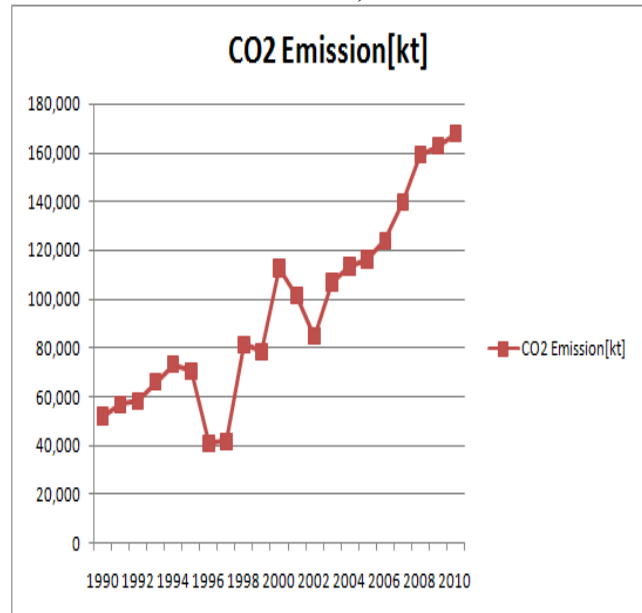


Chart 3 Trend of CO2 inflows of UAE: 1990-2013 [\$ Million]
<http://data.worldbank.org/>

CO2 emissions (metric tons per capita) in the United Arab Emirates was reported at 167597 kt in 2010,

according to the World Bank [7]. Carbon dioxide emissions are those coming from the burning of fossil fuels and the manufacturing of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring [8].

METHODOLOGY

The objective of this paper is to study the direct relationship between the FDI inflows, GDP and Co2. The annual GDP per capita is used as an indicator for economic growth; the annual Co2 is used as an indicator for pollution. The data for GDP, CO2 and FDI were obtained from World Bank Development Indicator. The study scope covers the period between 1990 and 2010. The choice of this scope is informed by the availability of uniform data in the country as well desire to study the relationship between the variables over a considerable length of time. The variables are presented in their log forms. Augmented Dickey-Fuller is used to test the stationarity of the variables. If the data is found to be stationary at the level, it can test VAR directly. In case the data is found non-stationary, the first differencing needs to be found to convert them into stationary. Secondly, Johansen Co-integration technique is used in order to find long run and short run relationship equilibrium between variables. If the series do not have co-integration or no long run equilibrium relation among time series, VAR model is supposed to be applied to measure Granger Causality test. In contrast, if there is equilibrium interrelation among the time series, VECM should be applied to examine Granger Causality Test [2]. Granger causality test is used to test the direction of causality between FDI and GDP, FDI and CO2, GDP and CO2. Three different assumptions regarding stationary of time series of FDI, GDP and CO2 are examined as follows.

Model I: Trend and intercept

$$\Delta Y_t = \mu + \rho_0 Y_{t-1} + \eta T + \sum_{i=1}^p \rho_i \Delta Y_{t-i} + \varepsilon_t \quad (1)$$

Model II: Intercept

$$\Delta Y_t = \mu + \rho_0 Y_{t-1} + \sum_{i=1}^p \rho_i \Delta Y_{t-i} + \varepsilon_t \quad (2)$$

Model III: Neither time series nor intercept

$$\Delta Y_t = \rho_0 Y_{t-1} + \sum_{i=1}^p \rho_i \Delta Y_{t-i} + \varepsilon_t \quad (3)$$

The direction of causality determines the direction of the relationship among variables and Granger causality test has four different directions for these purposes:

- Unidirectional Granger-causality from X to Y and not Vice-versa
- Unidirectional Granger-causality from Y to X and not Vice-versa
- Bidirectional (or feedback) causality from X to Y, and from Y to X.
- Lack of Causality: There is no relationship among the variables.

The model is presented below:

$$LGDP_t = a_0 + \sum_{j=1}^n a_1 LGDP_{t-j} + \sum_{j=1}^n a_2 LFDI_{t-j} + u_{1t} \quad (4)$$

$$LGDP_t = b_0 + \sum_{j=1}^n b_1 LGDP_{t-j} + \sum_{j=1}^n b_2 LCo_{t-j} + u_{2t} \quad (5)$$

$$LFDI_t = c_0 + \sum_{j=1}^n c_1 LFDI_{t-j} + \sum_{j=1}^n c_2 LGDP_{t-j} + u_{3t} \quad (6)$$

$$LFDI_t = \delta_0 + \sum_{j=1}^n \delta_1 LFDI_{t-j} + \sum_{j=1}^n \delta_2 LCo_{t-j} + u_{4t} \quad (7)$$

$$LCo_{t-1} = \rho_0 + \sum_{j=1}^n \rho_1 LCo_{t-1-j} + \sum_{j=1}^n \rho_2 LGDP_{t-1-j} + u_{5t} \quad (8)$$

$$LCo_{t-1} = \sigma_0 + \sum_{j=1}^n \sigma_1 LCo_{t-1-j} + \sum_{j=1}^n \sigma_2 LFDI_{t-1-j} + u_{6t} \quad (9)$$

RESULTS

Stationarity through ADF Test

Augmented Dickey Fuller unit root test is the first step to be performed in order to test the unit root in time series and to analyze the stationarity of FDI, GDP and CO2. The Lag length of each variable is selected by computer automatically based on minimum values of Schwartz Info Criterion (SIO) statistics and max lag is 4. The test equations include constant, Trend and constant and None.

Table 1 The results of ADF unit root test of UAE

Test Statistics /Assumption	Level			First Difference			Conclusion
	UAE FDI	UAE GDP	UAE CO2	UAE FDI	UAE GDP	UAE CO2	
Intercept (p-value)	-1.267142 (0.6235)	-1.340857 (0.5895)	-0.255502 (0.9157)	-3.246635** (0.0372)	-4.421641** (0.0029)	-4.688383** (0.0017)	I(1)
Trend & Intercept (p-value)	-4.794734 (0.0080)	-1.642195 (0.7386)	-2.387046 (0.3742)	-2.740757 (0.2365)	-4.428568** (0.0122)	-4.722569** (0.0070)	I(1)
None (p-value)	-0.798046 (0.3578)	0.089839 (0.6999)	1.401245 (0.9542)	-3.204781** (0.0035)	-4.505952** (0.0001)	-4.217223** (0.0003)	I(1)

Notes: *, ** and *** indicate the rejection of the null hypothesis at 10%, 5% and 1% level of significance, respectively

Null Ho: Variable has a unit root

Table 1 illustrates the result of ADF unit root test of U.A.E and the result indicates that all variables tested in UAE has unit root and so variable is non stationary at level. However after the first difference the absolute T statistics is more than 5% critical value and P-value is less than 5 percent, thus the null hypothesis is rejected and the variables are proven stationary at first difference.

Optimal Lag Length Selection Results

Optimal lag length is necessary to define autoregressive time series and a residual in the process of ADF unit root test. Table 2 illustrates the optimal lag length criteria for U.A.E.

Table 2: The optimal lag length of FDI, GDP and CO2 in U.A.E

Optimal Lag length				
	1	2	3	4
SIC	60.33148	61.10824	60.77862	59.25645*
AIC	59.73404	60.06438	59.29467	57.34496*

* indicates lag order selected by the criterion

AIC: Akaike information criterion

SIC: Schwartz Bayesian information criterion

According to the table 2 the fourth lag was the most suitable for further process due to both AIC and SIC indicated the lowest value as 107.7813 and 109.394 respectively and its represents the accurately of analysis.

Co-Integration Through Johansen Co-Integration Technique:

After satisfying the stationarity condition of the variables in ADF Unit root test, analysis of co-integration through johansen co-integration technique is performed as it helps to determine whether the variables under study have the tendency to move together in the long run .This is to say that the existence of co integration implies that there is a long-run equilibrium relationship existing between the variables in the equation [4].

Table 3: Result of the co-integration test

Hypothesized No of CE{s}	Eigenvalue	Trace Statistic	0.05 critical value	Prob **
r = 0 *	0.698192	37.61003	29.79707	0.0052
r ≤ 1 *	0.465025	16.04667	15.49471	0.0413
r ≤ 2*	0.233520	4.787048	3.841466	0.0287

Note * denotes rejection of the hypothesis at the 0.05 level

Since all the three hypothesis are rejected, it can be concluded that none of the variables contain stochastic

trends after all, because that is the only way there could be as many cointegrating relationship as variable [3].

Granger Causality Test For FDI, GDP and CO2

As results from previous test it is concluded that VECM technique should be examined in this study since there is an existence of co-integration between the variables [2]. The lag selection for performing VECM is done by choosing the lowest AIC(Akaike Information Criterion) value[1]. The value at Lag 1 is 60.12837 and the value at lag 2 is 59.85281. Hence lag 2 is chosen for calculating VECM.

Table 4 will display the results of Granger causality test performed by VECM approach.

Table 4: The granger causality test result of UAE performing by VECM technique

Dependent	Independent	chi- Square	P-value	Results
D(FDI)	D(GDP)	0.319437	0.8524	GDP 0 FDI
	D(CO2)	2.841651	0.2415	CO2 0 FDI
D(GDP)	D(FDI)	1.429803	0.4892	FDI 0 GDP
	D(CO2)	1.292034	0.5241	CO2 0 GDP
D(CO2)	D(FDI)	0.485011	0.7847	FDI 0 CO2
	D(GDP)	6.116011	0.0470**	GDP→CO2

Notes: *, ** and *** indicate the rejection of the null hypothesis at 10%, 5% and 1% level of significance, respectively

Null Ho: The variables do not have causality.

From the result analyzed, it can be inferred that there is no causality found between GDP and FDI. Further, result also shows that there is no causal relationship found between FDI and CO2. However, causal relationship is found between GDP and CO2. This is obvious, because of the significance of the probability value (4.70%) as shown in table 4. This causality runs from GDP to CO2 but does not run from CO2 to GDP which proves that the causality is uni-directional. This suggests that as Gross domestic production grows, the rate of pollution is likely to increase in the environment. This presumes that the sources of GDP have significantly negative impact on the environment of U.A.E. As the large percentage of GDP is coming from oil sector [5]. The finding of the study confirms the fact that it harmfully effects the environment of the country.

CONCLUSION AND RECOMMENDATION

The study analyses the causal relationship between Foreign Direct Investment and the main pillars of sustainable development: Economic growth (GDP as an indicator) and Environmental protection (CO2 as an indicator). All the variables were stationary at first

difference through augmented dickey fuller test. The Johansen Co-integration Test shows there is as many co-integrating relationship as variables. Since co-integration was found among the variables, Granger causality test was performed under VECM model. The test shows that there is no causality between growth of GDP and FDI, flow of FDI and CO2. Nevertheless, there is unidirectional causality between GDP and CO2. This means the emission of CO2 is caused with the growth of GDP in the country. The relationship can be considered as obvious as the main source of income of the country is from Oil and natural gas sector. The paper recommends that there is need of U.A.E government to make policies that will attract more foreign direct investment so that the dependency of the country over the oil sector will be reduced and thus the negative effect of GDP growth over CO2 emission will also be lessened.

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DETERMINANTS OF PROFIT INEFFICIENCY AMONG SMALL SCALE YAM FARMERS IN NASARAWA STATE, NIGERIA: A STOCHASTIC TRANSLOG PROFIT FUNCTION APPROACH

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ABSTRACT

This study examined the determinants of profit inefficiency among small scale yam farmers in Nasarawa State, Nigeria. Data for the study were elicited from primary sources with questionnaire. Multistage sampling technique was used to select one hundred and twenty (120) respondents for the study. The results showed that 85 % of the respondents were within the active age bracket of 25 to 55 years, 97.5% were married, 95.8% were males and 93.3 % cultivated between 0.1 and 1 hectare. Educational level, farm size, extension contact, membership of cooperative and household size with coefficients of -4.704, -1.544, -1.456, -1.121 and -2.56 respectively, significantly affected profit inefficiency in yam production in the study area at the ($p \leq 0.01$) probability level. Constraints faced by the yam farmers include lack of access to inputs, high cost of inputs, poor producer prices and inadequate cultivable farmland in decreasing magnitude of importance. It is recommended that there should be continued education of yam farmers on improved production technologies through concerted extension efforts as well as the encouragement of farmers to belong to organized farmer groups such as cooperatives in order to enhance their profit efficiency or reduce inefficiency.

KEYWORDS: profit, inefficiency, yam, farmers, production.

INTRODUCTION

Yam can be grown in nearly all tropical countries provided water is not a limiting factor. In Nigeria, it is grown within the coastal region up to latitude 12⁰N and corresponds to the rain forest, wood savanna belt. This is the region where the annual rainfall exceeds 800mm in amount and 4 months in duration. Nigeria is at the centre of the world yam production controlling more than 59% of the total output (Ibeawuchi, *et al.*, 2008). It is grown in traditional cropping system as the first crop after virgin forest or after a long period of fallow yielding about 10 tons of fresh tubers per hectare per year (Carsky *et al.*, 2001).

The production of yam in West Africa has been declining partly because the underground tuber which is the source of food is also the source of planting material and this compels the farmers to retain materials for next year production (Welch, 2008). Inefficiency in yam production has been attributed to militating factors such as disease and pest attack, low soil fertility, shortage of finance to carry out the necessary farming activities, high cost of inorganic fertilizer and poor knowledge of farm management (Agwu and Alu, 2005). Accordingly, a study by Inoni and Ike (2006) on the determinants of farm production and economic efficiency among small holder yam farmers in southeastern Nigeria, using stochastic frontier production function for instance,

indicated that education, farming experience and access to credit significantly affected inefficiency among yam producers. Nigeria produces about half of the world's total yam supply, yet, yam production is seriously being threatened by losses due to dry and wet rot disease especially during storage (Agwu and Alu, 2005).

The production of yam tubers in Nigeria is in the hands of small-scale farmers who use simple production techniques such as bush-fallow cultivation and cultivate one and a half to two hectares and they contribute two-thirds of yam tuber production. With this trend, the demand for yam tubers in Nigeria still exceeds its supply (Andreas, 2003). More importantly, lack of appropriate pricing for yam tubers, non availability of improved yam sets/seed to increase farmers productivity, decline in productivity owing to marginal lands, inefficiency in the allocation of existing resources and increasing labour demand all tend to discourage the production of yam in recent times. There are post-harvest losses due to the ignorance of farmers storing yams beyond the natural storage time (generally shorter than 12 months) which reduces the quality of yam resulting in the fall in price of the yam tubers (Andreas, 2003). According to Madukwe *et al.*, (2000), both the area under yam cultivation and total yam output were declining. Okoronkwo (2006), for instance found that

there has been a consistent decline in the output of yam in Ebonyi state Nigeria. Efficiency in resource allocation has a direct bearing on the poverty status of farmers. Enhancing the capacity of these farmers could ameliorate widespread poverty by enhancing their technical competence especially in the area of efficient resource allocation. The findings of this study can be useful in the farm advisory extension education services disseminated to the farmers.

The main objective of the study was to analyze profit inefficiency of yam farmers in the study area. The study is desirable given the dearth of documented evidence of investigations of this nature in the State, a major producer of yam in Nigeria. The specific objectives are to describe the socio-economic characteristics of yam farmers and analyze factors that affecting profit inefficiency among yam farmers. The study was limited to yam farmers in Nasarawa State. However, the findings could be useful for other farmers who share similar socioeconomic characteristics, are operating at a similar level of technology and within the context of similar geographical positioning.

METHODOLOGY

The study was carried out in Nasarawa State which is located in guinea savanna zone of the country. It lies between latitude 08^o35'N and longitudes 08^o32'E and shares common boundaries with Benue state to the south, Federal capital Territory (FCT) Abuja to the West, Kaduna State to the north and Plateau State to the East. The indigenes of the state are engaged in farming, trading and civil service (Binbol and Marcus, 2007). The State consists of three agricultural development programme zones, namely, Southern, Central and Western zones respectively. All the zones were considered for this study.

A multistage sampling technique was used. In the first stage, two Local Government Areas (LGAs) each were randomly selected from each of the zones giving a total of 6 LGAs. The second stage involved the random selection of two villages from each of the LGAs. In the third stage, ten (10) small scale yam farming households' heads were randomly selected from each of the village giving a total sample size of 120 respondents.

Data were collected using well-structured questionnaire and interview schedules. Data collection lasted for four months (January - April, 2012). Information were elicited on the socio-economic characteristics of yam farmers such as age, gender, educational level, marital status, household size, access to credit, extension contact, input-output data and constraints faced by yam farmers in the study area.

Analytical Technique

Socio-economic characteristics were analyzed using descriptive statistics. The transcendental logarithmic stochastic profit function model was used in analyzing the profit inefficiency of respondents.

The implicit profit function model was specified as follows:

$$\pi_i^* = \pi/p = f_i(q_iZ) \exp e_i \quad \dots (1)$$

$$e_i = v_i + u_i \quad \dots (2)$$

Where π_i^* = Normalized profit of the i^{th} farm, q_i = vector of variable inputs, Z = vector of fixed inputs, e_i = composite error term.

V_i 's are assumed to be identically normally distributed with mean zero constant variance as $N(0, \sigma^2, \mu = K)$. U_i 's are one-sided disturbance term used to represent profit inefficiency and it is independent of V_i 's and $i = 1, 2, \dots, n$ is the number of farms in the sample.

In the context of the stochastic frontier profit function, the profit inefficiency of the i^{th} firm is defined as the ratio of predicted actual profit to the predicted maximum profit for the best-practice yam farmer as follows:

Profit efficiency ($E\pi$)

$$= \frac{\pi}{\max} = \frac{\exp [\pi(P, Z)] \exp (\ln U)\theta}{\exp [\pi(P, Z)] \exp (\ln V)\theta} \quad (3)$$

From equation (3), firm specific profit efficiency is the mean of the conditional distribution of U_i given by $E\pi$ which takes a value between 0 and 1. If $U_i=0$, that is, the farm is operating on the frontier, it implies obtaining potential maximum profit given the prices it faces. If $U_i>0$, it implies that the firm is inefficient and loses profit as a result of inefficiency.

Following Battese and Coelli (1995), the maximum likelihood model was used to estimate the unknown parameters with the stochastic frontier and the inefficiency effect functions estimated simultaneously. The likelihood function is expressed in terms of the variance parameter $\delta^2V-\delta^2U$.

The parameter V represents the share of inefficiency in overall residual variance with values in interval of 0 and 1. A value of 1 suggests the existence of deterministic frontier, whereas a value of zero can be seen as evidence in favour of Ordinary Least Squares (OLS) estimation.

The explicit empirical stochastic frontier profit function model for the study is specified as:

$$\ln \pi p^* = \ln A^* + \alpha_1^* \ln q_1 + \alpha_2^* \ln q_2 + \alpha_3^* \ln q_3 + \alpha_4^* \ln q_4 + \alpha_5^* \ln q_5 + \alpha_6^* \ln q_6 + \alpha_7^* \ln q_7 + 0.5 \alpha_{11}^* \ln (q_1)^2 + 0.5 \alpha_{22}^* \ln (q_2)^2 + 0.5 \alpha_{33}^* \ln (q_3)^2 + 0.5 \alpha_{44}^* \ln (q_4)^2 + 0.5 \alpha_{55}^* \ln (q_5)^2 + 0.5 \alpha_{66}^* \ln (q_6)^2 + 0.5 \alpha_{77}^* \ln (q_7)^2 + \alpha_{12}^* \ln (q_1) \ln (q_2) + \alpha_{13}^* \ln (q_1) \ln (q_3) + \alpha_{14}^*$$

$$\ln(q_1)^* \ln(q_4) + \alpha_{15}^* \ln(q_1)^* \ln(q_5) + \alpha_{16}^* \ln(q_1)^* \ln(q_6) + \alpha_{17}^* \ln(q_1)^* \ln(q_7) + \alpha_{23}^* \ln(q_2)^* \ln(q_3) + \alpha_{24}^* \ln(q_2)^* \ln(q_4) + \alpha_{25}^* \ln(q_2)^* \ln(q_5) + \alpha_{26}^* \ln(q_2)^* \ln(q_6) + \alpha_{27}^* \ln(q_2)^* \ln(q_7) + \alpha_{34}^* \ln(q_3)^* \ln(q_4) + \alpha_{35}^* \ln(q_3)^* \ln(q_5) + \alpha_{36}^* \ln(q_3)^* \ln(q_6) + \alpha_{37}^* \ln(q_3)^* \ln(q_7) + \alpha_{45}^* \ln(q_4)^* \ln(q_5) + \alpha_{46}^* \ln(q_4)^* \ln(q_6) + \alpha_{47}^* \ln(q_4)^* \ln(q_7) + \alpha_{56}^* \ln(q_5)^* \ln(q_6) + \alpha_{57}^* \ln(q_5)^* \ln(q_7) + \alpha_{67}^* \ln(q_6)^* \ln(q_7) + V_i - U_i \dots (4)$$

Where πP^* = Normalized profit in Naira is defined as gross revenue less total costs of production normalized by price of yam output per farmer, q_1^* = Normalized cost of planting material (₦/kg), q_2^* = Normalized cost of fertilizer in (₦/Kg), q_3^* = Normalized cost of labour input in (₦/man day), q_4^* = Hectarage of cultivated land (Ha), q_5^* = Annual depreciation on fixed inputs (in ₦), q_6^* = Normalized cost of staking material (₦/No), q_7^* = Normalized cost of herbicides (₦/liters) and $V_i - U_i$ = composite error term (ϵ_i).

The socio-economic determinants of profit inefficiency were modeled in terms of the socio-economic characteristics and institutional variables believed to affect the profit inefficiency of the farmer and the model is specified as follows:

$$\mu = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \epsilon_i \dots (5)$$

Where: μ = profit inefficiency of the i th farm, X_1 = age farmer (in years), X_2 = level of education (number of years spent in school), X_3 = Gender (male = 1, female = 2), X_4 = farming experience (in years), X_5 = farm size (in hectares), X_6 = extension contact (number of times farmer was visited in the year), X_7 = credit status (Access = 1, no access = 0), X_8 = membership of co-operative societies (member = 1, non-member = 0), X_9 = household size (number), ϵ = error term. The coefficients of the unknown parameters are to be estimated by the method of maximum likelihood using computer program FRONTIER version 4.1 (Coelli, 1994).

RESULTS AND DISCUSSION

The result of the analysis of the socio-economic characteristics of yam farmers is presented in Table 1. Majority (85%) of the respondents were within the age bracket of 25 – 55 years with only 1.7% of them below the age of 25 years and 13.3% of them over 55 years. The age distribution implies that the vast majority of farmers in the study area were in their productive years. The males among the respondents were up to 95.8% while the female farmers were 4.2% and the married among them were 97.5%. This finding agrees with Ademsa and Djato (1996), who earlier observed that men dominate the workforce in Nigeria agricultural

communities but women generally play vital roles in the actualization of the household farm target. Furthermore, 86.7% of them had one form of educational attainment or the other. Education is an important human capital resource necessary for boosting the production, productivity and obviously the rate of adoption of modern farming system by yam farmers. Onyenweaku and Igwe (2005) corroborated this by affirming that education affects the speed with which new technologies are being diffused and accepted by the farmers.

The inaccessibility of up to 90% of the respondents to credit is a major problem of the yam farmers in the study area. Accessibility to credit can enhance profit efficiency if bottlenecks such as rent-seeking, inadequate training programmes, lack of adequate supervision and poor accessibility of credit by the poor are tackled by formal credit institutions (Zeller *et al.*, 2002). Most of the respondents (74.2%) did not have access to extension service. Only 25.8% of respondents had access to extension agent. This is an indication that the majority of the yam farmers in the study area did not have access to extension education. This can greatly affect the productivity level of the yam producers. In Table 1, 52.5% of the respondents had 11 to 20 years of farming experience while 14.2% had 1 to 10 years of farming experience. Only 6.6% of the respondents had experience in yam production spanning over 30 years. Experience is expected to increase the planning horizon of the farmer and subsequently the achievement of the targeted profit efficiency (Alibi and Aruna, 2006).

The household size composition of respondents indicated that a total of 45.8% had 6 to 10 persons in their households, 37.5% had 1 to 5 persons, 11.7% had 11 to 15 persons and only 5% had over 16 persons per household. Large household size is important to yam farmers as it is the main source of unpaid family labour services, as yam production is highly labour intensive. In small scale farming, the availability of family labour is greatly influenced by household size and the age structure (Ajibefun and Abdulkadri, 2004).

Farm sizes ranged from 0.1 to 3 hectares out of which 93.3% of the respondents had farm land not exceeding 0.1 to 1 hectare. Land holdings of small scale farmers which acquired land by inheritance (72.5%), borrowing (12.5%), purchase (10.8%) and hiring (4.2%) were typically small. The study also indicated that majority (70.8%) of the yam farmers in the study area did not belong to any cooperative society. Only about 29.2% of yam farmers are members of organized farmer groups.

Table 1: Socio-economic characteristics of yam farmers in the study area

Variables	Frequency	Percentage
Age		
<25	2	1.7
25 – 40	58	48.3
41 – 55	44	36.7
>55	16	13.3
Total	120	100.0
Gender		
Male	115	95.8
Female	5	4.2
Total	120	100.0
Marital status		
Married	117	97.5
Single	3	2.5
Total	120	100.0
Educational attainment		
Quranic	1	0.8
Primary	41	34.2
Secondary	35	29.2
Tertiary	24	20.0
Adult education	3	2.5
None of the above	6	5.0
Total	120	100.0
Access to credit		
Yes	12	10.0
No	108	90.0
Total	120	100.0
Extension contact		
Yes	31	25.8
No	89	74.2
Total	120	100.0
Years of experience		
1 – 10	17	14.2
11 – 20	63	52.5
21 – 30	32	26.7
31 and above	8	6.6
Total	120	100.0
Household size		
1 – 5	45	37.5
6 – 10	55	45.8
11 – 15	14	11.7
16 and above	6	5.0
Total	120	100.0
Farm size		
0.1 – 1	117	97.5
1.1 – 2	7	5.8
2.1 – 3	1	0.8
Total	120	100.0
Method of land acquisition		
Inheritance	87	72.5
Purchase	13	10.8
Hired	5	4.2
Borrowing	15	12.5
Total	120	100.0
Membership of cooperative		
Yes	35	29.2
No	85	70.8
Total	120	100.0

Source: Field Survey Data, 2012

Estimates of Production Variables Affecting Profit Inefficiency of Yam Farmers

The Maximum Likelihood Estimates (MLE) of production variables affecting profit inefficiency of the yam farmers are presented in Tables 2, 3 and 4. Table 2 show the production factors, while Tables 3 and 4 are

squared and interaction terms among production variables respectively. Sigma squared (δ^2) estimated as 3.496 was significant at 0.01 probability level. The gamma (γ) value was 0.999 and significant at 0.01 probability level, implying that 99.9 % of the total variation in yam output was due to production inefficiency. This is in line with the findings of

Onyenweaku and Igwe (2005), which indicated that the total variation in food crop output was due to technical inefficiency in Imo State of Nigeria. For the production factors in Table 2, the normalized price of planting materials, staking materials, labour and herbicides were significant at 0.01 probability levels. Other significant variables at 1% level of significance include farm size and depreciation. The normalized prices of planting materials, fertilizer labour and herbicides in Table 3 were all significant at 1% level of probability except staking materials, when squared. Depreciation and farm size were also significant at the same level of probability, but different estimates of coefficients. Out of the estimates reflecting interaction among the variables of the general model in the Table 4, only the normalized price of planting materials X depreciation was not significant. In all the cases, negative

coefficients was an indication of an inverse relationship while positive coefficients depict that an increase of a unit of production variable led to an increase of equal magnitude with the coefficient. The different levels and combinations of the variables give an insight of their use to reduce profit inefficiency.

Determinants of Profit Inefficiency in Yam Production

The maximum likelihood estimates of the inefficiency model are presented in Table 5. A negative sign of the estimate means that the associated variable had a positive effect on profit efficiency, that is, it reduced profit inefficiency and vice versa. The coefficient of age was 4.867 and significant at 0.01 probability level.

Table 2: Maximum Likelihood Estimates (MLE) of Production variables affecting Profit Inefficiency as a general model

Variables	Parameter	Coefficient	t-ratio
Constant	α_0	-180.308	-182.86***
Normalized cost of planting materials (kg)	α_1	2.142	2.899***
Normalized cost of fertilizer (kg)	α_2	-0.007	-0.009
Normalized cost of labour (man days)	α_3	2.686	2.754***
Hectarage of farm (ha)	α_4	-6.622	-6.983***
Annual depreciation of fixed inputs	α_5	37.058	69.815***
Normalized cost of staking materials	α_6	-5.793	-6.843***
Normalized cost of herbicide (N/lit)	α_7	-15.328	-18.212***

Source: Field Survey Data, 2012

Table 3: Maximum Likelihood Estimates (MLE) of Production variables affecting Profit inefficiency as a general model squared

Variables	Parameter	Coefficient	t-ratio
Squared terms			
Normalized cost of planting materials X normalized cost of planting Materials	α_{11}	-9.344	-4.278***
Normalized cost of fertilizer X normalized cost of fertilizer	α_{22}	0.429	7.398***
Normalized cost of labour X normalized cost of labour	α_{33}	-0.707	-4.580***
Hectarage of farm X hectarage of farm	α_{44}	0.344	2.016**
Annual depreciation of fixed inputs X annual depreciation of fixed inputs	α_{55}	-2.002	-35.399***
Normalized cost of staking materials X normalized cost of staking materials	α_{66}	-9.363	-1.271
Normalized cost of herbicide X normalized cost of herbicide	α_{77}	-0.587	-6.393***

Source: Field Survey Data, 2012

That is, an increase in the age of the yam farmers led to an increase in profit inefficiency of the yam farmer. The coefficient value of education was -4.704 and significant at 0.01 probability level. This means that as the level of education increases, profit inefficiency reduces. Education enhances the acquisition and utilization of information on improved technology by the farmers' as well as innovativeness. In consonance with this finding, Onyenweaku and Igwe (2005) had earlier observed that there existed a correlation between profit efficiency and educational level. Gender, farm size, extension contact, membership of cooperatives and household size with coefficients of -6.267, -1.544, -1.456, -1.121 and -2.566 respectively also reduced technical inefficiency significantly being significant at

1% levels respectively. This finding agreed with Ajibefun and Aderinola (2003), who affirmed that increases in the farm household size reduced the technical inefficiency of food crop farmers.

Distribution of Yam Farmers According to Profit Inefficiency

The frequency distribution of respondents according profit inefficiency in the study area is presented in Table 6. The mean profit inefficiency was 0.517 while the remaining 0.483 is an indication that there is room for reducing inefficiency and enhancing profit efficiency of yam farmers. The profit inefficiency level ranged from less than 0.11 to 0.99. Furthermore, 20 % of the respondents were within the range of 0.91 to 0.99. About 61.7 % Of the respondents had profit inefficiency

level that ranged from 0.11 to 0.90, while the remaining 18.3 % of the respondents had profit inefficiency level of less than 0.11. This result is similar to the findings of Agwu and Alu (2005) who investigated inefficiency in yam production in Ushongo

Local Government Area of Benue State, Nigeria and found that yam farmers were inefficient in terms of profit maximization.

Table 4: Maximum Likelihood Estimates (MLE) of Production variables affecting Profit inefficiency with interaction among the variables

Variables	Parameter	Coefficient	t-ratio
Interaction among production variables			
Normalized cost of planting materials X normalized cost of fertilizer	α_{12}	0.359	7.227***
Normalized cost of planting materials X normalized cost of labour	α_{13}	-0.993	-10.543***
Normalized cost of planting materials X hectareage of farm	α_{14}	0.422	3.735***
Normalized cost of planting materials X annual depreciation of fixed inputs	α_{15}	-6.852	-0.738
Normalized cost of planting materials X normalized cost of staking materials	α_{16}	9.158	1.565*
Normalized cost of planting materials X normalized cost of Herbicide	α_{17}	0.378	4.309***
Normalized cost of fertilizer X normalized cost of labour	α_{23}	0.651	-5.060***
Normalized cost of fertilizer X hectareage of farm	α_{24}	-0.211	-1.521*
Normalized cost of fertilizer X annual depreciation of fixed inputs	α_{25}	0.722	5.950***
Normalized cost of fertilizer X normalized cost of staking materials	α_{26}	0.576	7.129***
Normalized cost of fertilizer X normalized cost of herbicide	α_{27}	-0.431	-3.561***
Normalized cost of labour X heterage of farm	α_{34}	0.837	4.047***
Normalized cost of labour X annual depreciation of fixed inputs	α_{35}	-0.743	-4.893***
Normalized cost of labour X normalized cost of staking materials	α_{36}	-0.707	-4.762***
Normalized cost of labour X normalized cost of herbicide	α_{37}	2.169	7.410***
Hectareageof farm size X annual depreciation of fixed inputs	α_{45}	1.166	7.645***
Hectareage of farm size X normalized cost of staking materials	α_{46}	1.020	7.592***
Hectareage of farm size X normalized cost of herbicide	α_{47}	-1.729	-6.768***
Annual depreciation of fixed inputs X normalized cost of staking materials	α_{56}	0.376	3.423***
Annual depreciation of fixed inputs X normalized cost of herbicide	α_{57}	0.746	78.012***
Normalized cost of staking materials X normalized cost of herbicide	α_{67}	-1.088	-10.651***
Diagnostic statistics			
Sigma-squared (δ^2)		3.496	8.373***
Gamma (γ)		0.999	3.800***
Log likelihood test		-111.845	

Source: Field Survey Data, 2012.

Note: *** implies significant at $p < 0.01$ probability level, ** at $p < 0.05$ probability level, and * at $p < 0.10$ probability level.

Table 5: Maximum Likelihood Estimates of determinants of profit inefficiency in Yam Production

Variable	Parameter	Coefficient	t-ratio
Constant	β_0	-8.302	-7.484***
Age	β_1	4.867	6.508***
Educational level	β_2	-4.704	-5.890***
Gender	β_3	-6.267	-5.437***
Farming experience	β_4	-0.171	-0.230
Farm size	β_5	-1.544	-3.803***
Extension contact	β_6	-1.456	-4.877***
Credit status	β_7	-0.926	-0.969
Member of cooperative society	β_8	-1.121	-2.108**
Household size	β_9	-2.566	-3.624***

Source: Field Survey Data, 2012.

Note: *** implies significant at the $p < 0.01$ probability level, ** at $p < 0.05$ probability level and * at $p < 0.10$ probability level.

Constraints Faced by Farmers

The constraints encountered in production activities are presented in Table 7. Results show that lack of access to

inputs (100.0%), high cost of input (100.0%), poor producer prices (100.0%), lack of capital (100.0%) and incidences of pests and diseases (100.0%) were affirmed

by all the respondents to have posed as challenges. Other problems in decreasing magnitude of importance were poor transportation facilities (95.8%), pilfering (85.8%), inadequate extension services (74.2%), lack of improved yam varieties (62.5%) and inadequate farm

land (37.5%). Addressing these problems at the policy front and farmer initiatives could help raise the efficiency levels of the farmers.

Table 6: Frequency Distribution of farmers according to profit inefficiency

Inefficiency level	Frequency	Percentage
< 0.10	22	18.30
0.10-0.50	44	36.67
0.51-1.00	34	28.33
Minimum inefficiency	0.003	
Maximum inefficiency	0.998	
Mean profit inefficiency	0.517	

Source: Field Survey Data, 2012.

Table 7: Percentage Distribution of Respondents According to the Constraints Faced in Yam Production

Constraints	Frequency*	Percentage	Rank
Lack of access to inputs	120	100.0	1
High cost of inputs	120	100.0	1
Lack of capital	120	100.0	1
Incidences of pests and diseases	120	100.0	1
Poor transportation facilities	115	95.8	2
Pilfering	103	85.8	3
Inadequate extension services	89	74.2	4
Lack of improved yam varieties	75	62.5	5
Inadequacy of farm land	45	37.5	6
Total	1134*		

Source: Field Survey Data, 2012. Note; * implies that multiple responses were recorded

CONCLUSION AND RECOMMENDATIONS

Based on results of this study, it is concluded that yam production in Nasarawa state is of small-scale nature considering the hectarage devoted to the crop by the yam farmers. The study also indicated that yam farmers in the study area are not fully profit efficient and their overall profit efficiency level could be improved substantially by reducing their inefficiency.

The study analyzed the factors that affected the profit efficiency of yam farmers. Substantial improvement in profit efficiency is still required. Optimal use of the right combinations of production variables for instance, expansion of farm sizes, appropriate and remunerative and guaranteed prices, acquisition of requisite formal and extension education by the farmers, encouragement of the involvement of both sexes in yam production to curb unemployment, hunger and ensure food security and encouraging producers to belong to organized farmer groups such as cooperatives are hereby recommended. These actions are expected to improve the profit efficiency of the yam farmers.

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ANALYZING OF ECONOMIC FACTORS ON IMPROVEMENT OF ENTREPRENEURSHIP MANAGEMENT OF FIRMS QUICK IMPACT AT AGRICULTURE DEPARTMENT FOR POVERTY ALLEVIATION IN ALBORZ COUNTY

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ABSTRACT

This paper purpose is to investigate on of **economic** factors on improvement of entrepreneurship management of firm's quick impact at agriculture department in Alborz County –Iran-This study was an applied on and ISO consign relationship type research tools was an anther made questionnaire. Which we have used of supervisors, advisor and experts in agriculture development & education and also Alborz county credit funds authorities. Statistical society included all members of economical quick impact enterprises in Alborz county being 1200 persons (N= 1200). We have distributed 30 questionnaire before test and dependent variable (standard variance) meaning entrepreneurship management was calculated -0.37 (S= 0.37). Approved error equals 0.5 (d= 0.5) and sample volume was 179 whom were selected using class sampling by proportional assignment. Krunbach α coefficient was totally 0.87 percent which shows that question air has validity. To analyze investigation dates, we used of regression analysis. Using results achieves from viewpoints of firms quick impact members of agriculture department we step by step inserted economic respectively at first we inserted Microcredit system to provide facilities to the entrepreneurs, such as the establishment of rural banks variable to regression equation ant could to explained %18 of variance variation of dependent variable. In second steps Provide banking facilities to entrepreneurs variable along with last variable explained % 32.3 of variations in 3rd steps Financial resources needed by entrepreneurs, investors, banks and variable along with other variable factor predicted % 44.8 of dependent variable variations. In 4th step, Lending and banking facilities for small producers' variable along with structural, economic and environmental on predicted % 54.7 of dependent variable variations. In 5th step, Forming groups to meet the needs of the financial savings Authority variable along with others predicted% 58.9 of dependent variable variations, totally with insertion of this variables, we have achieved modified determination factors equal to 0.78.1 ($R^2= 0.589$).This coefficient shows that%58.9of entrepreneurship management variance variations relate to this5 variable and remaining (% 41.1) relate to other factors. Regression significance was determined by Calculated which is significance in%99level (sig=0.000).

KEYWORDS: entrepreneurship, management, entrepreneur's properties, Economic Factors, firms quick impact of agriculture department, Alborz County

INTRODUCTION

Different transformation and alterations in socio-economic systems at present, is rooted in advances and changes in science and technology. It is no doubt that current organizations in our country are encountered with extensive changes in inside the country and also in international level. Hence, ensuring the life and the survival of organizations require solutions and new ways of dealing with problems that depends on creativity and innovation in methods, processes and new products. So, entrepreneurship is believed to be as engine for development and progress (Rafe et al., 2012).

In fact, in each organization, they are potential entrepreneurs, but it is necessary to cultivate their potential and more important, existing structures let them to show themselves and have an opportunity to apply their abilities. (Pardakhtchi et al., 2009).

Entrepreneurship as an engine for economic and social development, has a crucial role in society's progress. Small businesses are the best haven for entrepreneurship activities and this is upon this fact that small business

owners have entrepreneurship abilities and skills (Moghimi and Ahmadpour, 2008).

The word “entrepreneurship” derived from French word “Entreprendre” which means commitment. In Webster’s dictionary, entrepreneur is the one who organizes, runs and commit an economic activity. (Hezar Jeribi, 2004).

Today, entrepreneur is a innovative or progressive person which identifies opportunities and catch them, make those opportunities into practical ideas and qualified for selling. This could be done through money, skill and adding value. (Malek pour & Ali Ahmadi, 2011).

Today, attending to various terms and factors which causes better efficiency in various affairs in governmental and private organization, have such importance that many specialists in management science pay attention to it. Many experts believe that small economic unit’s progress specially small and medium industries, are the best possible state for reaching appropriate level of efficiency (Shafii, 2009).

These industries could play an important role in reducing Poverty in rural communities.

Smallbone (2007) believed that the major problems in front of Small and medium enterprises in rural areas, could be accounted in seven factors which are: mismanagement, restrictions in labor, improper access to business premises, poor communication and transport infrastructure, lack of access to information and services related to business consulting, lack of access to adequate financial resources and inadequate institutional environment. Juhany (2010) stated some other factors such as deficiency in providing labor and lack of skilled managers, deficiency in harvesting, packaging technologies as main problems.

Moshabaki and Fathi (2009), regarding growing unemployment rate and challenges in front of employment matter, presented entrepreneurship as most important way for answering these challenges and take advantage of these ways.

Nasution et al., (2011) stated that, entrepreneurship as a modern phenomenon in economy, has a major role in economic progress and develop in all countries. In a dynamic economy, ideas, products and services are always changing. In this way, this is entrepreneur that bring a new pattern for confronting and adopting with new situations. Generally entrepreneurship is an ability for successful use of innovative ideas in competitive commercial markets. (Dem et al., 2010). Small and medium enterprises have unique traits in size and development stages. This traits moreover of separating

proper marketing from traditional marketing trends in large enterprises, also have some limitations as follows:

Resource limitations like financial resources, time, marketing knowledge, etc.

Limited influence on market.

Small and medium enterprises marketing does not follow common properties in marketing theories and determined by limitation, which stated above. This enterprise’s marketing is totally unofficial, casual, free, un-structured, spontaneously, passive and adoptive with industrial regulations. Generally, in entrepreneurship management, applying ideas, innovation and opportunism are the matters. Experience show that, those organization who rely on these principals, have more success in long term. Briefly, in every organization, there are people which use human, technology and financial resources better than others. Organization management, show strive to identify these people and support them for growing and activity. So, creating proper space and base for grow and cultivating of entrepreneurship, is a considerable matter. (Pardakhtchi et al., 2008).



Survey on quick impact enterprises in our country shows that, their problems which conducted to short carrier and broking and destroying country’s human and financial resources could be divided on two internal and external parts. In internal part, small enterprises and institutes have naturally human and financial resources problem. Small and medium enterprises, in fact born from new and fresh ideas for producing which activated by some entrepreneur persons who have some special abilities. These enterprises have broad girth in manufacturing and promotion of products, but for work continuity, they need a homogenous set of marketing, management, capital increase, technology promotion, etc., which these items are accounted as their structural limitations. In part of external problems, these days

there is a deep gap between small and large industries which causes to elimination of small and medium enterprises for manufacturing circle. In spite of potential capacities of these enterprises, such as their attachment to a specific economic field, low costs, increasing social wealth, etc., these enterprises' share in country's production process are inconspicuous. This enterprise's limitation are major obstacle for resisting against market fluctuations. In Alborz County, also, quick impact enterprises confronting those issues which mentioned before; marketing for these companies does not follow the rules of common marketing and determined by limitations. This enterprise's marketing is totally unofficial, casual, free, un-structured, spontaneously, passive and adoptive with industrial regulations.

Due to large benefits and abilities of small and medium cities and their distinct role in economy of country and

regarding with the problems and issues which these type of companies are dealing with, in advanced countries, there are various kind of support to these companies which cause improvements in their efficiency, in a way the we observe the increasing number of these enterprises in these countries (Zein Oldin, 2010).

Because in development process, quick impact enterprises have substantial place, these enterprises managers are obligated by devising some proper solution, adopt themselves to current situation. In this study, the main question and problem is that basically what elements can influence on improvement in economic entrepreneurship management in quick impact agricultural enterprises? Some related studies are shown in following chart:

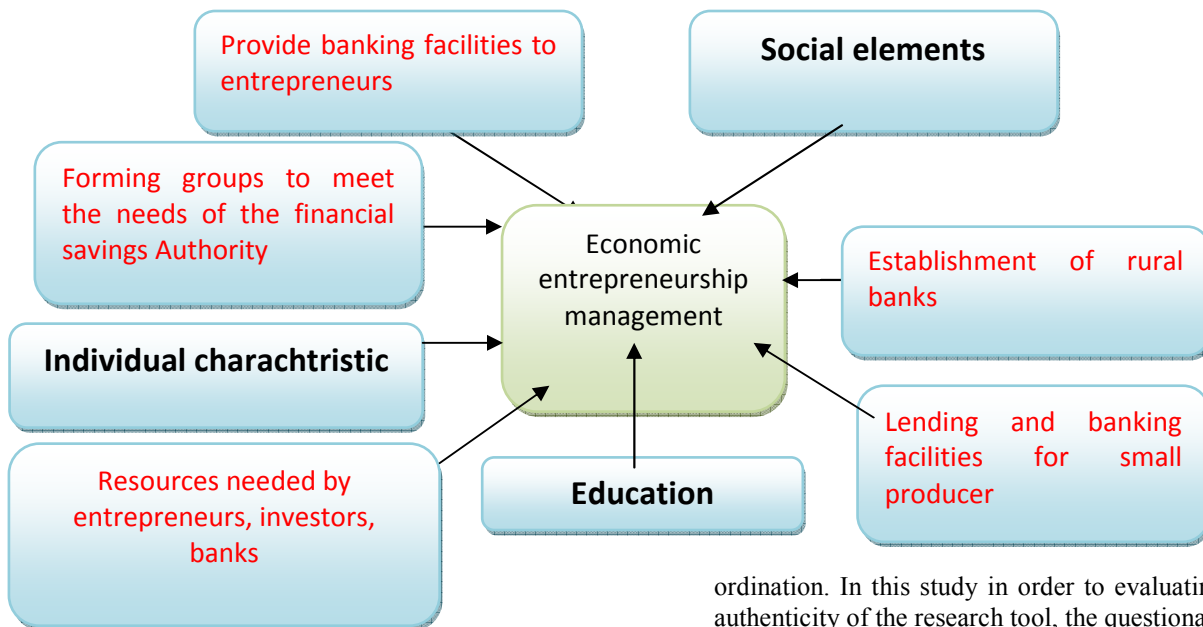


Chart 1, Theory Framework

METHODS AND MATERIALS

The present study, regarding type, is applicable and regarding method is descriptive (non-experimental) and tries to investigate relation between variables in a scientific communication. Statistical population in this study are all member of quick impact enterprises in Alborz County which number of them are 1200 person (N=1200). In order to calculation of sample volume, 30 questionaries' was prepared and distribution and Standard deviation of the dependent variable pre-test (entrepreneurship management) calculated, $S=-0.37$ and by admissible error $d=0.5$, the sample volume determined as 179 person which these people were chosen by stratified sampling with appropriate

ordination. In this study in order to evaluating level of authenticity of the research tool, the questionaries'

handed over to tutors and supervisors for editing and after proper investigations and gathering their ideas and final modifying, the questionaries' were ready to distribute. For evaluating sustainability of these questionaries'', a researcher had done some preliminary research with 30 copies in Varamin city, which gave Alfa Kronbach coefficient totally equal to 0.93-0.76. dependent variable in this survey, was peoples point of view about financial entrepreneurship management, which with 6 question in form of 5 choice (Likert scale) were evaluated and independent variables in this research were as follows: provide banking facilities to entrepreneurs, forming groups to meet the needs of the financial savings authority, social elements, lending and banking facilities, resources need by entrepreneurs,

investors, banks establishing of rural banks, small produces, educational elements, individual characteristic. In this study, we used 3 methods including documental study, library study and searching trough electronic resources and field investigation for gathering information.

years and the youngest was 28 years old and the oldest one was 52 years old. Regarding education level, 14.5% had high school degree, 19.7 had post-diploma, 53.4 BC, and 12.7 had MS degree. Regarding the results, the average tenure of these people in quick impact enterprises, active in agriculture sector, was 5 years, with minimum of 1 year and the maximum of 12 years.

RESEARCH FINDINGS

Regarding the results, the average age of employed people in quick impact agricultural enterprises was 42

Table 1: abundance distribution of farmers individual characteristics

Cumulative percentage	Valid percentage	Abundance (persons)	stairs	Individual characteristics
2.9	2.9	5	28-34	Age n=226 Lowest=28 Max=52 Variance=52.2 Average=42 year
44.6	41.7	73	35-41	
78.9	34.3	60	42-48	
100	21.1	37	49-51	
-	-	4	No answer	
14.5	14.5	25	Diploma	Education level
34.1	19.7	34	Post-Diploma	
87.3	53.2	92	Bachelor	
100	12.7	22	Masters	
-	-	6	Unanswered	
16.2	16.2	29	4-1	BACKGROUND: Posts: 5 SD: 81/2 Minimum: 1 year Maximum: 12 years
60.9	44.7	80	8-5	
92.7	31.8	57	12-9	
100	-	13	Unanswered	

In order to knowing people viewpoint working in quick impact enterprises active in agricultural sector about entrepreneurship management, we used 6 choice questionaries' (Likert Scale). The result of this survey

conducted that most of these people (45.8%) are agree with terms of entrepreneurship management and 33.7% have no idea about it and 20.5 are totally agree with this matter.

Table 2: viewpoints of people who work in quick impact enterprises active in agricultural sector about entrepreneurship management (n=179)

Evaluation spectrum	Abundance	Percent	Valid Percent	Cumulative percentage
No comment (22-17)	56	31.1	33.7	33.7
Agree (28-23)	76	42.5	45.8	79.5
Strongly agree (34-29)	34	19	20.5	
Unanswered	13	7.3	-	-
Sum	179	100	100	-

Mean: agree perspective: agree

By Prioritizing viewpoints of people who work in quick impact enterprises active in agricultural sector about their entrepreneurship management showed that most of the viewpoint with Coefficient of Variation 0.171, 0.128

and 0.133 are respectively for these matters: being an entrepreneur give a satisfactory feeling which they can continue their work and they are familiar with risks in their business and know how to handle it.

Table 3: prioritizing of viewpoints of people who work in quick impact enterprises active in agricultural sector about economic entrepreneurship management

priority	answers	average	Standard deviation	Coefficient of Variation
1	Being an entrepreneur feels me good	3.84	0.66	0.171
2	I can handle my job	4.20	0.54	0.128
3	I am familiar with risk in my business and know how to handle it	4.48	0.60	0.133
4	I'll take risk in order to improvement my job situation	4.01	0.84	0.209
5	Being an entrepreneur is attractive to me	4.16	0.92	0.221
6	I can met others to entrepreneur activities	4.13	0.98	0.237

Evaluation spectrum:

1=totally disagree 2=disagree 3=no comment 4=agree 5=totally agree

The results of consistency between variables of this research showed there is a positive and significant relationship between psychological elements, social elements, environmental element, structural elements,

economical elements and educational elements with trust distance of 0.99. The results also conducted that between age and tenure and entrepreneurship management there is no significant relationship, but there was positive and significant relationship between for education with trust distance of 0.99.

Table 4: consistency between research variables and entrepreneurship management

#	First variables	Second variable	r	p
1	establishment of rural banks	Entrepreneurship management	0.457**	0.000
2	Provide banking facilities to entrepreneurs		0.397**	0.000
3	Financial resources needed by entrepreneurs, investors, banks and variable		0.353**	0.000
4	Lending and banking facilities for small producer		0.297**	0.001
5	Forming groups to meet the needs of the financial savings Authority		0.264**	0.002
7	age		0.80	0.307
8	tenure		0.031	0.389
9	education		0.251**	0.001

(*) significance level: 0.95

(**) significance level: 0.99

In order to determining the role of each independent variables in dependent variable in research, we used step by step method which variable are entered in equation with following order: first step variable of establishment of rural banks inserted, that means this variable has the most effect on entrepreneurship management. Coefficient of determination was $R^2=0.18$ and Adjustment factor was $R^2=0.174$. in second step variable, provide banking facilities to entrepreneurs entered in equation and R^2 was 0.323 and determination coefficient was $R^2=0.309$, the financial resources

needed by entrepreneurs, investors, banks, variable entered in equation which $R^2=0.449$. in forth step “lending and banking facilities for smallproduces” entered in and $R^2=0.547$ and determination coeficent was $R^2=0.529$. in last step “forming group to meet the needs of the financial savings authority” entered and R^2 was 0.589 and also adjustment factor was $R^2=0.539$.

So according to these finding variables “structural, economic, environmental, psychological and social element” were responsible for 58.9% of variable changes and 41.1% were caused by other elements.

Table 5: various steps of entering independent variables into regression analysis

Steps	متغير	R	R ²	R ² _{Ad}	Std
1	establishment of rural banks	0.421	0.18	0.174	0.3895
2	Provide banking facilities to entrepreneurs	0.568	0.323	0.309	0.6042
3	Financial resources needed by entrepreneurs, investors, banks and variable	0.669	0.448	0.452	0.6742
4	Lending and banking facilities for small producer	0.741	0.547	0.529	0.7119
5	Forming groups to meet the needs of the financial savings Authority	0.767	0.589	0.539	0.7429

Table 6: variable coefficients, entered into regression equation

متغير	B	Standard error B	Beta	T	Sig.
establishment of rural banks	0.214	0.042	0.467	10.275	0.000
Provide banking facilities to entrepreneurs	0.198	0.037	0.309	8.097	0.000
Financial resources needed by entrepreneurs, investors, banks and variable	0.176	0.031	0.297	7.821	0.001
Lending and banking facilities for small producer	0.168	0.027	0.249	7.099	0.001
Forming groups to meet the needs of the financial savings Authority ₂) x(0.152	0.22	0.219	6.834	0.003
Fixed digit	0.364	0.011	-	-	-

So, regression line ($Y = a + b_1 x_1 + b_2 x_2 + \dots$) based on B and β are as follows

Based on B: $Y = 0.214 x_1 + 0.198 x_2 + 0.176 x_3 + 0.168 x_4 + 0.152 x_5 + 0.364$

Based on β : $Y = 0.467 x_1 + 0.309 x_2 + 0.297 x_3 + 0.249 x_4 + 0.219 x_5 + 0.467$

DISCUSSION AND CONCLUSION

Form members which are active in quick impact agricultural enterprises, “establishment of rural banks”, “provide banking facilities to entrepreneurs”, “forming groups to meet the needs” and “lending and banking facilities for small produces” and also “banks of financial savings authority” are entered into the equation step by step. In first step variable “structural element” entered into the regression equation and defined 18% of total variances of dependent variable. In second step variable “provide banking facilities to entrepreneurs” along with last variable, determined 32.3% of changes. In third step, variable “financial resources need by entrepreneurs, investors and banks” along with other variables, determined 44.8% of changes and in the fourth step variable “lending and banking facilities for small producers” along with previous variables, determined 54.7% of changes and in the fifth step, variable “forming groups to meet the needs of the financial savings authority” finally determined 58.9% of total changes. In general by

entering these variables, determination coefficient reached $R^2=0.589$. this coefficient (R^2) shows that 58.9% of variance of entrepreneurship management is related to these variables and rest of them (41.1%) related to some other variables. Significance of regression calculated by F which is 99% (Sig=0.000). This finding according to findings of Shafii (2011), Divandari et al., (2011), Abtin et al., (2011), Nasution et.al, (2011), Juhany, (2010), Rae (2007), Smallbone, (2007), Moshbaki and Fathi (2012) and Tambunan (2009) researches.

SUGGESTIONS

Regarding the priority results it is suggested that:

- Small crediting system in order to giving facilities to entrepreneurs, like rural banks could cultivate entrepreneurship management
- Long term loans and with first payment after at least one year after using that, granted to members of enterprises, so they could able for repayment.

Regarding prioritizing of educational elements, these suggestions could be made:

- Experts using communication channels related to entrepreneurship, increase knowledge of members.

- By using IT technology such as giving educational CD's, prepare a base for accessing to information about agricultural crops.
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CASH TRANSFERS, LOCAL GOVERNMENT'S EFFICIENCY AND POVERTY ALLEVIATION: THE CASE OF DAVAO REGION IN THE PHILIPPINES

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ABSTRACT

This paper aims to investigate the relationships between cash transfer programs, efficiency of program implementation and the change in poverty incidence rates. Using secondary data collected from different municipalities in Davao Region, Philippines, we found a positive and statistically significant correlation between the percentages of families enrolled in the program with the change in poverty incidence rate, especially if no quota is imposed in registering beneficiaries in the municipality. We found no evidence of significant relationship between size of the per capita cash transfers and the changes in poverty incidence rates. The efficiency of the local government units in the implementation of the program showed a positive and significant correlation with the changes in the rate of poverty incidence. This finding suggests that the involvement and commitment of LGUs to support the implementation of a nationally-funded poverty reduction program is an enabling mechanism for cash transfer programs to succeed with the end view of achieving a significant reduction in poverty and meeting the target for the Millennium Development Goal (MDG).

KEYWORDS: pantawid pamilyang pilipino program (4ps), philippines, poverty reduction, efficiency scores, cash transfer

INTRODUCTION

The growth of Philippine economy has been robust over the last few years but despite the economic improvement, the percentage of Filipinos living below the poverty line has narrowed only slightly. According to Philippine Statistics Authority (PSA, 2014) the national poverty incidence level in 2012 was 25.2. Comparing trends of poverty rates, the Philippines trails behind its neighbouring Asian countries like China, Indonesia and Vietnam, which also experienced similar poverty rates in the 1980s. According to Chaudhury et al. (2013), the Philippines also lags in terms of progress toward Millennium Development Goal (MDG) targets, primarily due to large inequalities in health and education outcomes between income groups and across regions. As stated in the Philippine Development Plan 2011-2016, the government is focused on diminishing poverty rates. However, the MDG of poverty rate of 14.2% is unlikely to be achieved by 2015. Confronted with these problems, the Philippine government designed and adopted a national anti-poverty program (2010-2016) and in its fore was the launching of a conditional cash transfer program (CCT), also known as

Pantawid Pamilyang Pilipino Program (4Ps). The program is central to the government's poverty reduction and social protection strategy. Since the extent and depth of poverty is such that abrupt decline is implausible, the initial thrust of the anti-poverty program is to reduce the burden of poverty by providing outright income, food, education and health services. But the implementation of 4Ps is more than just providing cash transfers to augment the income of poor household in selected municipalities, it is also designed to build capacity and create opportunities for the poor in the course of reducing the burden of poverty as the cash transfers can only be availed subject to their compliance of conditionalities related to education and health. Such investments in the education and health of poor children are expected to break the intergenerational transmission of poverty.

There were several studies that were conducted to examine the importance of CCTs both in the context of the Philippines and also in other countries like Mexico and Brazil. Most of these studies have indicated the

significant role that this program plays in poverty reduction. For example, Reyes et al. (2013) posited that 4Ps is by far the largest poverty reduction and social development program the Philippine government has ever conceived. Loureiro (2012) postulated that in Brazil, 'states that reached the level of cash transfer expenditures proposed by the guidelines of the programme more promptly had a more significant reduction in poverty rates' while for the Mexico's *Oportunidades* Program, evaluators claimed that the positive impacts of cash program of this nature can be an effective instrument not only in reducing current poverty but as well as improving the future of children through increased investment in their health and education. It would be noteworthy to know how these cash transfer programs were delivered to beneficiaries wherein the implementation process of which was potentially influenced by the capacity of program implementers.

Subsequently, while the program thrusts of the poverty reduction strategy of the government is focused on the poorest of the poor and on the poorest areas, it is also bent on supporting local government initiatives wherein the capacities of local government to reduce poverty are strengthened and a system for providing incentives to better performing local government units (LGUs) are in place. Such an incentive includes giving of additional funding for their poverty reduction program. Thus, linking cash transfer program and efficiency of the program implementation of CCT at the municipal level with the rate of poverty incidence among population is worthy of an exploratory investigation. It is imperative to find out the relationship between 4Ps and poverty alleviation and also the extent of LGUs initiative to support the national anti-poverty program. Using the case of 4Ps in Davao Region, Philippines this study seeks to provide some evidence of these relationships. The implementation of 4Ps were conducted in three phases, Set 1, Set 2 and Set 3 phases which covers the period from 2008 to 2014. More specifically, this study seeks to find out (i) whether the change in poverty incidence rate from 2006 (before 4Ps implementation) to 2009 (a year after 4Ps implementation) and change in poverty incidence rate from 2009 to 2012 (5 years from 4Ps implementation) is correlated with the implementation of 4Ps in terms of the percentage of families enrolled in 4Ps and the size of per capita cash transfer; and (ii) whether local government unit's (LGUs) efficiency score in 4Ps implementation is correlated with the change in poverty incidence rate (among population) from 2009-2012.

Hence, the main contribution of this paper is to (i) to provide an assessment of the relationship between the potential impact of conditional cash transfer and the

efficiency of local government units in the delivery of an important poverty-alleviation program; (ii) to examine the importance of capacity building of the main program implementers and its relationship to the capacity building of program beneficiaries; and (iii) to analyse the role of capacity building in poverty alleviation, especially in developing country context. This paper is organised as follows: section 2 briefly reviews related literature; section 3 discusses the methodology, section 4 outlines the results and findings and section 5 presents the conclusion and policy implication of the analysis.

REVIEW OF LITERATURE

Conditional Cash Transfer Programs

Conditional cash transfers reputation as a government strategy to combat poverty is attributed to the opinion that they embody a more politically conventional method to social assistance. Unconditional cash transfer programs are not popular as a social policy program since taxpayers and several opposition politicians view it as dole-outs. The typical arguments that cash transfers are government's hand-outs and are proliferating the attitude of mendicancy have been addressed by making cash transfer conditional on the beneficiaries' commitment in complying with the given conditions. Fiszbien et al (2009) stressed that conditional cash transfer, in a way, alter the notion of social assistance as mere 'hand-outs' to a 'social contract', binding beneficiaries to perform activities that will free them from the bondage of poverty.

Other than the customary goal of social welfare, social policy programs are now magnified to include another purpose, which is social investment (Lindert et al, 2006; Morley and Coady, 2003). With this development, Kakwani et al (2005) highlight that CCTs can now be viewed as both a short and long term approach to poverty alleviation. Providing cash assistance to the chronic poor and the vulnerable segments of the society allows them to cope with their immediate needs and adjust with the negative impacts of different forms of shocks, in the short-run (De Janvry, 2008). Likewise, Valencia Lomeli (2008) notes, that in the short term, CCT programs are more effective in minimising the intensity of poverty than in decreasing its overall incidence. The argument is reasonable considering that the aim of CCT program is to bridge the gap between the poverty threshold and the family's income in order for them to manage the immediate state of scarcity.

Determinants of CCTs Success

Many factors are associated with the success of CCTs in reaching its goals. According to Handa and Davis (2006), the success of a program depends on the national objectives, institutional capacity and financing

constraints of the country in question. Arnold et al (2011) also stress that the CCT experience highlights the importance of institutional capacities for planning, coordination and delivery. A CCT that is designed with features, which include a reliable process of targeting beneficiaries, incorporation of investment in the supply side of the program to complement the demand side, oversight in terms of monitoring of compliance and involvement of the central and local government in program operations indicate a government's commitment to a genuine social reform (Sewall 2008). Other key factors that help shape implementation and influence impact are the quality of administration, monitoring (coverage), choice of payment mechanisms, investment in capacity building, involvement of beneficiaries in designing and monitoring of implementation and integrating complementary interventions (Arnold et al, 2011). Essentially, the quality of administration at the local level in implementing the program is a major factor in achieving the outcome that is perceived by the program.

Studies on Efficiency Measurement of Local Government's CCTs Implementation

In terms of studies pertaining to the management of efficiently implementing the conditional cash transfer programs, empirical evidences is still limited. According to Ferreira et al (2011), this is ironical since various disputes pertaining to the design features of the cash transfer program like targeting, monitoring conditionalities, payment system, transparency and accountability has a great bearing on the quality of management concerned in the implementation of the cash transfer program. This kind of evaluation studies should not be taken for granted since the success or failure of any program implementation is attributed to the managers in an organisation. As pointed out by Cogburn and Schneider (2003), the management capacity of governments has direct impacts on the overall social and economic well-being of its constituents. This view is supported by Hacek (2011) stating that suitable quality level of municipal administration is a basic condition for the existence and development of any activity for the public sector. Another rational argument pointed by Ferreira et al (2011), is that more professional and efficient municipalities enjoying administrative and fiscal autonomy with access to resources through social projects can generate positive impacts on citizen's quality of life.

A related efficiency study however was conducted by De Janvry et al, 2007 about local governance and efficiency study of the Bolsa Escola in Brazil. They rigorously measure program efficiency at the municipal level and use it to establish correlates between efficiency and municipal features. Another study by

Carrillo and Jarrin (2007) focused on the efficient delivery of cash transfers to the poor by improving the design of a CCT in Ecuador. They build and estimate a behavioural dynamic model in order to evaluate the efficiency of current and alternative distribution (payment centres) mechanisms and their finding shows that an adequate design of the delivery of payments can substantially increase the value of cash transfer programs.

METHODOLOGY

We use descriptive statistics and correlation analysis in order to provide evidence of relationship between 4Ps, local government efficiency and poverty incidence rates. A comparison of the rates of poverty incidence from 2006 to 2012 was analysed in order to come up with the trend of poverty incidence rates prior to and after 4Ps implementation. Next, the change in poverty incidence rate from 2006 to 2009 and from 2009-2012 was computed and the results were correlated (using Pearson correlation analysis) with the percentage of 4Ps beneficiaries registered per municipality and with size of the cash transfer per capita.

A Pearson correlation analysis was obtained in order to establish the relationship in the change in poverty incidence rates from 2009-2012 with the LGUs technical efficiency scores in implementing 4Ps. This study made use of the obtained estimation results of technical efficiency scores of LGUs in a different study¹ using similar data set (Catubig et al, Unpublished) The technical efficiency scores were estimated using a two-stage data envelopment analysis (DEA), wherein in the first stage of DEA, the efficient frontier and the LGU-level efficiency scores were first estimated and in the second stage, these efficiency scores (pure technical efficiency-vrs) were regressed against identified exogenous/environmental factors that are beyond the control of the LGUs to estimate their impacts on efficiency.

This study used a secondary, pooled cross-section administrative data collected from the four provinces of Davao Region, Philippines, namely: Davao del Sur, Davao del Norte, Compostela Valley and Davao Oriental. This study made use of a pooled cross-section data as this can be useful for evaluating the impact of policy interventions and also because observations across different time periods allows for policy analysis. While there are about a total of 48 municipalities in all four provinces, there were only 24 municipalities included in the sample, because these were the

¹ The title of the study is 'Operational Efficiency of Local Government Units and its Relationship to Constituent's Quality of Life: The Case of 4Ps in Davao Region, Philippines.

municipalities covered by the phases of program implementation (Sets 1, 2 and 3 phases). The periods covered for the study vary for each set as follows: Set 1 (2008-2014); Set 2 (2009-2014) and Set 3 (2010-2014), this is because the start of program implementation for each set also varies. The intent of this study is to cover at least a five-year period of implementation as this is the duration of the program before a beneficiary exits.

Basic descriptions of the variables used in this study are reported in Table 1. The basic descriptive statistics comprised the rate of poverty incidence² of 2006, 2009 and 2012, the percentage rate of enrolled beneficiaries in 4Ps per municipality and the monthly per capita cash transfer.

Table 1: Basic description of variables used in the analysis

Variables	Mean	Standard Deviation	Minimum	Maximum
Poverty Incidence Rate 2006	33.60	9.99	23.7	50.5
Poverty Incidence Rate 2009	34.85	11.08	24.8	54.4
Poverty Incidence Rate 2012	34.82	6.77	24.4	45.8
Percentage of Family Enrolled in 4Ps*	0.05	0.04	0.0003	0.28
Average Per Capita Transfer (monthly)**	1112.59	455.83	253.22	2340.98

*computed as number of registered beneficiaries/population per municipality

**computed as total cash transfer disbursed per municipality/number of beneficiaries/no. of months in payroll

The average poverty incidence rate from 2006 to 2009 has increased despite the implementation of 4Ps in the late 2008 and early 2009, but it has improved in 2012 with only a very slight decline. The average percentage of family enrolled in 4Ps per municipality is too minimal at only about 5% of the total population while the average per capita transfer is Php1112.50.

RESULTS AND FINDINGS

The trend of poverty incidence rate among population by province prior to (2006) and after 4Ps implementation (2009-2012) is illustrated in Figure 1 below.

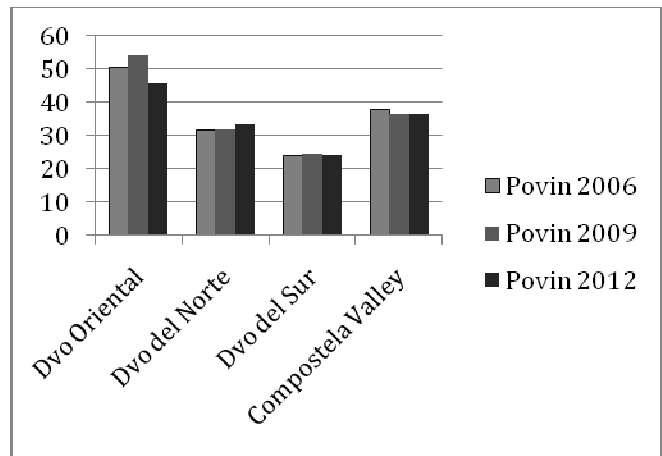


Figure 1: Poverty incidence among population by province.

The results show that municipalities in Davao Oriental has consistently high rate of poverty incidence from 2006-2012 compared to other three provinces. However, while the rate poverty in Davao Oriental increased from 2006 to 2009, it has also shown noticeable decline from 2009-2012. The province of Compostela Valley ranked next to Davao Oriental with its poverty incidence rate showing minimal improvement from 2006-2012 with a declining trend. Davao del Norte's rate of poverty incidence is not as expected since instead of a decline in poverty incidence rate, the figures showed increase rates from 2006-2012. The province of Davao del Sur has the lowest rate of poverty incidence among population of all the provinces in Davao region and the rates of trend is similar to that of Davao Oriental, however the decline from 2009 to 2012 is not as pronounced as in Davao Oriental.

The number of municipalities per province included in this study are as follows: 5 municipalities out of 11 from Davao Oriental (Caraga, Manay, Tarragona, Governor Generoso and San Isidro); 9 municipalities out of 11 from Davao del Norte (Asuncion, Carmen, Kapalong, New Corella, Panabo, Santo Tomas, Talaingod and Island Garden city of Samal); 7 municipalities out of 15 from Davao del Sur (Davao city, Don Marcelino, Jose Abad Santos, Sarangani, Kiblawan, Sta. Maria and Malita); and 2 municipalities out of 11 from Compostela Valley (Compostela and Laak). It should be noted that while Davao del Norte has the most number of municipalities covered during the first three sets of 4Ps implementation, the rate of poverty incidence in the province has not improved much unlike that of Compostela Valley with only two municipalities (18%) covered but the incidence rate has decline, albeit, very slow.

² The available poverty incidence rate is by province with a minimum rate of 23.7 and the maximum rate of 50.5

Another way of looking at the trends in poverty incidence rate is by computing the change in poverty incidence rate from 2006 to 2009 and 2009 and 2012. Figure 2 illustrates the distinct decline in poverty incidence from 2009-2012 in Davao Oriental compared to the other provinces, although, it also manifested the highest increase in poverty incidence rate prior to the 4Ps implementation in 2008. Compostela Valley's change in poverty incidence rate decline from 2009-2012 was negligible compared to its decline from 2006 to 2009. On the other hand, Davao del Sur's change in poverty incidence rate was not consistent for two periods as the poverty incidence increased from 2006-2009 but slowly declined from 2009-2012. Davao del Norte's rate was exactly the opposite of Compostela Valley as the province's change in poverty incidence continued to increase despite 4Ps implementation and the most number of municipalities in the province covered during the first three sets of implementation.

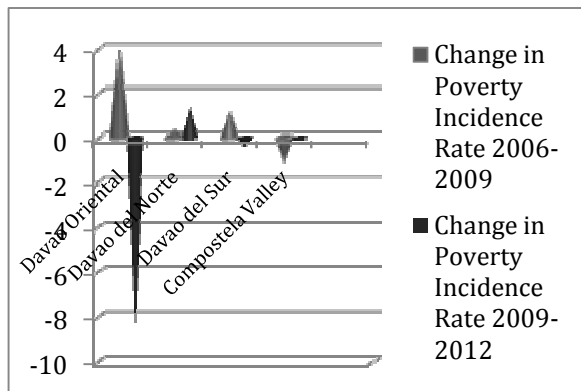


Figure 2: Change in poverty incidence rate for

Using the computed change in poverty incidence rates from 2006-2009 and 2009-2012, the results were correlated with the variables related to 4Ps implementation like percentage of families enrolled in 4Ps and the average monthly per capita cash transfer using the Pearson correlation analysis in order to find out if these variables are correlated with each other. Table 2 presents the correlation coefficient of the two variables versus the change in poverty incidence rate for two periods.

Table 2: Correlation coefficients using Pearson correlation analysis

Variables	Change in Poverty Incidence Rate 2006-2009	Change in Poverty Incidence Rate 2009-2012
Percentage of families enrolled in 4Ps	0.241 (0.00)	0.037 (>5%)
Average per capita cash transfer (monthly)	-0.1759 (0.0001)	-0.034 (>5%)

Note: () – p-value, statistically significant at 5% level.

The results of the correlation analysis suggest that the change in the rate of poverty incidence prior to the implementation of 4Ps in 2006 with that of the rate of poverty incidence five years after the implementation illustrate positive correlation between percentage of families enrolled in 4Ps but negative correlation between the average per capita cash transfer. The implication of the relationship between the percentage of families enrolled in 4Ps and the change in poverty incidence signifies the higher coverage of poor families during the initial roll out and subsequently lower coverage of poor families during the succeeding roll out due to quota per municipality. However, it was noted that the correlation coefficients of the variables were statistically significant from 2006-2009 but the correlation coefficients were insignificant from 2009-2012 at 5% level. A further illustration can clarify the correlation between percentage of families and per capita transfer with that of change in poverty incidence rate as shown in Table 3.

Table 3: Average percentage of families enrolled in 4Ps and average per capita transfer per municipality

City/Municipality	Average Percentage of Families Enrolled in 4Ps	Average Per Capita Cash Transfer (in Pesos/month)
Davao Oriental	5.8	1132.80
Caraga	6.9	1077.06
Manay	6.8	1035.30
Tarragona	13.3	1086.98
Governor Generoso	0.8	1231.85
San Isidro	1.3	1232.79
Davao del Norte	1.6	1164.35
Asuncion	0.8	1115.45
Braulio E Dujali	1.5	1122.53
Carmen	0.6	1148.38
Island Garden city of Samal	0.6	1233.48
Kapalong	0.5	1219.26
New Corella	0.9	1150.43
Panabo	0.2	1194.76
Santo Tomas	0.4	1256.21
Talaingod	9.0	1038.64
Davao del Sur	7.9	1065.12
Davao city	1.5	1086.70
Malita	9.9	1069.19
Sta. Maria	10.0	1088.71
Don Marcelino	13.3	1056.32
Jose Abad Santos	10.4	1021.10
Sarangani	11.5	978.30
Kiblawan	5.7	1147.22
Magsaysay	0.8	1073.42
Compostela Valley	4.8	1133.09
Compostela	1.2	1088.51
Laak	8.5	1177.66

The average percentage of families enrolled in 4Ps appears to be very low in coverage in terms of the entire population per municipality. The province of Davao del Sur has the highest percentage of families enrolled with an average of 7.9% of the entire population, followed by Davao Oriental, Compostela Valley and Davao del Norte. This could explain why despite the positive correlation between the percentages of families enrolled

in 4Ps and the rate of poverty incidence, the coefficient is statistically insignificant during the fourth to fifth year of implementation as there could be changes in the number of registered beneficiaries from the first two years due to factor like compliance with conditionalities. Moreover, the very low coverage of Davao del Norte could also elucidate why the poverty incidence rate of the province has not improved since. This finding corroborates the study made by Hagen-Zanker and Himmelstine (2014) stating that one factor that mediates impact of cash transfer is due to low coverage, which could show lower impacts on poverty reduction. Likewise in the same study, it also pointed out that a significantly low amount of cash transfer compared to the standard international poverty line is another reason why the impact of cash transfer on poverty reduction is not obvious. This is true in the case of Davao Region since the highest average per capita transfer is Php1164.35 for the province of Davao del Norte followed by Compostela Valley, Davao Oriental and Davao del Sur. The computed highest average per capita transfer for this study which is Php1164.35, is 13.75% lower compared to the common international poverty line which is about Php1350.00.³ This therefore clarifies the extent of the negative correlation between the rate of poverty incidence with the average per capita transfer of 4Ps. This also implies that the size of cash transfer does have an effect on the poverty incidence. In this case, it is assumed that cash transfer received by the beneficiaries may alleviate poverty, but the additional resource does not necessarily make a family, non-poor if the amount of cash they received is still below a threshold of acceptable income.

As mentioned above, we hypothesise that there is a relationship between the efficiency of local government units (LGUs) implementing the 4Ps and the change in the rate of poverty incidence from 2006-2009 and 2009-2012. The possible relationship between efficiency and change in poverty incidence was examined using simple correlation analysis. The change in poverty incidence was re-coded in order to reflect improvement in poverty status such that a negative value indicates a reduction in poverty incidence and a positive value indicates an increase in poverty incidence. Therefore, a positive correlation coefficient indicates that as the efficiency of LGUs increases, the rate of poverty incidence decreases and vice-versa. The correlation coefficient is presented in Table 4.

³ Conversion rate of US\$1=Php45.00. Common international poverty line is US\$1/day=Php45/day x 30 days = Php1350/month

Table 4: Correlation coefficients between LGUs efficiency scores and change in poverty incidence

Variable	Change in Poverty Incidence (2006-2009)	Change in Poverty Incidence (2009-2012)
LGUs technical efficiency score (Variable Returns to Scale)	-0.112 (0.014)	0.365 (0.000)

Note: () – p-value, statistically significant at 5% level.

The correlation coefficient between the LGUs technical efficiency score with the change in poverty incidence rate from 2006-2009 showed negative but significant relationship. Considering that 4Ps was implemented for some municipalities in the last quarter of 2008 and for the others during the mid of 2009, this explains why there is no significant correlation between the two variables. Most LGUs in the study have either minimal or no involvement at all during the initial implementation of 4Ps. Similarly, the change in poverty incidence can hardly be felt during the first year of 4Ps implementation. However, the result of the correlation analysis for the period 2009-2012 showed positive and significant relationship between LGUs technical efficiency score and the change of poverty incidence. In the five years of 4Ps implementation, the support and commitment of LGUs in helping carry out the national program of poverty reduction is already observable. Hence, the LGUs efficiency in implementing 4Ps at the local level can help ease the incidence of poverty of their constituents.

Moreover, the findings above was complemented by a further correlation analysis between the LGUs efficiency scores and the yearly poverty incidence rate which provided a significant negative correlation coefficients (-0.385, -0.392 and -0.270) for years 2006, 2009 and 2012, respectively.

CONCLUSION

This study draws salient information regarding the relationship between cash transfers, LGUs implementation efficiency scores and poverty alleviation in the case of Davao Region, Philippines. First, the result of the correlation analysis revealed positive and significant relationship between the change in poverty incidence and the percentage of families enrolled in the cash transfer program during the initial year of 4Ps' roll out but during the succeeding years of the implementation, the relationship became statistically insignificant. The low coverage of poor families in a municipality is one factor to consider in this case. Furthermore, according to Fernandez and Olfindo (2011) during the first and second phases of 4Ps expansion, the program aimed to enrol almost all (90%) eligible poor families in the selected municipalities

unlike in the third phase, wherein the selected municipality were given a quota for the number of households that could be enrolled in the program. Such an arrangement resulted to low take up rates in the later years of implementation and it was also compounded by other factors like implementation pressures (tight deadlines) and low institutional capacity at the municipal level.

Second, the correlation between changes in poverty incidence with that of average per capita transfer revealed negative and statistically insignificant relationship. This finding suggests that the size of the cash transfer matters in cash transfer programs. Thus, even if the cash transfer received may alleviate poverty but if the size of the cash transfer is still below a threshold of acceptable income, poverty incidence would still not improve. On a similar note but in a different context, if the size of the cash transfer is also considered by beneficiaries as a substitute rather than an augmentation to their income, this becomes a drawback as this reduces the incentives for beneficiaries to find work and would simply depend from the program.

Third, correlating LGUs implementation efficiency scores with that of changes in poverty incidence showed negative but significant relationship during the early years of implementation but the relationship improved in the succeeding years resulting to positive and statistically significant relationship. This finding suggest that the involvement and commitment of LGUs to support the implementation of a nationally-funded poverty reduction program is an enabling dynamics in order for the cash transfer program to succeed with the end view of achieving a significant reduction in poverty and meeting the target for the MDG.

Fourth, the findings of this study can also provide policy direction for the national and local government implementing the 4Ps. Since the result of this study revealed positive and significant relationship between LGUs efficiency scores and that of poverty alleviation, the national government should also truly implement the thrust of their poverty reduction program of providing incentives to better performing local government units (LGUs). In this way, the national government not only augment the capacity of LGUs but it is also a way of motivating LGUs improve their performance efficiency in implementing the 4Ps. As pointed out in Policy brief no. 3 (2011), the success of cash transfer schemes has always been associated with continued and enlarged investment in public services.

Finally, given data availability, a rigorous quantitative analysis should provide a more complete picture of the actual impact of the CCTs on poverty incidence of the

target municipalities. This will also allow us to examine the influence of factors, in addition to the characteristics of local government units that may or may not influence the efficacy and effectiveness of the delivery of this program, especially in targeting key social indicators, such as education, health, poverty, consumption, etc.

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EASING THE WATER SHORTAGE: THE CASE OF GEORGE LOCAL MUNICIPALITY

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ABSTRACT

It is a well-known fact that water as a basic natural resource is indispensable for life. Income and food of millions of people across the globe are directly dependent on the availability of fresh water. The main focus of this article is on how the George Municipality, in the Eden District, managed its water supplies during the worst drought the area experienced, for the period 2009 to 2011. The article looks at interventions put in place to counter the water shortage problem in order to determine their effectiveness. A qualitative research approach was employed where purposely selected key role-players were given an in-depth interview. The study revealed that the Municipality was not only able to mitigate the impact of the dilemma, it also succeeded in putting measures in place to counter the impact of droughts should such a natural disaster reoccur. One of the key recommendations was to create continuous awareness amongst consumers around water restriction measures and strategies to use water wisely.

KEYWORDS: water shortage, water restrictions, eden district, george municipality, South Africa

INTRODUCTION

The Eden District Municipality which is located in the Western Cape Province of South Africa covers the Kannaland, Langeberg, Mossel Bay, George, Oudtshoorn, Plettenberg Bay and Knysna local municipalities. These municipalities experienced a natural climatological drought from 2009–2011. The compromised water shortage conditions resulted in immediate negative effects for urban areas. Reduced rainfall resulted in numerous consequences to ground and surface water resources that translated into critically low urban water supplies in the Eden District, in particular George, which is the focus area of this study. Over this period the drought conditions necessitated significant emergency responses (George Municipality, 2010). The aim of the article is to forward the results of an empirical investigation which assessed strategies implemented in November 2009 to mitigate water shortages in the study area in order to determine their successes or failures. The study is confined to the Eden District, George Municipality in South Africa in particular and the results cannot be generalised to the entire South Africa per say.

The next section therefore forwards a discussion on the theoretical underpinnings pertaining to water, followed by a discussion on the research methodology employed, findings, conclusions and finally the recommendations.

WATER AN IMPERATIVE COMMODITY

Water is a basic natural resource, indispensable for life. Although not priced, the value of rain is undisputed. Income and food of millions of people are directly dependent on the availability of fresh water. Since the beginning of human settlement on Earth, water has been used for drinking, sanitation and irrigation purposes. In pre-historic times, humans usually settled in areas of reliable water supplies. During times of drought, however, clans of humans were often forced to relocate in order to survive. Prior to the intervention of humans, the world's water supply remained in a natural state (Pennington & Cech, 2010:13). Fresh water is naturally rare. This fact may at first glance seem surprising. Although two thirds of the earth's surface is covered by water, most of it is salt water found in oceans. Fresh water comprises some 3 per cent of the total, and a large proportion of this is unavailable for use because it is frozen in ice caps and glaciers or locked away as soil moisture (Feldman, 2012:5). Between 1940 and 2000, withdrawal of fresh water has increased more than fourfold, despite improvement in water efficiency. Yet in developing countries the provision of water services still lags far behind the need. Even though many people in the world still lack basic water services, water scarcity has been increasing in many parts of the world. With the supply of fresh water limited by the dynamics

of hydrological cycle, per capita water availability declines as population grows. Increased contamination by population has further reduced supply of fresh water and increased the cost of treatment of available supplies (Lange & Hassan, 2006). According to Pennington and Cech (2010:17) drinking water is the most basic human use for water. Humans can survive eight to ten days without food, but only two days without water. Water must also be safe to drink since poor-quality drinking water can lead to infectious disease. Unsafe drinking water is a daily problem faced by nearly 2 billion people around the world.

WATER SHORTAGES AND SCARCITY: THE SOUTH AFRICAN DILEMMA

Water is often cited as one of the major constraints to development in South Africa. South Africa is a much larger country than Namibia and Botswana with a more varied climate, but its average annual rainfall is still only 500mm. South Africa is projected to achieve the status of acute water stress in the future (Lange & Hassan, 2006:3). Water availability will most likely be further restricted as a result of climatic conditions and increased demand for water resources through population growth, urbanisation and economic growth. Water scarcity is becoming one of the most critical risks threatening social and economic development throughout the world. South Africa is currently classified as a 'water stressed' country. This is largely due to climatic conditions in South Africa in combination with human settlement patterns. South Africa is characterised by relatively low annual average rainfall combined with high evaporation rates. This makes South Africa the world's 30th driest country. Some projections estimate that South Africa already exploits about 98% of its available water supply resources. Water availability will most likely be further restricted in future as a result of climatic conditions and increased demand for water resources through population growth, urbanisation and economic growth (Institute of Directors Southern Africa, 2012).

GEORGE MUNICIPALITY: THE STUDY AREA

Within the Western Cape Province in South Africa there are five District Municipalities (*viz.* West Coast, Eden, Central Karoo, Cape Winelands and Overberg) and the City of Cape Town Metropolitan Municipality. In total, there are 30 municipalities across the Province. Water resources are managed on a catchment scale, i.e. per Water Management Area (WMA); whereas actual water use is aligned according to municipal boundaries (Western Cape Integrated Water Resources Management Action Plan, 2011). The Mediterranean climate of the Western Cape differentiates it from the rest of South Africa in that it receives winter rainfall and drier summers whereas the opposite is true for the rest

of the country. This is due to its latitudinal position in relation to the band of westerly waves of air circulation and the associated low pressure systems. These westerly waves contribute to the climate of the Western Cape, bringing rain in the form of cold fronts (Midgely, Chapman, Hewitson, Johnston, De Wit, Ziervogel, Mukheibir, Van Niekerk, Tadross, Van Wilgen, Kgope, Morant, Theron, Scholes & Forsyth, 2005). The major challenge that the George Municipality was facing was that the municipal area had not received its normal rainfall and this had brought water shortages to the area.



Figure 1: Map of George Municipality

Source: http://www.westerncape.gov.za/your_gov/18

George is very centrally situated, halfway between Cape Town and Port Elizabeth, and is the centre of the Garden Route. It is situated on a ten-kilometre plateau between the majestic Outeniqua Mountains to the north and the Indian Ocean to the south. George is rated among the most popular tourist attractions in South Africa and is popular among both local and overseas visitors for its scenery and moderate climate. The town also has a sophisticated infrastructure with banks, conference facilities, businesses, major shopping chains, transport and shopping facilities, yet it retains an atmosphere of peace and tranquillity. It is a major accommodation centre, with a vast array of facilities on offer to suit every taste and pocket. It has a pleasant climate, conducive to beautiful flowers, lawns, and fruit trees. Botanists and zoologists, over the years, have been amazed to discover the diversity of forest and fynbos. The Touws and Swartvlei river mouths occasionally became silted up and closed when the water did not flow strongly, especially during the dry periods (Nell, 2003).

Eden District's total population is 574 265, representing 9.8% of the Western Cape Province total population of 5, 8 million. George Municipality has the largest population in the Eden District, the population was

estimated at 193 672 in the 2011 census, which represents a growth of 29.1% from 2001-2011 (George Municipality, 2013). The undertaking of the South African government is to provide water to the public as it is a basic need. In particular, the *Constitution of the Republic of South Africa, Act No.108 of 1996* (South Africa, 1996) states that water is a basic need that must be provided to all citizens, and that this is the obligation of government. It further states that water must be free from contamination and pollution, and people must have access to clean and good quality water. The *National Water Act No. 36 of 1998* (South Africa, 1998) regulates the use of water in South Africa. The overarching objective of the Act is to ensure the beneficial use of water in the public interest. The fundamental principles of the Act centre on the need for sustainability and equity in the protection, use, development, conservation, management and control of water resources.

The Garden Route Dam (GRD) constitutes the primary water supply for the George Municipality. The sustainability of the George municipal area water supply depends on the seasonal rainfall to fill the dam. This generates expected storage levels, with full storage in the winter months to provide for the water demand in the municipal area. The tight relationship between rainfall, dam levels and water consumption shows the close connotation between rainfall, water consumption and the increase or decrease in the GRD level (Human, 2013).

The responsibility of the Municipality is to monitor the dam level of water to make sure that sufficient water is available for respective areas.

In lieu of the above, the research objectives of the study were to investigate interventions set in place to address the water shortage problem, in particular the implementation of water restrictions; the strategies that contributed to the alleviation of the water shortage; and, lastly, to analyse the effectiveness and performance of the measures set in place to alleviate water shortages.

METHODOLOGY

The study employed a qualitative research approach. This approach proved apt for this investigation as it provides for an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of or to interpret phenomena in terms of the meanings people bring to them (Ritchie & Lewis, 2003). One of the data collection tools that may be employed in qualitative research is an in-depth interview. A key feature of in-depth interviews is the depth of focus on the individual. It provides an opportunity for detailed investigation of each person's

personal perspective, for an in-depth understanding of the personal context within the research phenomenon located, and for very detailed subject coverage. It is the only way to collect data where it is important to locate the perspective within the context of personal history or experience, and where it is important to relate different issues to individual personal circumstances (Ritchie & Lewis, 2003).

As the above data collection tool proved apt for the study, the researcher conducted in-depth interviews with purposely selected individuals within the George Municipality in July 2014 who holds specific knowledge on water management (restrictions and shortages) and planning professionals to seek professional opinions. It was important that the research be based in the respective departments that will be mentioned so that the results were useful in the George Municipality.

The selected participants were firstly contacted by e-mail and telephonically to request their consent and participation for an interview. Selected participants were from the Water Services Department, Water and Sanitation Civil Engineering Services Department and Disaster Management Services in particular, the Director: Water and Sanitation Services Civil Engineering Services, Senior Manager Operations: Water and Sanitation Services Civil Engineering Services, Marketing Coordinator: Water Services, Manager: Civil Engineering Services, Manager: Water and Sanitation Services Civil Engineering Services, and Manager: Disaster Management Services.

FINDINGS AND DISCUSSION

As indicated earlier, in the Western Cape, the George Municipality resides under the Eden District Municipality. In 2010, the Eden District, in terms of the *Disaster Management Act No. 55 of 2002* (South Africa, 2002), in consultation with the National, Provincial and Municipal Disaster Management Centres, resolved that owing to the drought conditions within the jurisdiction of the George Municipality, the municipal area be declared as a local state of disaster in terms of the Act. This municipal area was affected the worst of all the municipalities in the Eden District. On 10 November 2009, Eden District, George Municipality, was declared a drought disaster area (Western Cape Government, 2009).

The George municipal area was in the grip of its worst drought in 132 years; with the George Municipality facing the prospect of taps running dry. It has become known as the "green drought" – while the area still looked lush and fertile, dam levels were plummeting and rivers slowing to a trickle (Bamford, 2009). From

the in-depth interviews by the research participants that were conducted within the Eden District, George Municipality, it was found that the water shortages occurred as a result of low rainfall and introduced water restrictions in the George municipal area starting in January 2009.

The Garden Route Dam (GRD) and the George Municipality

The Municipality of George draws water supply from the Garden Route Dam (GRD). This is the sustainability of the George municipal area water supply and depends on the seasonal rainfall to fill the dam. This dam constitutes the primary water supply of the Municipality. This generates an expected storage level, with full storage in the winter months to provide for the water demand in the municipal area. The provision of water to the George Municipality area is the Municipality's responsibility. It could be interpreted that the Municipality is responsible for the management of the water levels of the dam and making sure that water is available to water consumers. Due to the fast dropping level of the Dam it was imperative for the Municipality to make the public aware of the shortage of water and the implementation of the water restrictions. The water managers in the water department absorbed the seriousness of the water shortages and plans were implemented for the raising of the Garden Route Dam Wall to collect more water for future purposes and for the futuristic outlook for water shortages. It can be interpreted that the Municipality is in its final stage of licence approval and raising the dam wall. This indicates the ability of George Municipality to act on the seriousness of the water shortage, to extend the dam wall in order for the dam to collect more rainfall for future use. This confirms that the long term project is underway for the raising of the dam wall and that the dam is fairly full.

Water saving appliances

During the interviews with the research participants, it was found that water consumers were made aware of water saving appliances that could be installed to lower water usage. This included, for example, showerheads, and flush toilets that could have been installed or replace existing fixtures and appliances within homes and business. The mechanical irrigation of gardens was prohibited to save water. Gardens were permitted to be watered during certain periods only, that is, between 19:00 to 21:00. Even numbered households (e.g. 2, 4, 6.....) could only water their gardens Mondays and Thursdays. Uneven numbered households (e.g. 1, 3, 5...) could only water their gardens Tuesdays and Fridays. When the garden hose was used it had to be hand-held.

The interviewees mentioned that water consumers were advised to collect rainwater that would run from their roofs into the gutters of the roof and flow into the water tank for use in the lawn and garden. This would help the municipal area to save water and would also benefit homeowners themselves. The Municipality encouraged the use of water tanks to home owners, especially to the farmers and schools for the playgrounds that consumed a lot of water. This ensured that drinking water was not being used for that purpose. It functioned well for water consumers to contribute to the saving of drinking water and from wasting it on lawns and gardens. It can be interpreted that the water saving appliances initiatives were effective and efficient because they made more water available to water consumers. The result was that less water was lost and more water reached the taps. The less water needed to be supplied and served to water consumers, the slower the dam level was running dry.

Water Restriction Strategies

The research participants in the water department of the Municipality acknowledged that the public awareness campaign was a very important event for the restriction of the water shortages. This was because the water dam levels were depleting fast and water consumers had to be educated on the water restrictions. The reason for this campaign was also ultimately to make the public aware of the water shortage in the municipal area and to reduce consumption of water to prevent further drastic measures. The intention of this campaign was to reduce consumption to a level that prevented further more drastic measures. All possible ways of communication were used, for example, radio, press, television, billboards, posters, announcements in the streets and, with the help of the Municipality, everything was done in its power to accomplish the awareness campaign of water shortage restrictions and water conservation in the George municipal area.

The George Municipality did not receive any water from neighbouring municipal areas, for example, Knysna Municipality or Mossel Bay Municipality. The goal was to manage the situation of the dam so that it would not run empty or dry. The lack of the water inflow into the dam called for the water restriction strategies to be implemented. It was clear that water consumption decreased by up to 38 per cent from April 2009 to the beginning of 2010 which was a testimony that the awareness campaign contributed positively to the management of the water shortage in George municipal area. During the interpretation of the data above it was found that the water managers were confident that the Municipality was independent under the circumstances of low rainfall and was optimistic in anticipating more rainfall for the increase of water

inflow into the dam. It was evident that the municipal area has been restored completely following the water shortages and the Municipality was still encouraging the public or community to be mindful of what was experienced in the past and to save water continuously. The research participants were positive when uttering these words. More measurements, for example, a desalination plant, would also be an improvement to reduce the water shortages in the George municipal area. This also makes a huge impact regarding the water restrictions.

According to Feldman (2012:20-21), one arena where water stress is at its highest is urban areas composed of millions of people. It is this type of conflict of fresh water that may likely be seen more frequently in the future. They are also touchstones for innovations in conservation, waste water re-use and recycling and desalination. It can be interpreted that the water restriction strategies initiatives were real and competent because more water made it to water users. This resulted in more water reaching the taps and less water being lost. The less water needed to be provided and served to water consumers, the slower the dam level was depleting.

Public Water Awareness Campaign

The study found that the George municipal areas were educated on the awareness of water restrictions and the competitions on the radio alerted people and rewarded the listeners. The public was made aware physically and mentally in relation to the water restrictions. The interviewees had a very positive attitude towards the above mentioned being implemented. This campaign was successful and showed optimistic results. There was a great deal of convincing the George municipal area about the importance of saving water. It was mentioned that this awareness campaign was essential because the public or community often did not have an understanding of how much water they use and how valuable it is. To change this, public education was needed to change public perceptions and behaviour toward water conservation.

The changing of the public's thinking about water conservation and productivity therefore was gradually achieved by many people in the municipal area and the water consumers already had some idea, understanding and knowledge of the issues involved, for example, home-owners were not allowed to use a hosepipe to water the garden at a certain time of the day or on a particular day. This confirms that public awareness was needed to change these perceptions as well as to change personal behaviour of individuals towards saving water. This education awareness included information about water shortages, restrictions and conservation. It helped

individuals to realise their effect on the water shortages and it helped individuals to understand the measure implemented to alleviate water restrictions. It was found that social marketing was a method of changing the perception of water consumers and educating the public about water restrictions in the George municipal area.

It was stressed by the research participants that an aggressive social marketing awareness campaign was conducted at the community level and was connecting with individuals, residents and the neighbours. The social marketing campaign included community events to promote water conservation, for example, road shows. Educational material (e.g. pamphlets and guides on saving water in homes) was made available and distributed widely in the community and the George municipal area. The public awareness campaign that was implemented by the George Municipality reduced the water consumption in the municipal area. According to Low (2005) capacity building for needs in education, training and raising awareness include the public at large. This has proven that the campaign was successful.

Water Restriction Mitigations

The interviewees were able to provide a host of water shortage restriction advice about how to implement water restrictions measures successfully to alleviate the water shortages. A host of knowledge and understanding of the importance of water restrictions was deemed to contribute to water conservation. A very significant section of advice was to do simplistic and small changes to save water first. Even though some water restriction implementation plans took a longer time to materialise and to see results, they required making tough decisions and were very difficult to implement. There were many other approaches that also could have achieved significant results in a relatively short period of time and been easy to implement.

Firstly, the implementation of water restriction plans with relatively simplistic methods created fast results with significant decrease of water shortages and confirmed the benefits of water restrictions to those who would not support it. This provided motivation for the plans for water shortages and included the more difficult and long term plans (e.g. raising the Garden Route Dam wall) that were required to achieve true sustainability.

Secondly, it was normal that most people did not want to change their habits and behaviour. The George Municipality had some difficulty to convince these types of water consumers. This was in the case of water consumers who were set in their normal way and believed in the way individuals consumed water. It was mentioned by the interviewees that water consumers with high consumption were often the ones that found it

hard to break their habits. These water consumers were so used to abusing water consumption that it was so difficult to speak second nature without thinking of their water usage. An example was when men are shaving and they leave the tap running when rinsing their razor. All these bad habits contributed to the traditional ways of wasting water and make it difficult to change it. Grey water, also called recycled water, was suggested to households as a potential way to recycle water for household uses or purposes and not as drinking water. According to Harding (2011), grey water could be used for other purposes, for example, watering the garden instead of using and wasting drinking water. It was evident that this confirmed the contribution of saving water and water restriction mitigation.

Lastly, the Municipality does not have control over the informal settlement but has managed to come up with an initiative to control water losses in the area by means of push type taps to reduce the water losses. The perception of the right of water as mentioned in *The Constitution* leads many people to think that they have the entitlement to use and waste as much water as they want, which is a perception that must be overcome by the public. All were possibly prepared to implement water restrictions for the alleviation of the water shortage, saving of water and the high consumption thereof. Although difficult water consumers changed their mind-set on high water consumption and joined in with the plan, they seemed to understand that water conservation could also result in more water being shared with more water consumers. The following theme also helped water consumers to stay in line with water restrictions.

Water Emergency Tariffs

The senior manager of the water department mentioned that the Municipality employed water emergency tariffs to address the water shortage disaster in order to mitigate the impact thereof. This took the form of a progressive water tariff that increases for blocks of water usage. Due to the situation, water consumption had to be managed to extend the life of the water resources in order to meet the basic water requirement for the residents of the George municipal area. It was running out of water and the water consumption levels continued to deteriorate. This was when the emergency tariffs were implemented to prevent the water levels from deteriorating so rapidly. It shows that the Municipality was ready and was aware of the water shortages.

The way it was managed was that water usage over 15 kilolitres per month was charged at an emergency rate when the dam reached 25 per cent. In the case of all other tariff groups (car washes, dry cleaners, industries

with a consumption of more than 100 kilolitres per day, farms/rural areas, educational institutions, welfare organisations, religious institutions and municipal buildings), tariffs were increased by an additional fifty per cent (50%) for the usage. Should the Garden Route Dam reach a level of 15% then the minimum usage of water consumption will be reduced to 10 kilolitres per month. The Council decided on more stringent measures when the dam level was depleted and the Municipality adjusted the tariffs upwards. The Municipality does not have control over the informal settlement but has managed to come up with an initiative to control water losses in the area by means of push type taps for communal purposes to reduce the water losses. During the interview the senior manager confirmed that this was a mechanism that worked very well in the water restriction period to manage the shortage of water.

Because the right of water as described in *The Constitution* has led many people to think that they have the entitlement or right to use and waste as much water as they want, people's thinking needs to be challenged and changed.

In so doing, the heaviest water users would be penalized and lower water users would be rewarded and this created an incentive for water consumers to use less water.

Climate Change in the George Municipality

During the interviews with the water service managers, it was mentioned that climate change has to do with conducting a long-term planning for water restriction and water consumption in the George municipal area. It was confirmed with the water service managers that water restrictions are a means to adapt to the potential effects of future climate change in the municipal area. According to them it was acknowledged that the George municipal area was likely to have longer, drier summers in the future. Should water shortages occur again and it results in a drought, the measures set in place to alleviate water shortages will mitigate the likelihood or severity of water restrictions in the future. The water service managers confirmed that the measures were fully incorporated into the long term water master plan and water demand management strategy. It would give the Municipality the means to take a more holistic and comprehensive approach on water shortage.

George Municipality's Drought Policy

The research participants explained that water restrictions were implemented in April 2009. A council resolution was taken that restrictions will be imposed if the dam level reaches 60 per cent. The restrictions have been intensified on three occasions since then and a decision was made to implement emergency tariffs if

the volume of water in the dam reached 25 per cent. The George Municipality therefore has a Drought Management Policy in place to address possible future drought or water restriction situations, periods of low rainfall, or insufficient raw water resources to address the needs of the residents of George municipal area. The Municipality has a drought policy in place and this was approved by council on 25 November 2010 for future purposes and outlooks. Most of the water restrictions items have been covered in this policy. The Municipality also adhered to and complied with the requirements from the Western Cape Provincial Government to adopt this policy. In essence the Municipality has all aspects in place and is ready for this unexpected occurrence. It was confirmed that the Municipality achieved a drastic drop over the 2009-2011 water shortage periods. It can be confirmed that this drought policy prevented potential shortfalls in the supply of water.

Sources of Funding to Alleviate Water Shortage

The research participants responded that the Eden District Municipality allocated funds towards the projects. The measures implemented to alleviate water shortages were a priority to the George Municipality mentioned by the interviewees. The research participants indicated that funding was a concern to finance the water shortage strategies and mitigations. Maintaining the awareness campaign and emergency projects financially was important because of limited municipal budget. These water awareness campaigns and projects had to be as efficient as possible to get the maximum benefits and had to find sources of funding whenever possible. Funds were provided by the Eden District Municipality for projects, for example, the boreholes. This confirms that the Eden District Municipality in conjunction with the George Municipality worked together to provide funding for the water shortage projects. The total cost of the funds was allocated toward the projects with a shortfall of funds. The balance of the funding was financed from the savings on the existing capital budget and loans in the financial year 2009/10.

Another impact of the water restrictions was the resultant lower water sales and the reduced income for the financial year. The shortfall as well as the resultant cost of the loans was financed from higher water emergency tariffs. The council of the George Municipality has approved both the taking up of the loan and the adjustment of tariffs in a financial year. The financial implication was under control to finance the disaster between the National, Provincial Treasury and the Local Authority (George Municipality). The Municipality had capital savings to contribute to the disaster and also an external loan to settle the shortfall.

One concern the research participants had was that the community had to carry the burden of higher tariffs to pay for the external loan that was taken up by the Municipality.

CONCLUSION AND RECOMMENDATIONS

This research was a study on the water shortages that occurred in the George Municipality and how the measures or restrictions were implemented to counteract the water shortages. The problem in essence encompasses the assessment of the shortages of water and the interventions set in place to address the problem, particularly the implementation, and the essential strategies and mitigations that contributed to the alleviation of the water shortages. This study presented, analysed and interpreted data that was collected from the use of in-depth interviews. It presented the research findings and was accompanied by interpretations of the water shortages and interventions for this investigation.

An analysis of the measures implemented to alleviate the water shortage was addressed. The findings revealed that the measures implemented to counteract the water shortages were positive in the municipal area. The assessment indicates that it did not only mitigate the impact of the dilemma, but the Municipality is in a position to have a strategic futuristic outlook should this natural disaster reoccur. Also, the intention was to reduce water consumption to a level that will prevent further more drastic measures for as long as possible.

The researcher recommends that the George Municipality should continue to market water restriction awareness campaigns to the public even though the George municipal area is no longer experiencing water shortages. This task should be continued and managed by the senior manager of the water department: water services and sanitation, which is the coordinators of this process. This process could be marketed or advertised on a quarterly or bi-annual basis in and on social media. It should be noticeable with social media in the municipal area, for example, on the local radio station: Eden FM and Billboards and in the local newspaper: George Herald local newspaper as a friendly reminder to respect water consumption and conservation thereof.

It is recommended that short term water restriction strategies and mitigations, for example, the simplistic methods should be concerned with the implementation of long term water restriction strategies and mitigations (Raising of the Garden Route Dam) by the George Municipality. The short term and the long term strategies and mitigations should run concurrently. For example, as the short term strategies and mitigations are working to reduce water consumption, the long term

strategies and mitigations should work on raising the Garden Route Dam. This indicates that the task of the Senior Manager and the Water Marketing Coordinator in the water department should work closely to update or communicate with each other on the status in short and long term water status. This will keep them abreast when comparing the two variables. These strategies must work simultaneously together to reach their common goal by saving water, collecting water and making more water available to more water users.

The George Municipality needs to review the Drought Policy on an annual basis (at the start of the financial or fiscal year) in order to keep track or abreast of and remain relevant to the ever changing population growth, climate change, water consumption, water restrictions, needs and dynamics in the George municipal area. This must be reviewed by the Chief Financial Officer, Senior Management and the Council of the George Municipality in conjunction with the relevant legislation and regulation frameworks, for example, the Municipal Financial Management Act (MFMA). The Municipality should continue to build relationships with water experts, for example, Ninham Shand (Aurecon), for bulk water planning, sources of funds and the establishment of an early warning system against water scarcity as mentioned in this study. Therefore it is recommended that the senior manager of the water department should concentrate on risks (delay in water projects) and early warning signals (climate change) for water shortages conditions. The way forward is for the senior manager of the water department to continue to strengthen the alignment of the water restrictions to climate change as discussed in this study.

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AN INVESTIGATION OF STRATEGIC FACTORS AFFECTING THE PERFORMANCE OF MANUFACTURING BASED SMALE AND MEDIUM ENTERPRISES (SMEs) OPERATING IN BATTICOLOA DISTRICT IN SRI LANKA

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ABSTRACT

Small and Medium Enterprises (SMEs) play a pivotal role in the development of the country. It has made significant contribution to industrial production, export and employment generation and very much important for developing countries like Sri Lanka. The objective of this study was to identify the underlying strategic factors in a collected data set that represent to indicate to the performance of small and medium enterprises (SMEs) in Batticaloa district in Sri Lanka. The analysis based on the 150 numbers of owner / managers who responded to a questionnaire survey conducted on randomly selected samples of manufacturing based SMEs which are operating in Batticaloa district in Sri Lanka. The study examined six factors namely financial, management, marketing, technology, infrastructure and government regulation that influence in the performance of SMEs. In the beginning phase of this research, pilot study was conducted to verify the reliability of questionnaires through Cronbach's alpha test. Seven hypotheses were developed to find out factors that are impacting the performance of SMEs in Batticaloa district. The entire hypotheses were successfully tested and five hypotheses were accepted including the overall strategic factor. Overall strategic factors and SMEs performance correlation value indicates 0.786 which shows a moderate strong positive relationship and the regression analysis shown that, SMEs performance could be explained by 70.60% variations of its independent variable. Therefore these results confirmed that, there is a significant association between strategic factors and SMEs performance in Batticaloa district. Finally recommendations are suggested to enhance the performance of SMEs in Batticaloa. In this juncture, especially the government participation and its valuable contributions are very much expected in the growth of the manufacturing based SMEs in Batticaloa district and for the entire country.

KEYWORDS: small and medium enterprises, manufacturing based SMEs, strategic factors and performance

INTRODUCTION

Contemporary world global economy is facing certain up and down even though, multinational companies moving in a right track, retail formats, such as food city and other modern business entities have reached good market shares as a same, small and medium enterprises (SMEs) also contributed significantly to the gross domestic product (GDP) of economies. SMEs all over the world indicate that, contribution to the GDP is more than half proportion that means 50% to the global economy and 95% of registered firms operating in the world under the SMEs sector (<http://www.sundaytimes.lk/130303>). Further, this implies that SMEs are vital to middle level income countries to keep in pace of economy and survival of business ventures. According to Central Bank of Sri Lanka (CBSL) annual report (2012), the industrial contribution to the GDP in 2011 is 30.4% in Sri Lanka. The contribution of small businesses to the national economy in Sri Lanka is not noteworthy. Abeyratne (2005) reveals that in the year 2004, the small business sector contribution to the country's GDP is only 18.5%.

In contrast, in neighbouring India, the small business sector input to GDP during the period 1995-2002 has remained at an annual average of 33% (Manimala, 2003).

Research has shown that in Sri Lanka 68% of the small business failed within the first 2-5 years of operation (Lingesiya, 2012). This statistics make questioning that, what are the key reasons behind this situation? Even though, this study's intention to find out strategic factors that contributed and impact on performance of SMEs and through this finding enable to address do and don't for future SMEs investors. Main point is, through identifying where SMEs weak, that may give teaching lessons to eliminate these malpractices regarding SMEs. In Batticaloa district, there are many firms operating under SMEs concept but, there is a lacking guidance or monitoring process exist to guide those firms regarding the sustainability of SMEs formats. According to department of census and statistic (DCS) hand book

(2010) altogether 375 manufacturing based SMEs are operating in Batticaloa district.

SMEs performance dictates by several factors. In this study researcher analyse which factors contribute more in the process of performance of SMEs. According to the literatures, factors that are accompanied with SMEs performance denoted as, '*financial based factors, management based factors, marketing based factors, technology based factors, infrastructure based factors and government regulation based factors*'. These factors are commonly indicated as strategic factors in this study. Further, these factors are called as 'variables of strategic factors'.

STATEMENT OF THE PROBLEM

SMEs is playing significant role in economic context in Sri Lankan arena. According to Wolfenson (2001) denoted that, '*SME is a recognised integral component of economic development and a crucial element in the effort to lift countries out of poverty*', this implies that, countries such as Sri Lanka could be well benefitted through these SMEs because, initiating and establishing procedures relatively ease compare with large scale business formats. According to Gamage (2000) illustrate that, Sri Lanka is having potential to get maximum outcome from SMEs. Further, low level income is fairly enough, less infrastructure facilities are enough to run SMEs rather than large scale operation and availability of very cheap labour or in another term, cost effective labour force. These comfortable nature of business formation very much suit to SMEs. Even though, how far policy makers and other stakeholders realize the significance of SMEs is questionable.

Literatures suggest that, in Sri Lanka SMEs sustainability is still questionable and statistics shows 68% of SMEs failures within 2-5 years of operation (Lingesiya, 2012). After the end of war, lack of studies investigated in SMEs concept in Batticaloa, a literature gap exists to fill in Batticaloa district. This study is being conducted at a suitable time and correct concept to find the hypothetical answer in Batticaloa district. There are many reasons behind the failure of SMEs. In this study researcher's role is to find the answer regarding the extent of impact of strategic factors on the manufacturing based SME's performance in Batticaloa district. Therefore, the study raise the research question that,

What extent the strategic factors significantly impact the performance of the manufacturing based SMEs operating in Batticaloa district?

Based on above argument the research problem focused on the manufacturing based SMEs, whether it contributes towards shaping and modifying above

factors based restructuring process. This may support and ensure the sustainability of the manufacturing based SMEs in Batticaloa as well as throughout the nation. This research problem leads to answer that, what are the strategic factors impacts the performance of the manufacturing based SMEs in Batticaloa district.

OBJECTIVES OF THE STUDY

The primary objective of this study attempts to find out what are the strategic factors impacts the performance of the manufacturing based SMEs in Batticaloa district. This implies, by finding out each and every factor, this study could address how far these factors contributing and impacting on the performance of the manufacturing based SMEs. Literally, factors such as 'financial based factors, management based factors, marketing based factors, technology based factors, infrastructure based factors and government regulations based factors' which are playing a specific role in shaping the performance of SMEs or ensure the successfulness of SMEs.

This research has the following secondary objectives.

- Identify to what extent the financial based factors impact the performance of the manufacturing based SMEs in Batticaloa district
- Examine to what extent the management based factors impact the performance of the manufacturing based SMEs in Batticaloa district
- Inquire to what extent the marketing based factors impact the performance of the manufacturing based SMEs in Batticaloa district
- Find out to what extent the Technology based factors impact the performance of the manufacturing based SMEs in Batticaloa district
- Check to what extent the infrastructure based factors impact the performance of the manufacturing based SMEs in Batticaloa district
- Observe to what extent the Government regulation based factors impact the performance of the manufacturing based SMEs in Batticaloa district

SIGNIFICANCE OF THE STUDY

This research focusing on factors study that accompanied with the strategic factors and its impact on performance of the manufacturing based SMEs in Batticaloa district. Researcher suggests that, the role of strategic factors and the level of extent regarding this concept may support SMEs to maintain the high standard of performance. In another term, finding out of economic significant of SMEs also expected through this study.

This study is playing an important concern over value reorganization of SMEs. As this study points out the positive sides of SMEs and to how well these type of

formation suitable to middle level income countries like Sri Lanka is relatively important. Further this study emphasis on finding the actual feedbacks from respondents in Batticaloa district.

This research work will be of immense benefit, not only to the Government in terms of the appreciation of factors critical to SMEs performance which have been overlooked, but also to the industries. The study will also contribute to knowledge and enhance practices in the management of similar types of manufacturing based SMEs in Sri Lanka.

SURVEY METHDOLOGY

This study considers strategic factors of SMEs and its' impact on SMEs performance, in the selected manufacturing based SMEs in Batticaloa district.

Data Collection Method

This study focuses on primary data, which were collected through the structured questionnaire. These questionnaires are originally developed by the researcher based on the literature. The questionnaire consists of part I for personal information of study variables and part II for research information.

Part II of the questionnaire consists of the research information to be collected through 42 statements in relation to the study variables: 15 statements for SMEs performance and 27 statements for strategic factors of SMEs. All these 42 statements in the questionnaire are measured with 5 point Likert's scale of SMEs entrepreneur's perceptions as given below for maintaining the consistency and to avoid the scale effect between the study variables.

1. Strongly Disagree
2. Reasonably Disagree
3. Neutral
4. Reasonably Agree
5. Strongly Agree

This research considers strategic factors of SMEs and its' impact on SMEs performance, in the selected SMEs in Batticaloa District. Population of this study were selected from 09 categories of SMEs functioning in Batticaloa District.⁴ Since this study considers the relationship of strategic factors of SMEs and its impact on SMEs performance. 165 questionnaires were distributed strategically on random sampling basis and 150 responses were returned for analysis.

Hypothesis

⁴ Mining and quarrying, Food, Beverages and tobacco, Textiles, weavings, apparel, and leather, Paper products and printing, Non metallic mineral products, Metal Industries and metal products, machinery and equipments, Wood and wood production and furniture, Water works and supply and Other ancillary manufacturing industries.

Hypothesis is a specific statement of prediction. It describes in concrete rather than theoretical which are expected in the study. Checking the significant or extent of impact of Strategic factors on SMEs performance is playing key role in this research. To achieve this, the following Alternative and Null Hypothesis are proposed in this study.

H₀ (Null Hypothesis): There is no significant relationship between overall strategic factors and SMEs performance in Batticaloa district.

H₁ (Alternative Hypothesis): There is a significant relationship between overall strategic factors and SMEs performance in Batticaloa district.

To meet the ultimate outcome of this study it is required to find which of the strategic factor significantly impact on dependent variable (SMEs performance) so, this study decides to check each of the strategic factor's significances with respective dependent variable based on the results study would able to come know what are the factors significantly impact at the same what are the factors not significant at all.

Data Analysis

Hypothesis testing is used to find out significant strategic factor in this study. In accordance with studies objectives is to identify significant strategic factor that impact on SMEs Performance in Batticaloa. Several steps are there to construct hypothesis in this specific study. First study is focusing to set up assumptions regarding hypothesis, formulated Null, Alternative Hypothesis and define the decision rule or criteria are the significant steps of this hypothesis.

These are the assumptions setup in this study relevant to Hypothesis,

- (01) Probability distribution of this study is normal distribution
- (02) Two tail test is suitable method to find out reject region
- (03) Test statistic have to be greater than -1.96 to 1.96 to accept H₁ (Alternative hypothesis) as the same value which fall into this region (-1.96 to 1.96) accept the Null Hypothesis
- (04) P- value (P) or level of significant has to be less than 0.05 to accept the H₁ (Alternative hypothesis)
- (05) Significant level which exceed the 0.05 value need to be accept the Null Hypothesis and reject H₁ (Alternative hypothesis)

Test Statistics for each of the factor were calculated based on the under mentioned formula.

$$\text{Test Statistics} = \frac{\text{Correlation Coefficient (r)}}{\sqrt{1 - \text{Correlation determination} \div (\text{Number of respondents} - 2)}}$$

The respective results are shown as follows in Table 1

Table 1: Summary of T Statistics

Testing factor correlated with SMEs performance	Correlation coefficient (r)	Correlation determination (r ²)	1-R ₂	$\sqrt{1-R_2/148}$	Test Statistics approximately coefficient -t
<i>Financial based factors</i>	0.741**	0.5491	0.4509	0.05519	13.42
<i>Management based factors</i>	0.651**	0.4238	0.5762	0.06239	10.43
<i>Marketing based factors</i>	0.659**	0.4343	0.5657	0.06182	10.66
<i>Technology based factors</i>	0.311**	0.0967	0.9033	0.07812	3.98
<i>Infrastructure based factors</i>	0.475**	0.2256	0.7744	0.07233	6.57
<i>Government regulation based factors</i>	0.147	0.0216	0.9784	0.08131	1.81
<i>Overall Strategic factors</i>	0.786**	0.6178	0.3822	0.05081	15.47

*. Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

Source: Developed for this study

Primarily, financial based factors discussed in this study. Financial based factors and SMEs performance having significant among them. Literature indicates, Central Bank report (1996) pointed out successful performance of SMEs depending on maintaining consistency annual growth. Levy (1993), Yapa (1999), Chandrasri (1999), Reddy (1991), and Little et al. (1987) argues, tickling the financial based factors definitely bring success to SMEs. Theories strongly suggest there is a significant positive impact of financial based factors. To find the answer for this question; “what extent financial based factor impact on SMEs performance?”, study pointed out the results as follows,

- Mean value 4.6442 with the standard deviation of 0.4765. This implies mean fall into high range.
- Correlation coefficient between this factor and SMEs performance stand as, 0.741 (t=13.42, p=0.000)
- Regression analysis indicates that, one unit increase in this factor will increase the SME performance by 0.417 units (p=0.000).

The above results imply that, there is a moderately strong positive impact between financial based factor and SMEs performance in Batticaloa district.

Secondly, it is suitable to address management based factors. Accordingly management based factors having significant impact on SMEs performance. Literature indicates, Cronje et al. (2001), Mohotti (1993), Gamage (2000), Nurul et al. (2005), and Man et al. (2002) pointed out, management efficiency ensure the goal accomplishment of SMEs. This implies components of management impacting significantly on SMEs

performance. In this junction study checks whether these theoretical underpinning compatible with Batticaloa district? The results received is as follows,

- Mean value 4.098 with the standard deviation of 0.6088. This implies mean fall into high range.
- Correlation coefficient between this factor and SMEs performance stand as, 0.651 (t=10.43, p=0.000)
- Regression analysis indicates that, one unit increase in management based factor will increase the SME performance by 0.244 units (p=0.000).

The above output implying that, there is a moderately strong positive impact of management based factor on SMEs performance in Batticaloa district.

Thirdly, it is suit to elaborate marketing based factors. Marketing based factors playing crucial role in business arena. There is a significant impact between marketing based factors with SMEs performance. Literatures relevant to Kimura (2003) and Foley et al. (1989) indicate that, there is a significant association between Organization strategies with marketing operations this implies compatibility of marketing based factors with SMEs performance.

- Mean value is 4.1200 with the standard deviation of 0.5238. This implies mean fall into high range.
- Correlation coefficient between this factor and SME performance stand as, 0.659 (t=10.66, p=0.000)
- Regression analysis indicates that, one unit increase in marketing based factor will increase the SME performance by 0.297 units (p=0.000)

The above results reveal that, there is a moderately strong positive impact of Marketing based factor on SMEs performance in Batticaloa district.

Fourthly, study considers discussing on technology based factors. Technology is driving the world, in any sort of business ventures adaption of technological advances inevitable. There is a certain extent of impact of technology based factors on SMEs performance. Robertson (2003) and Chandrasri (1999) indicate, advancement of technological aspects supports to improve SMEs growth and suggest technological constraints are significant barrier faced by the developing countries that reduce the outcome of SMEs performance. This indirectly implies, successful performance of SMEs has to adapt to technology. In Batticaloa situation feedback received in this study are as follows,

- Mean value indicates as 3.7160 with the standard deviation of 0.4131. This implies mean fall into high range.
- Correlation coefficient between this factor and SMEs performance stand as, 0.311 ($t=3.98$, $p=0.000$).
- Regression analysis indicates that, one unit increase in technology based factor will increase the SME performance by 0.045 units ($p=0.348$)

This result express that there is a very weak positive impact of Technology based factor on SMEs performance in Batticaloa district. The reason for this result could be due to the war and conflict situation in the past in Batticaloa area and now only SME entrepreneurs are willing to adapt technology in their operations to enhance the output. This implies still Batticaloa SMEs has to take care on Technology based factors and further improvement is expected to survive in the competition market changes.

Fifthly, study intends to discuss on infrastructure based factors. Investors very much keenly consider infrastructure based platform before they take decision regarding investment plan. Gamage (2000) illustrates, SMEs special features is to operate the business with less infrastructure facilities even though SMEs which are not adapting to well executed infrastructure will face difficult in the expansion phrase or conversion into large scale businesses. Further, literatures in connection with Abeyratne (2005), Chandrasri (1999), Kristiansen (2003), and Huggins (2000) emphasized the importance of infrastructure facilities. Even though, in Batticaloa situation these are the feedback received in this study.

- Mean value is 4.2587 with the standard deviation of 0.5015. This implies mean fall into high range.

- Correlation coefficient between Infrastructure based factor and SMEs performance stand as, 0.475 ($t=6.57$, $p=0.000$)
- Regression analysis shows that, one unit increase in infrastructure based factor will increase the SME performance by 0.103 units ($p=0.05$).

This result confirms that there is a fair significant positive impact of Infrastructure based factor on SMEs performance in Batticaloa district.

Sixthly, study focused on Government regulation based factors. Government is a body practising, modifying and implementing suitable economic policy in business arena. Sudden changes in government regulations and other restrictions negatively affect the performance of SMEs. Yusuf (1995), Simbi (2004), and Huggins (2000) indicate, government regulation is an external factor that impacts on SMEs performance. This studies figure out,

- Mean value is 3.4225 with the standard deviation of 0.3435. This implies mean is slightly above average value.
- Correlation coefficient between Government regulation based factor and SMEs performance stand as, 0.147 ($t=1.81$, $p=0.073$)
- Regression analysis indicates that, one unit increase in Government regulation based factor will reduce the SME performance by 0.061 units ($p=0.190$).

The above results implying that, there is a weak impact of Government regulation based factor on SMEs performance in Batticaloa district. The main cause for this result could be, in the past the government involvement and contribution with SMEs in Batticaloa district is very less compared to other districts in the country due to the war and conflict in Batticaloa District. Further law and orders were not properly followed in the past and now being implemented accordingly.

Finally, study suggests looking deeply in overall strategic factor. Combination of financial, management, marketing, technological, infrastructural and government regulation based factors consider as strategic factors in this study. Chandrasri (1999) indicates, by reducing these deficiencies such as, low technology, shortage of finance, access to raw materials, inadequate infrastructure, lack of managerial skills, shortage of skilled labour and low productivity, the SME performance could be improved.

Further Ali et al. (2008), Abeyratne (2005) Gamage(2000) and Levy (1993) also confirms that the overall strategic factors are impacting the performance of SMEs.

Mean value of Overall Strategic factors indicates 4.0433 with the standard deviation of 0.3182 (p=0.000). This implies mean fall into high range. The regression analysis shows the dependent variable is explained 70.6% of independent variable and the correlation coefficient between Overall Strategic factor and SMEs

performance stand as, 0.786 (t=15.47, p=0.000). This result confirms that there is a moderately strong positive impact of strategic factors on SMEs performance in Batticaloa district.

Table 2: Correlation Summary of Hypothesis

Dimensions		SMEs performance	Decision attributes
H _{1(a)} Financial based factors	Pearson Correlation	.741**	t-statistics 13.42 and significant level 0.000 less than 0.05
	Sig. (2-tailed)	.000	
H _{1(b)} Management based factors	Pearson Correlation	.651**	t-statistics 10.43 and significant level 0.000 less than 0.05
	Sig. (2-tailed)	.000	
H _{1(c)} Marketing based factors	Pearson Correlation	.659**	t-statistics 10.66 and significant level 0.00 less than 0.05
	Sig. (2-tailed)	.000	
H _{1(d)} Technology based factors	Pearson Correlation	.311**	t-statistics 3.98 and significant level 0.000 less than 0.05
	Sig. (2-tailed)	.000	
H _{1(e)} Infrastructure based factors	Pearson Correlation	.475**	t-statistics 6.57 and significant level 0.00 less than 0.05
	Sig. (2-tailed)	.000	
H _{1(f)} Government regulation based factors	Pearson Correlation	.147	t-statistics 1.81 and significant level 0.073 greater than 0.05
	Sig. (2-tailed)	.073	
H ₁ Overall Strategic factors	Pearson Correlation	.786**	t-statistics 15.47 and significant level 0.00 less than 0.05
	Sig. (2-tailed)	0.000	

P= significance level.

Source: Developed for this study

DISCUSSION OF THE FINDINGS

Analysis of univariate descriptive, bivariate correlation and multivariate regression shows that manufacturing based SME's performance is highly positively correlated with financial based factors. Further SME's performance is moderately positively correlated with management and marketing based factors.

SME performance is weakly positively correlated with technology based factors. The reason for this result could be due to the war and conflict situation in the past in Batticaloa area and now only SME entrepreneurs are willing to adapt technology in their operations to enhance the output. This implies that SME performance is fairly positively correlated with infrastructure based factors.

Further SME's performance is weakly correlated with government regulation based factors. The main cause for this result could be, in the past the government involvement and contribution with SMEs in Batticaloa district is very less compared to other districts in the country due to the war and conflict in Batticaloa District. In addition to the above law and orders were

not properly followed in the past and now being implemented accordingly.

Finally the results of this study confirm that there is a moderately strong positive relationship between overall strategic factor and manufacturing based SME's performance in Batticaloa district.

CONCLUSION

Primarily, financial based factors discussed in this study. Financial based factors and SMEs performance having significant among them. Literature indicates, Central Bank report (1996) pointed out successful performance of SMEs depending on maintaining consistency annual growth. Levy (1993), Yapa (1999), Chandrasri (1999), Reddy (1991), and Little et al. (1987) argues, tickling the financial based factors definitely bring success to SMEs. Theories strongly suggest there is a significant positive impact of financial based factors. To find the answer for this question; "what extent financial based factor impact on SMEs performance"? Based on the result, there is a moderately strong positive impact between financial

based factor and SMEs performance in Batticaloa district.

Secondly, it is suitable to address management based factors. Accordingly management based factors having significant impact on SMEs performance. Literature indicates, Cronje et al. (2001), Mohotti (1993), Gamage (2000), Nurul et al. (2005), and Man et al. (2002) pointed out, management efficiency ensure the goal accomplishment of SMEs. This implies components of management impacting significantly on SMEs performance. In this junction study checks whether these theoretical underpinning compatible with Batticaloa district? The results revealed that, there is a moderately strong positive impact of management based factor on SMEs performance in Batticaloa district.

Thirdly, it is suit to elaborate marketing based factors. Marketing based factors playing crucial role in business arena. There is a significant impact between marketing based factors with SMEs performance. Literatures relevant to Kimura (2003) and Foley et al. (1989) indicate that, there is a significant association between Organization strategies with marketing operations this implies compatibility of marketing based factors with SMEs performance. According to the results, there is a moderately strong positive impact of Marketing based factor on SMEs performance in Batticaloa district.

Fourthly, study considers discussing on technology based factors. Technology is driving the world, in any sort of business ventures adaption of technological advances inevitable. There is a certain extent of impact of technology based factors on SMEs performance. Robertson (2003) and Chandrasri (1999) indicate, advancement of technological aspects supports to improve SMEs growth and suggest technological constraints are significant barrier faced by the developing countries that reduce the outcome of SMEs performance. This indirectly implies, successful performance of SMEs has to adapt to technology. In Batticaloa situation feedback received in this study express that there is a very weak positive impact of Technology based factor on SMEs performance in Batticaloa district. The reason for this result could be due to the war and conflict situation in the past in Batticaloa area and now only SME entrepreneurs are willing to adapt technology in their operations to enhance the output. This implies still Batticaloa SMEs has to take care on Technology based factors and further improvement is expected to survive in the competition market changes.

Fifthly, study intends to discuss on infrastructure based factors. Investors very much keenly consider infrastructure based platform before they take decision

regarding investment plan. Gamage (2000) illustrates, SMEs special features is to operate the business with less infrastructure facilities even though SMEs which are not adapting to well executed infrastructure will face difficult in the expansion phase or conversion into large scale businesses. Further, literatures in connection with Abeyratne (2005), Chandrasri (1999), Kristiansen (2003), and Huggins (2000) emphasized the importance of infrastructure facilities. Even though, in Batticaloa situation these are the feedback received that there is a fair significant positive impact of Infrastructure based factor on SMEs performance in Batticaloa district.

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Finally, study suggests looking deeply in overall strategic factor. Combination of financial, management, marketing, technological, infrastructural and government regulation based factors consider as strategic factors in this study. Chandrasri (1999) indicates, by reducing these deficiencies such as, low technology, shortage of finance, access to raw materials, inadequate infrastructure, lack of managerial skills, shortage of skilled labour and low productivity, the SME performance could be improved.

Further Muhammad Hasmat Ali (2008), Abeyratne (2005) Gamage(2000) and Levy (1993) also confirms that the overall strategic factors are impacting the performance of SMEs.

Mean value of Overall Strategic factors indicates 4.0433 with the standard deviation of 0.3182 ($p=0.000$). This implies mean fall into high range. The regression analysis shows the dependent variable is explained 70.6% of independent variable and the correlation coefficient between Overall Strategic factor and SMEs performance stand as, 0.786 ($t=15.47$, $p=0.000$). This result confirms that there is a moderately strong positive

impact of strategic factors on SMEs performance in Batticaloa district.

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ANALYSIS OF THE FOOD SECURITY STATUS OF FRUIT AND VEGETABLE MARKETERS IN IBADAN NORTH LOCAL GOVERNMENT, OYO STATE

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ABSTRACT

This study was conducted in Ibadan north local government, Oyo state. The study investigated the food security status of fruits and vegetable marketers in Bodija, Sabo, Mokola and Sango markets. A systematic sampling technique was employed to collect data from 150 marketers in the markets; 60 marketers in Bodija and thirty 30 marketers each were sampled from other markets, this is due to the population of the marketers in each market. Out of 150 questionnaire distributed, 148 were retrieved and processed. The results from the findings revealed that 63.5% of the marketers were food secure while 36.5 % were food insecure. Concerning the mean capital expenditure of the marketers, 42.6 % of the income was spent on food and 21.9% on education. Food insecurity incidence increased with increase in age of marketers (0.16 to 0.52) but decreased with increase in level of education (0.50 to 0.25). Food security incidence declined as income increases from low income group to higher income group (0.49 to 0.20). And finally food insecurity incidence increased from 0.13 to 0.65 with increase in household size. It is recommended that marketers should engage in more than one income generating activities, for financial empowerment and food security.

KEYWORDS: food security, fruit, vegetable, marketers, Ibadan

INTRODUCTION

The idea of food security was presented for the first time at the World Food Conference in 1974 viewed solely from the perspective of having adequate availability of food on a national scale. Today, it is a condition in which all people have access at all times to enough food of an adequate nutritional quality for a healthy and active life (Adegboye, 2004; Omonona and Agoi, 2007). There are four dimensions to this: (i) availability of sufficient amount of food which is a function of food production (ii) stability of supply over time which depends on the ability to preserve/store produced food and supplement available food through imports if necessary (iii) access to the available food which depends on income levels and its distribution and (iv) food utilization which encompasses procurement, ingestion and digestion all of which are dependent on nutritional quality, education and health (World Bank, 2001). Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. (FAO, 1996). This happens at both the macro and micro levels. National Food Security (NFS), the macro dimension, is possession by a nation of the capacity to procure enough food through production or imports to feed its population. This is a necessary condition but not a sufficient condition for Household Food Security and Individual Food Security

since food availability on a national scale does not preclude the lack of adequate access to such food by many of the inhabitants due to weak markets, poor infrastructure and information system, and inequality in resource and income distribution (Idachaba, 2004). Availability of food at the household level requires that food must be available either through their own-farm operations or by purchasing the food from the market. In most cases, the food produced from own-farm operation is inadequate and this makes a good marketing system very important to ensure food availability.

The problem of food security entails various elements in different countries. Such as lack of available food products, lack of food or technical ability to distribute the food, problems of availability, affordability and accessibility of food through conventional food channels. In recent times however, economic deregulations has had a serious and negative influence on the food security. Economic deregulation in Nigeria has in a very short time brought about a reduction in people income levels and to this effect, the livelihood patterns of most people have remained more deplorable (Sanusi. *et al.*, 2006). This research work was therefore designed to throw more light into the food security status of fruit and vegetable marketers in Ibadan metropolis.

The objectives were to:

- i. describe the socio- economic characteristic of the fruits and vegetable marketers in the study area.
- ii evaluate the mean per capital expenditure of the marketers..
- iii identify the food security status of the marketer in the study.

PURPOSE OF THE STUDY

Food security is jointly determined by availability of food and accessibility to the food. Availability of food is a function of food production, stock holding and food marketing (Von Braun *et al.*, 1992). Certainly by raising agricultural productivity, food availability could be increased but might not be enough. The food produced must be distributed efficiently at minimum costs in order to guarantee continuous availability of the food. This is the subject of food marketing. Babatunde and Oyatoye, (2005), observed that food marketing is a very important but rather neglected aspect of agricultural development. More emphasis is usually placed, by government on policies to increase food production with little or no consideration on how to distribute the food produced efficiently and in a manner that will enhance increased productivity. In other words, food marketing by farmers and their families, mostly in the immediate post-harvest period usually involves a lot of costs and in Nigeria these costs are so high that lowering the costs through efficient marketing system may be as important as increasing agricultural production (Ahmed and Rustagi, 1987).

A good and well-coordinated national food marketing system can affect food production and household's food security in two ways. One, it can stimulate increased commercial activities that could generate more funds for plough back investments in both agricultural and agro-allied industrial sectors (Ihimodu, 2004). The resultant increased agricultural productivity will lead to increased food production and increased food output. Secondly, it can lead to employment generation for both food distributors and rural farmers. The involvement of rural people in food marketing could uplift the rural populace standard of living and increase their personal income thereby enhancing the prospect of food security at the households, local and national levels. (FAO 2001), submitted that if available food could be evenly distributed (through efficient national and international markets), each person would be assured of 2,700 calories a day, which is the recommended daily calorie intake. However, since available food is not evenly distributed (due to marketing inefficiencies and other problems), there are shortages of food in some regions but excess in some other regions. Therefore, the issue of how much food gets to the eating table, which is fundamental in household's food security, is a function

of food production level, food marketing efficiency and the households' income level (Ladele and Ayoola, 1997).

There is a great diversity of fruits and vegetables in the tropical and sub-tropical regions of the world. In Nigeria, there is abundance of seasonal fruits which replace others as soon as these are out of season. Many Nigerian indigenous fruits and vegetables are native to different ecological zones of the country. However, some of these species have been introduced to other parts of the country. Most Nigerian indigenous vegetables are cultivated all year round especially as dry season crops with irrigation, while others which grow in the wild (Ubani and Okonkwo, 2011). Fruits and vegetables are important in both human and animal nutrition, these crops provide nutrients such as minerals, vitamins and dietary fibre which are essential for animal and human health. Some of these fruits are also rich sources of antioxidants which play a role in cancer prevention from environmental pollutants such as polycyclic aromatic hydrocarbons (PAHS) emitted from fossil fuels which are now of great concern globally (Ubani, *et al.*, 2011).

Williams, *et al.*, (2000), explained that fruits and vegetables are cultivated in Nigeria for economic purposes both in the rural and urban environments, some of the perennial fruits trees such as citrus, avocado pear, guava and others are planted as ornamental trees in homesteads. The annuals such as tomatoes, leaf vegetables, garden eggs and okra may be cultivated either as seasonal or irrigated crops. Farm and market surveys (Ubani, *et al.*, 2010) showed that the prices of these commodities are more than doubled during their off-season period. The producers and marketers hardly benefit from these price increases because of the lopsided marketing system where the collectors (middlemen) sell to retailers. In addition, economic losses experienced by farmers, middlemen and marketers are in part related to crop deterioration along the food chain, especially by inadequate storage and transportation to distant markets where fruits and vegetables would yield better economic returns. This happens particularly during the peak season of fruits and vegetables when there is glut in local markets and crops are sold at very low prices (Okonkwo, *et al.*, 2009). And the lopsidedness will invariably affect the produce prices, marketers' income and eventually their food security. With the issues of price fluctuation and low income, larger percentage of farmers and marketers live below poverty line and cannot have access to food adequately even when it is available, thus suggesting a strong linkage between poverty and food security. Gundersen, *et al.*, (2011) affirmed categorically that the primary cause of food security is low income. When

income is insufficient and limited, the households may be forced to make difficult decision that can result in a less than adequate supply of food.

METHODOLOGY

This study was conducted in Ibadan north local government, Oyo state. The study investigated the food security status of fruits and vegetable marketers in Bodija, Sabo, Mokola and Sango markets. A systematic sampling technique was employed (i.e every ith marketer in the market) to collect data from one hundred and fifty (150) marketers in the markets;

Food Security Index

$$F_i = \frac{\text{Per capital food expenditure for the } i\text{th marketer}}{2/3 \text{ mean per capital food expenditure of all marketers}}$$

Where F_i = food security index, When $F_i \geq 1$ = food secure marketer, $F_i \leq 1$ = Food insecure marketer

RESULTS AND DISCUSSION.

Socio-Economics Characteristics of the Marketers

Table 1.0 revealed that majority of the fruits and vegetable marketers were female (82%), their age fell within the age range of 51-60 years (40%), the average age was 53 years. About 42.6% of the marketers had average household size of 5 members while 39.2% had 8 household members. Thirty one percent (31.8%) of the marketers had no formal education and 36.5% stopped their schooling at primary educational level. Larger percentage (60.9%) of the marketers explained that they had 2-5 members of the household that were totally depending on them, 34.5% said they had 6-9 dependants. Concerning other income generating activities that the marketers engaged in, 40.5% of the marketers did not have any other income generating activity while 23.0% were involved in hair dressing/barbing activities, 16.2% and 12.2 % of the marketers were tailors and farmers. The finding indicated that most of the marketers were mature, poorly educated with large household size and dependants. Few of them had another sources of income which influenced their purchasing power positively and invariably influenced their food security status. This statement is confirmed by Omonona and Agoi (2007)

Expenditure Profile of the Fruits and Vegetable Marketers

The summarized expenditure profile was presented in the table 2 below. The total of the mean per capita expenditure per month was ₦30,798.61 and the average per capita expenditure on food was ₦13, 122.09 which accounted for about 42.6% of the total of the mean per capita expenditure. Expenditure on education constituted the second largest at 21.95% while other expenditures on clothing, health, electricity and water were, 8.9% 4.5%, 1.5% and 0.5% respectively. The result revealed that the fruits and vegetable marketers in

sixty(60) marketers in Bodija markets and thirty (30) marketers each were sampled from other markets, this is due to the population of the marketers in each market. Structured questionnaire were used in the collection of primary data from the sampled marketers. Out of 150 questionnaire distributed to the marketers,148 was retrieved and processed. The data from the survey were analysed and discussed. Data were analyzed using both descriptive and food security index was used to measure the food security status.

the study area spent larger percentage of their income on food and lesser on other basic amenities, they considered food very essential and important for survival. This result was in agreement with Sanusi. *et al.*, (2006) who found out that the average expenditure on food was the highest when he carried out a research on measuring household food insecurity in selected local government areas of Lagos and Ibadan.

Food Security Status

The food insecurity line was defined as two-third of the mean per capita food expenditure of the marketers studied. In the table 3 below, 63.5 percent of the marketers were food insecure while 36.5 percent were food secure. In the food secured and food insecure groups, marketers within the age range of 51-60 years constituted a relatively high percentage of the sample. In table 4, Marketers that were 51 years and above were less food secured. The food insecurity incidence increase with increase in age from 0.16 to 0.52 for marketers between 31 and 60 years. Marketers with no formal educational had higher insecurity incidence (0.56) while those with tertiary education had the lowest food insecurity incidence (0.25). The high food insecurity for the marketers with no formal education might be due to their illiteracy while the decline in food insecurity incidence for marketers with tertiary education can be explained by the influence of their educational status on occupation and income.

The table 4 also showed that the size of household influenced the food security status of the households which means that food insecurity incidence increased from 0.13 to 0.65 with increase in household size. These results are in line with the findings of Omoteso, *et al.*,(2009) and Babatunde, *et al.*, (2007). Marketers that were in low income group, for instance less than ₦20,000 had higher food insecurity incidence (0.49)

while those that earned higher income experienced lower food insecurity incidence (0.20). This implies that higher income earners are food secure, this is in

agreement with Omonona, *et al.*, (2007) work on an analysis of food security situation among Nigerian urban households: evidence from Lagos State.

Table 1.0 Socio-Economic Characteristics of the fruits and vegetable marketers

Variable	Frequency	Percentage
Age		
≤30	6	4.1
31-40	12	8.2
41-50	48	32.5
51-60	59	40.1
>60	23	15.6
Total	148	100
Household size		
1-3	7	4.7
4-6	63	42.6
7-9	58	39.2
>9	20	13.5
Total	148	100
Educational level		
No formal education	47	31.8
Primary education	54	36.5
SSCE	32	21.6
Tertiary	15	10.2
Total	148	100
Number of Dependents		
No dependent	4	2.7
2-5	87	60.9
6-9	51	34.5
>9	6	4.1
Total	148	100
Other income generating activities		
Hair dressing/barbing	34	23.0
Tailoring	24	16.2
Farming	18	12.2
Artisans	12	8.1
None	60	40.5
Total	148	100

Field Survey : 2013

Table 2.0 : Distribution of Marketers Expenditure Profile

Basic item	Mean	Percentage
Food	13122.09	42.6
Cloth	2735.81	8.9
Rent	734.12	2.4
Transportation	2196.35	7.1
Health	1375.65	4.5
Education	6761.49	22.0
Electricity	445.34	1.5
Kerosene	1483.65	4.8
Water	178.04	0.5
Remittance	1662.16	5.3
Others expenses	94.59	0.3
Gifts	9.291	0.1
Total	30798.61	100

Field Survey : 2013

Table 3.0 :Food security Status of the Marketers

Food security status	Frequency	Percentage
Food secure	54	36.5
Food insecure	94	63.5
Total	148	100

Field Survey : 2013

Table 4.0: Food security status of the marketers according to their age, educational status and household size

Variable	Food Insecure		Food Secure		Food insecurity incidence
	Freq	%.	Freq	%.	
Age					
<30	-	-	6	6.3	
31-40	2	3.7	10	10.6	0.16
41-50	15	27.8	33	35.1	0.31
51-60	25	46.3	34	36.2	0.42
>60	12	22.2	11	11.07	0.52
Total	54	100	94	100	1.41
Educational level					
No formal education.	23	42.6	23	24.5	0.56
Primary six	19	35.2	35	37.2	0.35
SSCE	8	14.8	24	25.5	0.25
Tertiary	4	7.5	12	12.7	0.25
Total	54	100	94	100	1.35
Household size					
1-4	3	5.6	20	21.3	0.13
5-8	36	66.7	62	65.9	0.36
9-12	15	27.8	8	8.5	0.65
>12	-	-	4	4.2	-
Total	54	100	94	100	1.14
Income					
< 20,000	22	40.7	23	24.4	0.49
20,001-40,000	30	55.6	52	55.3	0.37
40,001-60,000	2	3.7	8	8.5	0.20
>60,000 -	-	-	11	11.7	-
Total	54	100	94	100	1.06

Field Survey : 2013

CONCLUSION AND RECOMMENDATION

The basis of this study centered on the food security status of fruits and vegetable marketers, in Ibadan North Local Government area of Oyo state. From the empirical findings, it could be concluded that some proportion of the sampled population were not food secure. The study also established that majority of the marketers spent their income on food. The food insecurity incidence became higher with increase in age, and household size, but it declined with increase in level of education and income.

Based on the findings of the study, the following recommendations are made in an attempt to improve the food security status of households

- Since food insecurity incidence increases with increase in household size, efforts should be made at improving programmes and policies that will ensure a proper family planning which will regulate the number of child birth and invariably reduce the number of dependants.
- Marketers should be encouraged to engage in other income generating activities, in order to be more financially empowered and food secure.
- Marketers are encourage to plough their profit back into the marketing business and expand the business so that more income will be earned and consequently be more food secure
- Nutrition-oriented programmes should be organized in an attempt to improve the food security

knowledge of the marketers as educational status affects food security.

BIOGRAPHY

The author, Adetunji, Morenike Oluwatoyin is one of the senior colleagues in the department of Agricultural Economics, Ladoko Akintola University of Technology, Ogbomoso, Oyo State, Nigeria. She specializes in the field of Agricultural Marketing and Cooperation Economics. She started her career as Graduate Assistant in 1995 and rose to the rank of Professor in 2012 through the dint of her hardwork. Prof Adetunji is a passionate teacher, researcher and mentor to younger generation. She has successfully supervised the researches of over 70 undergraduates, 10 postgraduate students and she has many publications to her credits. She is currently working on value chain, price transmission and market co-integration among other things. She is happily married with children

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CAPACITY BUILDING NEEDS OF FARMERS FOR SUSTAINABLE POVERTY ALLEVIATION IN NIGER STATE, NIGERIA

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ABSTRACT

The study examined the capacity building needs of farmers for sustainable poverty alleviation in Niger State, Nigeria. To achieve the study objective, 375 respondents were randomly and proportionately selected from three Local Government Areas in the State. Validated interview schedule with reliability coefficient of 0.82 was used to collect data. Data collected were analyzed using descriptive and inferential statistics. Result of the study revealed that 56.00% of the respondents had no formal education, while crop (96.00%) and livestock farming (67.45%) were the predominant livelihood activities of the respondents for poverty alleviation. The mean annual income of the respondents was ₦152,436. Major areas of capacity building needs of the respondents for poverty alleviation include crop and livestock farming as well as sustainable fishing strategies. Socio-economic characteristics such as age ($r=0.392$), family size ($r=0.312$) and cooperative membership ($r=0.307$) had significant correlation with involvement of respondents in livelihood activities. Therefore, sensitization of farmers on diverse agricultural livelihoods was suggested to enable them obtain more opportunities for sustainable development and poverty alleviation. Also, the paper drew attention to the need to consider age, family size and cooperative membership of farmers when planning and implementing agricultural poverty alleviation programmes in the State.

KEYWORDS: farmer, livelihood, poverty alleviation, capacity building, sustainable

INTRODUCTION

Poverty is one of the most serious problems in Nigeria today. Despite the efforts of various governments from independence to date, poverty among the people has been on the increase. Available data indicated that by 1960 the poverty level in the country covers about 15 percent of the population and by 1980 it grew to 28 percent. In 1985 the poverty level was 46 percent. By 1996 the Federal Office of Statistics estimated the poverty level in Nigeria at about 66 percent (National Poverty Eradication Programme (NAPEP), 2001). In 2004 the indices of poverty in Nigeria greatly increased to 70 percent and there are a number of real indications to show that the present poverty level has gone up (Ademola *et al.*, 2011). Several reasons account for this, according to Olomola (1995) agricultural potentials are far from being fully realized and this has unpalatable implication for poverty alleviation and sustainable economic development. Unlike other sectors, agriculture plays a vital role in employment and income generation as well as in the provision of raw materials for industrial development and foreign exchange earnings. Therefore, agriculture and farmers in particular merit support for many reasons, for instance, Thirtle *et al.* (2005) and de-Janvry and Sadoulet (2010) stressed that farmers have great capacity to reduce

poverty, if they are given the necessary services and support. According to them, for each percentage growth in agricultural yield, there is 0.6% to 1.2% reduction in poverty. Also, World Bank (2007) reported that Ghana reduced poverty among rural farmers by 24% between 1990 and 2005, mainly through capacity building in form of empowerment. It is the recognition of the role agriculture can play in poverty alleviation that led to its inclusion in most poverty alleviation programmes across the States of the federation.

Notwithstanding the apparent widespread of agricultural poverty alleviation programmes in States, particularly in Niger State has not yield the desired result of sustainable poverty alleviation. United Nations (2009) indicated that world agriculture in the coming 50 years will undergo far-reaching economic and physical changes of which stress on natural resources and climate change may act as constraints to supply. Similarly, Molles (2002) pointed out that the depleted state of wild fish stocks is due to overfishing and increasing degradation of coastal, marine, freshwater ecosystems and habitats. The author further stressed that growth in human populations exert increasing pressure on natural resources, changing the ecosystem via various

developmental projects without due consideration for the natural resources sustainability. Thus, the task of sustainable development and poverty alleviation in the face of depleting resources requires capacity building whereby relevant stakeholders and organizations can strengthen, create, adapt and maintain capacity over time, with the objective of assuring sustainable growth and improving the lives of the stakeholders (Eremie, 2006; Issa *et al.*, 2010). While lending credence to this assertion, Illiyasu (2010) argued that capacity building strengthens institutions and improves access of farmers to services. The researcher further added that capacity building supported the development of environmental friendly, low-risk, low-cost technologies and management practices relevant to farmers. It is expected that capacity building will provide opportunities for farmers to acquire skills, put skills to productive use as well as develop good mental and physical abilities to give the maximum output for development and poverty alleviation on sustainable bases. It is against this background that this study was carried out to provide empirical research information on capacity building needs of farmers. This will likely result into formidable policy foundation block for sustainable poverty alleviation in the State and nation at large. The usage of the study's findings would be in the area of knowledge development and design of relevant capacity building strategy for sustainable development and poverty alleviation based on the need of the farmers. The specific objectives of the study are to:

- i. describe socio-economic characteristics of the respondents;
- ii. determine agricultural livelihood activities of the respondents for poverty alleviation;
- iii. ascertain annual income of the respondents;
- iv. identify areas of capacity building needs of respondents for sustainable poverty alleviation; and
- v. determine relationship between socio-economic characteristics of respondents and involvement in agricultural activities.

METHODOLOGY

Niger State falls within Guinea Savanna ecological zone of Nigeria. The State lies between latitudes 8^o22' and 11^o30'N and longitudes 3^o30' and 7^o20'E. Annual rainfall of the State range from 1600mm in the south to 1100mm in the north with average monthly temperature range of about 23^oC to 29^oC. The major occupation of the people is crop and livestock farming (Niger State Geographic Information System, 2007). The sample design for the study was based on the agricultural activities in the State. In line with this consideration, 3 Local Government Areas (Katcha, Wushishi and Paikoro LGAs) one from each agricultural zone in the State were randomly selected. Thereafter, 3 villages were randomly chosen from each LGA to obtain 9

villages in all. Based on the population of farmers in each village, a total of 375 respondents were proportionately sampled for the study from established sampling frame of 3750 farmers.

A validated interview schedule which was subjected to Cronbach's Alpha reliability test ($r=0.82$) was used to collect data in February, 2014 of which age and educational level were measured in years, while cooperative membership and sex were measured in dummy and household size was measured in number. Livelihood activities were determined by asking the respondents to indicate the number of agricultural activities they partake in. Annual income was measured in naira. Capacity building needs was measured by using a 4-point Likert scale of great need =4, some need=3, little need =2 and no need = 1. In calculating the capacity building needs, the values of the scale (1+2+3+4) were summed up to obtain 10. The sum was further divided by 4 to get 2.5 which is the mean. Any area of capacity building with a mean score of 2.5 and above depicts major need of capacity building and any area with mean less than 2.5 was regarded as minor need of capacity building. The data collected for objectives 1, 2, 3 and 4 were analyzed using descriptive statistics (frequency, percentage and mean) while objective 5 was achieved using inferential statistics (correlation analysis). This study was limited to only three Local Government Areas of Niger State Nigeria.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Respondents

The result in Table 1 showed that more than half (52.00%) of the respondents were within the ages of 31-40 years. This implies that the respondents are still in their active productive ages which would be instrumental to poverty alleviation and quest to build capacity. Figure in Table 1 also revealed that majority (53.34%) of the respondents had household size of 16 to 25 members. The large family size of the respondents is expected to motivate them to participate in many economic activities to alleviate poverty. In addition, Table 1 indicated that 73.87% of the respondents were male while 26.13% were female. Similarly, Table 1 revealed that 54.14% of the respondents were members of cooperative societies and the remaining 45.86% were not members. Furthermore, Table 1 showed that majority (56.00) of the respondents had no formal education. This low educational status may pose serious problems that may affect farmers' capacity building. In buttressing this point, Umar *et al.* (2009) stressed that acquisition of formal education is necessary for every person in respective of occupational profession.

Table 1: Socio-economic characteristics of respondents

Socio-economic characteristics	Frequency	Percentage
Ages(Years)		
21-30	75	20.00
31-40	195	52.00
41-50	42	11.20
51-60	36	9.60
61 and above	27	7.20
Total	375	100.00
Household size		
1-5	40	10.66
6-10	45	12.00
11-15	90	24.00
16-20	100	26.67
21-25	100	26.67
Total	375	100.00
Sex		
Male	277	73.87
Female	98	26.13
Total	375	100.00
Cooperative membership		
Yes	203	54.14
No	172	45.86
Total	375	100.00
Educational status		
No formal education	210	56.00
Primary education	90	24.00
Secondary education	55	14.67
Tertiary education	20	5.33
Total	375	100.00

Source: Field survey, 2014

Agricultural Livelihood Activities of Respondents for Poverty Alleviation

Table 2 indicated that crop sub-sector constitutes the most dominant agricultural activity of the respondents in the area for poverty alleviation. This is evidenced by the involvement of overwhelming majority (96.00%) of the respondents in crop farming. Livestock farming was next with 67.45% respondents. Moreso, 50.13% of the respondents practiced fishing in the wild rivers. In a related study, Haylor and Bland (2001) reported that integration of fisheries to other forms of livelihood in some communities in Asia resulted in income increase and better livelihood. Similarly, 41.60% of the respondents partake in animal traction business. In rural communities in Nigeria where alternative source of income generation outside farming are usually scarce, empowering more farmers to acquire traction animals would contribute to poverty alleviation in the study area. However, only 16.00%, 10.13% and 9.07% of the respondents, respectively, engaged in food processing, aquaculture and apiculture which is attributed to lack of capacity building in terms of productive asset. Consequently, the respondents are failing to utilize these agricultural opportunities to their advantage. Potentially, food processing and apiculture provides a lot of opportunities for farmers to earn a meaningful livelihood in agriculture for sustainable economic development and poverty alleviation. Thus, productive asset provision component of capacity building must be

addressed for sustainable development and poverty alleviation in the area.

Table 2: Agricultural livelihood activities of respondents for poverty alleviation

Agricultural livelihood activities*	Frequency	Percentage
Livestock farming	253	67.45
Marketing of agricultural products	124	33.07
Food processing	60	16.00
Farm labour business	136	36.27
Animal traction business	38	10.13
Aquaculture	156	41.60
Animal traction business	360	96.00
Crop farming	77	20.53
Forestry product business	34	9.07
Agro-input dealer	25	6.67
Fishing	188	50.13

Source: Field survey, 2014

*Multiple responses

Annual Income of Respondents

Table 3 showed that the annual income of 35.46% of the respondents ranged between ₦100,000 and ₦200,000, while additional 32.27% of the respondents realized between ₦201,000 and ₦300,000 as income. The mean annual income of the respondents was ₦152,436 which is an indication that majority of the respondents are low income earners. When the mean amount is converted to US dollar, it is equivalent to \$896.68 which is a pointer that most of the farmers in the study area are living below the poverty line i.e. living on less than \$2.50 a day. Capacity building in this regard should emphasis on provision of marketing information and basic infrastructural facilities such as construction of road networks and markets for easy transportation and marketing of agricultural produce from rural to urban centres to earn more income for sustainable development and poverty alleviation.

Table 3: Annual income of respondents

Income (₦)	Frequency	Percentage
≤ 100,000	85	22.67
100,000 –200,000	133	35.46
201,000 –300,000	121	32.27
Above 300,000	36	9.60
Total	375	100.00
Mean	₦152,436(\$896.68)	

Source: Field survey, 2014

Capacity Building Needs of Respondents for Sustainable Poverty Alleviation

The mean values of 3.70 and 3.34 respectively, revealed that most of the respondents are in need of capacity building in the areas of crop and livestock farming in order to increase production and alleviate poverty (Table 4). Similarly, the mean figure of 3.27 implies that the respondents are in need of capacity building on sustainable fishing strategies to reduce the overexploitation of natural stock, which the respondents stressed, is getting to its limit. These areas was followed by climate change (3.15); which suggests that the respondents are in need of capacity building on climate change adaptation strategies for sustainable production and poverty alleviation. Other areas of capacity building needs were food processing (3.03), aquaculture (2.63), sustainable forest product utilization (2.58) and apiculture (2.51). Attending to these areas of needs will go a long way in building farmers' capacity for improved production and sustainable poverty alleviation among farmers in the study area.

Table 4: Capacity building needs of respondents for sustainable poverty alleviation

Capacity building needs	Mean	Remark
Livestock farming	3.34	Major need
Food processing	3.03	Major need
Aquaculture	2.63	Major need
Crop farming	3.70	Major need
Marketing of product	1.69	Minor need
Sustainable forest product utilization	2.58	Major need
Apiculture	2.51	Major need
Animal traction business	2.26	Minor need
Climate change	3.15	Major need
Agro-input business	1.72	Minor need
Sustainable fishing strategies	3.27	Major need

Source: Field survey, 2014

Relationship between Socio-economic Characteristics of Respondents and Involvement in Agricultural Activities for Poverty Alleviation

As shown in Table 5, age (0.392), family size (0.312) and cooperative membership (0.307) had significant correlation with involvement of respondents in agricultural activities; indicating that one unit increase in these socio-economic variables will lead to involvement of farmers in more agricultural activities in order to alleviate poverty. Involvement of farmers in social organizations especially cooperative societies could enhance reception of government assistance in form of loans, subsidies and other services. It also provide forum for capacity building. In an earlier study, Olomola (1995) reported that one of the most important factors determining the level of involvement of farmers in agricultural livelihood activities is the size of family.

Table 5: Relationship between socio-economic characteristics of respondents and involvement in agricultural activities for poverty alleviation

Socio-economic characteristics	Correlation values
Age	0.392*
Family size	0.312*
Sex	0.189 ^{ns}
Cooperative membership	0.307*
Educational status	0.0.182 ^{ns}

Source: Computed from field survey data, 2014

*Significant at 5%

ns Not significant

CONCLUSION

Based on the findings, it was concluded that crop and livestock farming was the common livelihood activities of the respondents for poverty alleviation. The annual mean income from livelihood activities of the respondents was ₦152,436. While major areas of capacity building needs of the respondents for sustainable poverty alleviation include crop, livestock and fish farming. Age, family size and cooperative membership had correlation with involvement of respondents in livelihood activities.

RECOMMENDATIONS

Sensitization of farmers on diverse livelihood activities should be carried out to enable them obtain more opportunities for sustainable development and poverty alleviation. Specifically, more emphasis should be given to food processing, aquaculture and apiculture.

Finding revealed that animal traction business is an alternative source of income generation for poverty alleviation. Thus, farmers should be empowered. This could come in form of loans through the State's Poverty Alleviation Programme. To facilitate this, farmers should be encouraged to form viable association through which traction animals could be made available. Capacity building strategy in the area of crop and livestock farming would involve provision of improved crop varieties and animal breeds. To enhance farmers' access to improved crop varieties, communities and associations should be encouraged to establish their own seed farms while the government offers them the necessary technical support.

Education and information dissemination is crucial to sustainable development. Therefore, capacity building strategy for fishing should focus on creating awareness on sustainable fishing strategies such as none use of explosives, poisons and compliance with gear control, declaration of fish catch and closed area/season regulations. Also, marketing information and skills needed for aquaculture, fisheries, forest product utilization and climate change management should be disseminated. This could be achieved through

demonstration by skilled extension workers who should pay on-farm visit to the farmers regularly.

To build farmers capacity for more productivity for sustainable development and poverty alleviation in the area, government, non-governmental organisations and even patriotic citizens should embark on provision of relevant productive assets and infrastructural facilities. Given the poverty level of the farmers, the productive assets and technologies should be provided as loans at highly subsidized prices.

Finally, age, family size and cooperative membership of the farmers should be considered when planning and implementing any agricultural poverty alleviation programme in the State.

BIOGRAPHY

The lead author was born in 1972 in Niger State, Nigeria. He obtained first, second and third degrees in 1997, 2006 and 2013, respectively in Agricultural Extension and Rural Development. Since 2001, he has been teaching in Federal University of Technology Minna, Niger State, Nigeria. He is married with children.

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EFFECTS OF CREDIT ACCESSIBILITY ON PERFORMANCE OF TOMATO MARKET IN OSUN STATE, NIGERIA

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ABSTRACT

This study evaluates the effects of accessibility to credit on tomato market performance in Osun State, Nigeria. A multi-stage sampling method was employed to select one hundred and sixty (160) tomato marketers in the study area. A well structured interview schedule was designed to collect necessary data for this study. The descriptive, budgetary and logit regression analyses were carried out on data obtained. The study found that 88.8% of the respondents were female, the average age was 43.05 years, and 71.3% were married with average household size of 6.16 members. Result of analysis also revealed that 67.5% received formal education with an average of 9.81 years of schooling. On the average, respondents claimed 16.05 years of marketing experience. Only 37.5% of them claimed to have access to credit and the average amount of credit obtained within the last one year was found to be ₦21,262.50. Transportation and finance were the most common challenges faced by tomato marketers in the study area. Result of logit regression analysis suggests that small scale tomato marketers are not likely to have access to credit. The result of OLS regression analysis indicated that amount of credit obtained by respondents and quantities of tomato sold per week have positive effects on marketing efficiency. The study recommends that tomato marketers should form cooperative groups/societies through which financial and transportation needs of members could be met. This will lead to sustainable development and poverty alleviation among produce marketers.

KEYWORDS: credit, tomato, marketing efficiency, logit model

Tomato is a highly nutritious food ingredient used in the preparation of many foods. Tomato is virtually used by every tribe in Nigeria. As an important source of minerals, vitamins and health acids, tomato (*Lycopersicon esculentum* Mill) is one of the most important vegetable crops of solanaceae grown universally with the production of 124.75 million tons (FAO, 2007). Tomatoes are nutritious and low in calories. One medium-sized tomato provides 57% of the Recommended Daily Allotment (RDA) of Vitamin C, 25% RDA of Vitamin A and 8% RDA of Iron yet it has only 35 calories. Tomatoes are available in a wide variety of shapes, sizes and colours. While red tomatoes are the most common, yellow, orange and pink tomatoes are sometimes grown. Tomatoes may be round, slightly flattened or pear-like in shape. Sizes range from the bite size cherry types to the giant beef steak tomatoes. Besides being eaten fresh, the versatile tomato can be used in soups, salads and sauces (Lerner, 2001). Onion, tomato and chilies are most common and important kitchen items cooked as vegetables, used as condiments and salad. The consumption of tomato and onion has high income elasticity of demand. Thus, there will be more demand for these vegetables with population growth, economic growth, and urbanization (Fateh, 2009). The problems militating against tomato production and marketing were identified to be high cost of fertilizer, pest and disease problems, and

inefficient transportation network resulting in spoilage of output and inadequate credit facilities (Afolami and Ayinde, 2002).

Marketing is one of the vital aspects of agriculture since agriculture entails the production of goods and services, and production is said not be completed until the commodity produced reaches the final consumer. Hence, there is need for efficient marketing channel and system. Aminu (2009) pointed out that in a typical vegetable marketing, retailers were observed to sell both tomato and onion at the same time in addition to other vegetables like hot pepper, sweet pepper, cabbage, salad and in some cases chilies pepper. Tomato marketing is characterized mainly by the problem of seasonality and perishability amongst others. Market performance is how well process of marketing is carried out and how successful its aims are accomplished. Specifically, market performance is concerned with technological progressiveness, growth orientation of agricultural firms, efficiency of resources use, as well as product improvement and maximum market service at the least possible costs (Adegeye and Dittoh, 1985). Marketing efficiency is a measure of market performance and is defined as the movement of crops and livestock from the producers to consumers at the lowest cost consistent with the provision of the services desired by consumers. Dittoh (1994) opined that in the past the federal, state

and local government of Nigeria paid little attention to the marketing of vegetables such as pepper, tomato, onions, garden eggs, okra and leafy vegetables despite the fact that they need spatial marketing facilities. The losses are accentuated by improper packaging and handling. Losses of 40-50 percent occur for many fruits and vegetables in the marketing system because of spoilage from poor handling, inadequate transportation, and lack of cooling facilities.

Agricultural activity is a major contributor to Nigeria's GDP and small-scale farmers, processors and marketers play dominant roles in this contribution but their productivity, efficiency and growth are hindered by limited access to credit facilities. Credit institutions can be categorized into three groups. The first one is regarded as formal, such as commercial banks, microfinance banks, the Nigeria Agricultural and Cooperative Rural Development Bank (NACRDB), and state government-owned credit institutions. The second is semiformal, such as nongovernmental organizations-microfinance institutions (NGO-MFIs) and cooperative societies. The third is informal, such as money lenders, and rotating savings and credit associations (RoSCAs). Enhancing Financial Innovation and Access EFINA (2008) noted that 23 percent of the adult population in Nigeria has access to formal financial institutions, 24 percent to informal financial services, while 53 percent are financially excluded (Badiru, 2010). The rural financial market in Nigeria covers the formal banks, credit unions, non-governmental institutions, self-help groups and private lenders. They advance credit and render other financial assistance or services (CBN, 1999).

Micro-credit is helpful as it creates scope for further investment and helps the poor and lower income group to get funds for their business. Micro-credit or known as micro-lending is defined as an extremely small loan given to impoverished people to help them become self-employed. Micro-credit was given to the poor individuals for income generating activities that will improve the borrower's living standards. The loan characteristics are too small, short-term (a year or less), no collateral required, weekly repayment, poor borrowers and mostly those that are not qualified for a conventional bank loan (Sharrif & Nawai, 2010). For agricultural practice to be meaningful, one of the enabling factors is addressed by availability of adequate credit to finance agricultural production. The agricultural lending market in any country is made up of the participating financial institutions and units that can effectively lend resources to facilitate the production and marketing of farm produce, crops and livestock (Adetiloye, 2012). The lack of bank accounts, collateral, and information regarding the procedure for accessing

credits from banks limit rural people's access to credit from formal institutions. Loan default could limit access to credit and the complex mechanism of commercial banking is least understood by the small-scale farmers, and thus limits their access. The limitations on imperfect and costly information problems encountered in the financial markets, credit rationing policy and banks' perception of agricultural credit as a highly risky venture; while high interest rate and the short-term nature of loans with fixed repayment periods do not suit annual cropping, and thus constitute a hindrance to credit access. The location of banks in urban centers is also a limiting factor. Financial lending Institutions in Nigeria often shy away from giving loans to farming households because of the high cost of administering such loans and the perceived high default rates among farming households (Badiru, 2010).

The low level of marketing agricultural products and development in Nigeria had been attributed to many factors. Principal among these factors is the dearth of funds with which to finance marketing activities. In spite of the sustainability of climatic conditions for agriculture in Nigeria, the level of agricultural production and marketing is still very low. Lack of access to credit has plagued marketers for many years. Farmers and marketers need credit to allow investments in their small businesses to increase production and reduce their vulnerability to weather and economic stock. Because they have little access to formal financing institutions, people follow sub-optimal risk and consumption strategies and rely on costly informal credit sources (Majolagbe, 2005). In the light of the above, it is very crucial to conduct a study to survey the accessibility of tomato marketers to credit. The general objective is to examine the effects of accessibility to credit on tomato marketers' performance in Osun State of Nigeria. The specific objectives of the study are to describe the socio-economic characteristics of tomato marketers in the study area, identify the sources and characteristics of credit available to the marketers in the study area, investigate the factors affecting access of tomato marketers to credit in the study area, estimate the cost and returns to tomato marketing in the study area and examine the challenges faced by tomato marketers in the study area. Two hypotheses were tested. The first one estimated relationship between selected socio-economic characteristics of respondents and access to credit, while the second estimated relationship between socio-economic characteristics and marketing efficiency of respondents.

METHODOLOGY

This study was carried out in Osun State of Nigeria. The capital is Osogbo. The state which is made up of 30 local government areas lies between longitude 4^o and 6^o

East of the Greenwich Meridian, latitude 5⁰ and 8⁰ North of the equator. This means that the state lies entirely in the tropics. The state is bounded in the West by Oyo State, in the North by Kwara State, in the East by Ondo State and in the South by Ogun State. The tropical nature of the climate favours the growth of a variety of food and cash crops. The main cash crops include cocoa, palm produce, kola, while food crops include yam, maize, cassava, millet, rice, plantain and vegetables (Wikipedia, 2013). The climate is tropical with two distinct seasons. Usually the wet season lasts between March and October, while the dry season comes between November and February. Mean annual rainfall is between 2,000 and 2,200mm. Maximum temperature is 32.5⁰C while the relative humidity is 79.90percent. The state has been divided under Osun State Agricultural Development Projects (OSSADEP) into three (3) agricultural zones and twenty five (25) blocks. These are Oshogbo (6 blocks), Ife/Ijesha (12 blocks) and Iwo (7 blocks).

Primary data was used for this study. The instrument used for data collection was a structured interview schedule based on the study's objectives. A multi-stage sampling technique was used to select 160 tomato marketers in the study area. In the first stage two (2) agricultural zones were selected based on the type of crops grown. These are Oshogbo and Iwo zones. In the second stage, two markets (one from each zone) were purposively selected because of high concentration of tomato marketers. In the third stage, the tomato marketer's stalls were numbered in each market and every marketer that falls to an even number was interviewed. Analytical techniques used include descriptive, budgetary, logit and OLS regression analyses. Socio economic characteristics, marketing activities and challenges were discussed using descriptive analysis (mean, frequency and percentages) budgetary analysis investigated cost and returns to tomato marketing. Logit regression revealed the determinants of accessibility to credit while the OLS regression analysis showed the relationship between the socio-economic characteristics of respondents and

- X₁ = Age (Years)
- X₂ = Household size (Actual number)
- X₃ = Formal Education (Years)
- X₄ = Sex (Female = 1, Male = 0)

Regression Model was used to find the relationship between marketing efficiency and amount of credit obtained. The model was specified as: $Y = f(x_1, x_2, x_3, x_4, x_5, \epsilon)$ ----- (10)

Where Y = Marketing Efficiency

- X₁ = Formal education (Years)
- X₂ = Tomato marketing experience (Years)
- X₃ = Amount of credit obtained (#)

marketing efficiency (performance) of respondents. The budgetary analysis was carried out as follows:

Gross Margin (GM)

$$= \text{Total Revenue (TR)} - \text{Total Variable Cost (TVC)} \quad (1)$$

$$\text{Where: TR} = \text{Quantity sold} \times \text{Selling price} \quad (2)$$

$$\text{TVC} = \text{Purchase Cost} + \text{transport} + \text{storage} + \text{packaging materials} + \text{labour} \quad (3)$$

$$\text{Net Profit } (\pi) = \text{GM} - \text{Depreciated Fixed Cost (DFC)} \quad (4)$$

Fixed cost items include containers used for selling, tables, chairs, rent, and trade union dues.

$$\text{Benefit Cost Ratio (BCR)} = \frac{\sum \text{Total Revenue}}{\sum \text{Total Cost}} \quad (5)$$

$$\text{Where} = \text{Total Cost (TC)} = \text{TVC} + \text{DFC} \quad (6)$$

When BCR is > 1, the business is profitable; otherwise the business is not profitable

Marketing Efficiency: This is a measure of the market performance. Marketing efficiency (M.E.) is computed as: $\text{M.E.} = \frac{\text{Value added by marketing}}{\text{Cost of marketing}} \times 100 \quad (7)$

Value added by marketing is computed as Price (in #) received by the respondent marketer less the price received by the preceding marketer in the marketing chain.

Therefore: $\text{M.E.} =$

$$\frac{\text{Total revenue (\#)} - \text{purchase cost (\#)}}{\text{Total cost of marketing (\#)}} \times 100 \quad (8)$$

The Logit Model (Inferential statistics) was employed to establish relationship between selected socio-economic characteristics of respondents and accessibility to credit. The logit model takes the following functional form: $y_i = x_i \beta + \epsilon_i \quad (9)$

Where y = 1 for accessibility or y = 0 for non-accessibility to credit. The variable y_i is the observed contingent valuation bid by individual I, y_i is a latent measure, and x_i denotes the independent variables. β is a vector of parameters and ε_i the error term distributed as independent normal with zero mean and constant variance (0²). The explanatory variables in the regression model are a set of variables dealing with socio-economic characteristics. The model was specified as:

$$Y = \text{Access (1) No access (0)}$$

$$X_5 = \text{Tomato marketing experience (Years)}$$

$$X_6 = \text{Quantity sold per week (baskets)}$$

$$\epsilon = \text{Error term}$$

$$X_4 = \text{Quantity sold per week (baskets)}$$

$$X_5 = \text{Source of Credit (Formal 1, Informal 0)}$$

$$\epsilon = \text{Error term}$$

PRESENTATION AND DISCUSSION OF RESULT Socioeconomic Characteristics of Respondents

Result of data analysis as presented in Table 1 indicated that 37.5% were between 31-40 years while 6.3% were above 60 years of age. The mean age was found to be 43.05 years which implies that they are still very agile and active to effectively perform tomato marketing activities in the study area. Analysis revealed that 11.2% of the respondents were male while 88.8% were female, implying that more female engaged in tomato marketing than the male gender. Many (71.3%) were married while 13.8% claimed to be divorced. Averagely the household size of respondents was 6.16 which is an indication of fairly large household size, which could suggest an advantage of family labour supply for tomato marketing activities. Result of analysis also revealed that 67.5% received formal education with an average of 9.81 years of schooling. Half of the respondents (50.0%) claimed to be Christians while 48.8% were Muslims. This implies that there is no religion barrier to the enterprise in the study area. The average years of experience in tomato marketing was found to be 16.50 which could be an advantage to expertise.

Credit Related Practices and Experience of Respondents

Result of data analysis as presented in Table 2 revealed that 37.5% of the respondents claimed to have access to credit while 62.5% claimed that they did not. This finding implies that not many of the respondents have access to credit facilities to finance tomato marketing activities in the study area. The study showed that 13.8% of the respondents got credit from friends/relatives, 21.3% from microfinance banks while 2.5% got from cooperative societies. Result as presented on the table also indicated that only 13.8% did not have to present collateral for the money borrowed. This implies that most credit source will require the presentation of collateral securities before procurement. It was revealed that 12.5% claimed an affiliation of above 5 years with the credit source. The mean amount of credit applied for was found to be ₦22,375.00 while the average amount of credit actually obtained was found to be ₦21,262.50.

Table1: Socio-Economic Characteristics Distribution of Tomato Marketers, n=160

Variable	Frequency	Percentage
Age		
≤30	18	11.3
31-40	60	37.5
41-50	50	31.3
51-60	22	13.8
>60	10	6.3
Sex		
Male	18	11.2
Female	142	88.8
Household size		
≤3	14	8.8
4-6	92	57.5
7-9	40	25.0
>9	14	8.8
Marital status		
Single	18	11.3
Married	114	71.3
Divorced	22	13.8
Separated	6	3.8
Religion		
Islam	78	4.8
Christianity	80	50.0
Traditional	2	1.3
Educational status		
No formal education	52	32.5
Adult education	2	1.3
Primary education	44	27.5
Secondary education	62	38.8
Years spent in school		
0	52	32.5
≤6	46	28.8
7-9	38	12.8
10-12	20	12.5
>12	4	2.5
Years of experience		
≤10	62	38.8
11-20	54	33.8
21-30	36	22.5
31-40	6	3.8
>40	2	1.3

Source: Field Survey, 2014

Table2: Credit Related Practices and Experience of Respondents, n=160

Variable	Frequency	Percentage
Access to Credit		
Yes	60	37.5
No	100	62.5
Sources of Credit		
*Not Applicable	100	62.5
Friends/relatives	22	13.8
Microfinance bank	34	21.3
Cooperative society	4	2.5
Collateral Requirement		
*Not Applicable	100	62.5
Yes	38	23.8
No	22	13.8
Affiliation with Credit Source (years)		
*Not Applicable	100	62.5
≤1	12	7.5
2-3	20	12.5
4-5	8	5.0
>5	20	12.5

Amount of Credit Requested		
*Not Applicable	100	62.5
≤10000	6	3.8
10001-20000	10	6.3
20001-30000	2	1.3
30001-40000	10	6.3
40001-50000	22	13.8
>50000	10	6.3
Amount of Credit Obtained		
*Not Applicable	00	62.5
≤10000	8	5.0
10001-20000	12	7.5
20001-30000	2	1.3
30001-40000	10	6.3
40001-50000	20	12.5
>50000	8	5.0

* Not Applicable group are those that have no access to credit

Source: Field Survey, 2014

Marketing Practices and Experience

Result of data analysis as presented in Table 3 showed that 75.0% of respondents indicated personal savings as major source of financing tomato marketing activities, 22.5% endorsed friends/relatives while 2.5% claimed cooperative societies. This therefore revealed clearly that most of tomato marketers in the study area depend on personal savings to finance the enterprise. Result further showed that 67.5% stock up tomatoes on daily basis, 16.3% claimed to stock up twice in a week while 5.0% stock up only once in a week. Findings indicated that baskets were the most common measure of selling tomatoes in the study area, and that respondents sold an average of 15.51 baskets per week. Finally, data analysis revealed that households constitute the major consumers of tomatoes in the study area.

Budgetary Analysis and Marketing Efficiency Computation

Table 4 gives a summary of tomato marketers' cost and returns analysis in the study area. The benefit cost ratio was found to be 1.53 which is an indicator that the enterprise is profitable. Marketing efficiency computation revealed that on the average, tomato marketers were 67.9% efficient in the study area. As discussed earlier, marketing efficiency is a measure of market performance and is defined as the movement of crops and livestock from the producers to consumers at the lowest cost consistent with the provision of the services desired by consumers. Considering this result, there is obviously the need for improvement.

Marketing Efficiency =

$$\frac{\text{Total revenue (\#)} - \text{purchase cost (\#)}}{\text{Total cost of marketing (\#)}} \times 100$$

$$= \frac{\#9,310.63 - \#5,161.66}{\#6,101.43} \times 100$$

$$= 67.9\%$$

Table 3: Marketing Practices and Experience, n=160

Variable	Frequency	Percentage
Major Source of Finance		
Personal savings	120	75.0
Relatives/friends	36	22.5
Cooperative society	4	2.5
Frequency of Stocking Tomatoes		
Once in a week	8	5.0
Twice in a week	26	16.3
Everyday	108	67.5
Not regular (as the needs arise)	18	11.3
Quantity sold per week (baskets)		
≤5	14	8.8
6-10	30	18.8
11-15	28	17.5
16-20	54	33.8
21-25	34	21.3
*Measure of Sales		
Plates	132	82.5
Buckets	120	75.0
Baskets	142	88.8
*Type of Customers		
Households	138	86.3
Fast food firms/ restaurants	136	85.0
Local food vendors	122	76.3

*Multiple responses

Source: Field Survey, 2014

Table 4: Summary of Budgetary Analysis Result (Based On Weekly Activities of Respondents)

Variables	Amount (₦)
Total revenue	9,310.63
Total variable cost	6,002.47
Depreciated fixed cost	98.96
Gross margin	3,308.16
*Gross margin per basket	213.29
Profit generated	3,209.20
*Profit generated per basket	206.91
Benefit Cost Ratio (BCR)	1.53

*Average number of tomato baskets sold per week is 15.51

Source: Field survey, 2014

Challenges Encountered in Tomato Marketing

Table 5 indicated that 95.0% experienced transportation challenge, closely followed by financial challenge (93.8%) in the study area. Next to these were rapid deterioration in tomato quality (90.0%) and frequent fluctuation in market price of tomato (78.8%).

Table 5: Distribution of the Respondents by Challenges Encountered, n=160

Challenges Encountered	*Frequency	Percentage
Transportation	152	95.0
Price fluctuation	126	78.8
Inadequate supply	64	40.0
Low demand	40	25.0
Rapid deterioration in quality	144	90.0
Poor marketing information	48	30.0
Finance	150	93.8

* Multiple responses

Source: Field survey, 2014

Result of Logit Regression Analysis

The logit regression analysis identified variables influencing accessibility to credit among tomato marketers in the study area. Result obtained revealed that quantity of tomato sold per week was significantly related with access to credit. The relationship was positive and significant at 5% level. The positive relationship is an indicator that as quantity of tomato sold per week increases, the tendency to secure credit also increases. This implies that lending institutions consider business volume of applicants when making decisions to grant applicants' request or otherwise. This result suggests that small scale tomato marketers are less likely to have access to credit in the study area.

Table 6: Result of Logit Analysis

Variable	Coefficient	S.E	P value	-
Constant	-1.691	1.516	0.265	
Age	0.034	0.036	0.343	
Household size	0.040	0.163	0.808	
Years of schooling	-0.120	0.115	0.300	
Sex	-1.653	1.144	0.148	
Years of experience in business	-0.039	0.040	0.335	
Quantity of tomato sold per week	0.090	0.402	0.034**	

** Significant at 5% level

Source: Data Analysis, 2014.

The Multiple Regression Analysis

The Adjusted R² for the relationship was 0.703 meaning that the explanatory variables had 70.3% decisive influence on the dependent variable. The F value was 38.420 and significant at 1%. The result of linear regression analysis indicated that amount of credit obtained (t = 2.334**) and quantity of tomato sold per week (t =13.440**) significantly influence marketing efficiency in the study area. The amount of credit obtained is positive and significant at 5%, indicating that an increase in the amount of credit obtained increases the efficiency of tomato marketers in the study area. Quantity of tomato sold per week is also positive and significant at 1%, implying that increase in business volume increases the efficiency of marketers. Operating on a larger scale will grant the marketers the advantage of reduction in average marketing cost, thereby having a positive effect on the marketing efficiency.

Table 7: Result of Regression Analysis Showing the Relationship between Selected Respondents' Socio-economic Characteristics and Marketing Efficiency, n=160

Variable	t-value	Decision
Constant	0.832	-
Years spent in school	-0.172	Not significant
Years of experience in business	-1.511	Not significant
Amount of credit obtained (#)	2.334**	Significant
Quantity of tomato sold per week	13.440***	Significant
Source of Credit	1.295	Not significant

Adjusted R² = 0.703

F value = 38.40***

** Significant at 5 % level

***Significant at 1 % level

Source: Data Analysis, 2014.

CONCLUSION AND RECOMMENDATION

Based on the finding that access to credit has significant effect on marketing efficiency, and that the most severe challenges faced by the respondents were transportation and finance related, the following recommendations were made: Tomato marketers should form cooperative groups/societies through which members can have access to low interest and timely credit to finance their tomato marketing activities. This action will ease finance related challenges. The marketers should make sure that credit obtained from such groups are used only for tomato marketing activities and not diverted to other purposes. The groups/societies could also arrange for bulk transportation of members' goods. This will ease transport related challenges and also reduce transport cost per head. All these will lead to sustainable development and poverty alleviation among produce marketers

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LOCAL SUSTAINABLE DEVELOPMENT: GUIDELINES OF LOCAL AGENDA21

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ABSTRACT

Evidence suggests that a growing number of countries worldwide are becoming more environmentally aware in terms of adopting SD. Many countries are focusing on bottom-up methodology in targeting SD by forming LA21. However, less attention has been given to the area of Local Sustainable Development (LSD) in the Arab countries. The study identified the challenges and potentials facing the Arab states in LA21 activation using SWOT analysis. Additionally the study tested the local communities' readiness to apply bottom-up SD in Egypt, by adopting (Lack-Gap-Mismatch: LGM). The paper concluded some policies to help Arab countries building their national capacities in a participatory approach at all levels; Economics, Business and Management in order to move forward such as; Launching a national campaign for LA21, enhancing decentralization, working on capacity building and proper identification of SD, more engagement in the international organizations concerned with SD and LSD, to take advantage of their financial and technical support, adopting decentralized environmental management, provision of adequate data and information with complete transparency, more vertical and horizontal communication in the governments and supporting the role of education in changing attitude and behavior of Arab citizens regarding participation. The Egyptian case showed some internal strength points would make it possible to develop LA21 for Egypt if the prerequisites are fulfilled, through applying three categories of actions; Exogenous to local authority, within the interaction between local authority & local citizens and Internal to the local authority. Furthermore, the study presented a simple and primarily LA21 toolkit for a local authority to develop its LA21

KEYWORDS: sustainable development, local sustainable development, Egypt, local agenda21, Arab countries

INTRODCUTION

The last three decades have witnessed a progressive worldwide increase concerning sustainable Development (SD) consciousness. This was due to changing the approach of tackling economic, social and environmental problems from being separated to being integrated. In 1992, the United Nations (UN) has held its conference on Environment and Development (UNCED). This so called Earth Summit has released a groundbreaking action plan for SD called (Agenda 21), to be considered a blue print for actions needed to achieve global sustainability in the 21st century. The gathered governments' leaders recognized that most of the environmental challenges have roots in local activities. Moreover, local authorities with their proximity to citizens would be the best in mobilizing people for more sustainable lifestyles. Therefore, they included chapter 28 of Agenda 21 as a special mandate describing the important role of local authorities in facing these challenges. This chapter was then named local Agenda 21(LA21). In this context, local authorities are called to enter into a dialogue with their citizens, local organizations, and private enterprises to adopt LA21, which translates the principles of SD into strategies that are meaningful for local communities. Such compound involvement of all stakeholders is concerned with all kinds of local investments that are

economically accepted by investors; do not overburden the capacity of the local eco-system and in line with local needs and population growth. Thus, within 1992 Earth Summit, the leitmotif was to advance policies towards sustainability. A decade later, challenges have multiplied, but yet very little success can be traced (Jacobi, 2002). By year 2002, 113 countries worldwide have been formally committed with 6,416 LA21 for their municipalities (ICLEI, 2002).

Sixteen Arab states have committed themselves to a total of forty-one LA21 (ICLEI, 2002). However, none of them have taken serious steps beyond this commitment. On its way to further development, Egypt is facing profound sustainability challenges that will influence its ability to achieve lasting economic, social and environmental goals for its people and future generations. Environmental Performance Index (EPI) 2010 ranked Egypt number 68 from 163 countries worldwide.

Egyptian environmental policy for a long time has been reactive rather than proactive, pragmatic and uncoordinated¹ (Tantawi, O'Shaughnessy, Gad, & Ragheb, Green Consciousness of Consumers in a Developing Country: A Study of Egyptian Consumers,

2009). Consequently, these challenges cannot be solved with old policies and traditional strategies. Over the last two decades, Egypt ascertained its interest in SD approach in the international forums, by attending the Earth summit in 1992, and adopting its own country profile for Agenda 21 in 2002 according to the UN context incorporating complete support for LA21 initiatives. Moreover, Egypt has enacted and issued number of policies, legislations and laws in the context of regulating and governing the development process in many areas related to SD. Many SD activities are undertaken on the Egyptian local level led by Non-Government Organizations (NGOs) or Business sector (CSR). Therefore, Egyptian LA21 can and should build, on existing policies and partnerships and provide a framework for changes in attitudes and in practices, which can help move society towards SD. It can help local authorities to draw together their various commitments towards a more sustainable society in the long-term. Given that it is a long-term process, it can also be useful to consider short-term goals to maintain interest and momentum.

Evidence suggests that a growing number of countries worldwide are becoming more environmentally aware in terms of adopting SD by integrating the environmental dimension along with both economic and social dimensions in formulating their development plan. Moreover, many countries are focusing on bottom-up methodology in targeting SD by forming LA21. However, less attention has been given to the area of Local Sustainable Development (LSD) in the Arab countries. The objectives of this study are; to identify the challenges and potentials facing the Arab states in LA21 activation, **the paper is testing the following hypothesis:** there is a possibility to apply LA21 for Egyptian municipalities. By that, the study is testing the local communities' readiness to apply bottom-up SD in Egypt.

In order to reach the paper's objectives, **analytical approach** is adopted to analyze the need towards localizing SD, and the global trend towards forming LA21. SWOT analysis used to identify Strengths, Weaknesses, opportunities and Threats facing Arab states regarding SD and LA21. For testing the paper's hypothesis, the study pursues (Lack-Gap-Mismatch: LGM) analysis to evaluate the Egyptian situation and chances for LA21.

The **significance** of this study arises from filling in the knowledge gap between theory and practice of Local Sustainable Development along with the specificity and realities of Middle Eastern countries. The results will identify and divide the roles between stakeholders in the society. Additionally will inform decision and policy

makers in the Arab world about the reasons and obstacles of lagging behind the rest of the world in applying their signed LA21 agreement. Accordingly, **The findings will** identify proper policies to help Arab countries building their national capacities in a participatory approach at all levels; Economics, Business and Management in order to move forward in an efficient way. **Moreover**, the paper's results of the Egyptian case will help the policy makers identifying the prerequisites needed for effective application of signed LA21 in Egypt.

Localizing Sustainable Development

Over the next coming 2 decades the urban population of developing countries is expected to increaseⁱⁱ by 60 million people every year (WB, 2003). Many problems are expected to aggravate in form of "congestion costs"ⁱⁱⁱ, leading to spread of informal sector^{iv} and lower material live. Eventually, this would threaten the chances of sustainability at the end. Hence, new key functions are needed to protect sustainability; local level seems to be the right scale to coordinate and encourage SD activities at the community level and would give the required support to SD on the national level. Evolving into LSD requires explicit recognition that things change at different times and at different rates, and will in some way affect all three elements mentioned above^v. Much of the future local problems could be mitigated at lower costs when they are recognized sooner not later. Thus, LSD as a goal must be approached in a flexible and dynamic manner to account for variations in circumstances and improved knowledge. Decision-makers and managers must try things that make sense on basic principles, then monitor progress and adjust activities based on what works (Beratan & Brown, 2001).

Many LSD practices are observed around the world. Some of them are under NGOs leadership; others are led by individual businesses in the form of CSR projects, while local authorities or central governments usually lead environmental projects. Even though these are considered good practices, the most successful experiences were those in which a broadly inclusive consultation process was developed. This was through involving all key stakeholders and providing an efficient and equitable means of reconciling conflicting or competing interests (Jacobi, 2002). This process stimulates more cooperation among the relevant actors; community organizations, NGOs and government agencies. Moreover, it is not advisable to focus on particular projects without creating a strategic basis for SD. Effective SD cannot be achieved through individual projects; it has to be embedded into a comprehensive sustainability strategy which forms a joint perspective of stakeholders (GTZ, 2008).

It worth saying, that many of the local problems affecting low-income populations at most, those tend to be the most deprived and, so, the most dependent on implementation of public policies. In these regards, LA21 acts as a lengthy action plan on a wide range of these local problems linking environment, human well-being, development, and social equity (Jacobi, 2002). LA21 presents a new collaborative governance (institutional framework) to apply SD at the local level. This new institutional framework would allow the old model of policy "Father State" and the following model "Entrepreneur State" both to retire, and give the chance to animate the new community between state and society (Glück, 2004).

The term Local Agenda 21 (LA21) was used to describe the strategic approach of sustainable development at the local level^{vi}. It was first defined in **Agenda 21(A21)**, the global blueprint for sustainability that was agreed at the UNCED in 1992. **A21** is based upon four pillars which could facilitate a move to SD. These pillars are; Social, Economic, Institutional and Environmental. A21 addresses all levels of governance including international relations between governments, national sustainability concerns, regional sustainability and local sustainability (Towards Sustainable Local Communities:Guidelines on LA21, 2001). **A21** aims at; reducing the amount of energy and raw materials society consumes, as well as the pollution and waste it produce, protecting fragile ecosystems and environments, fairer distribution of wealth both between countries and between different social groups within countries, with particular emphasis on the rights of poor and disadvantaged people^{vii}.

A21 contains 42 chapters, where Chapter 28^{viii} seeks to engage local authorities in the creation of sustainable development models in their areas. It is an effort from the UN to define a clear role for local authorities in what is a complex policy arena.

LA21 means nothing unless it is based upon a process, which facilitates sustainable development within a municipality. It is a strategic approach based upon collaboration and participation, aiming to support the community to integrate environmental, economic and social development in a long term strategic action plan that integrates existing policies and programs, along with respecting needs of the present and future citizens of a community in all its diversity (ICLEI web-homepage)^{ix}.

LA21 process involves the targeted community, focuses on the strategic needs of the community and seeks to balance the competing demands of development and environmental protection and should try obtaining a reasonable balance among the present community life and the future community (Towards Sustainable Local Communities:Guidelines on LA21, 2001). This Agenda is a good chance for NGOs, Business sector and particularly citizens to get involved with the government in political decisions as partners. Putting LSD in form of strategy would ensure more connections between all stakeholders, without contradictions or obstacles from integrated entities. Therefore LA21 is a wise strategy choice if continuity is targeted.

The existence of LA21 contributes in improving local problems in a dual ways

- (A) If the overall municipality's development objectives are defined within a LA21, it would be easier to arbitrate a proposed solution for a certain local problem in a way that considers the three pillars of SD.
- (B) The realized positive effects from solving local problems can be intensified and more efficient, if they are in line with other initiatives following the same "development corridor" embodied within a LA21.

Developing LA21 is a four-step process; Data Collection, Planning and Development, Plan management and finally monitoring & evaluation. These steps are not mutually exclusive and there are overlapping and cyclical activities involved (GDRC web-homepage^x). Completion of the LA21 Action Plan is not a one-shot matter, but a nonstop cyclical process, where each step strengthens and feeds on to the next step. Therefore, monitoring and evaluation of each step results is vital. The indicators incorporated in the LA21 are to be used in determining the achievements of the Plan. The baseline conditions measured in the first step should be monitored for progress. Positive and negative environmental, social, economic and cultural aspects of the local environment should also be monitored, with evaluation of its effects on local conditions. Moreover, it is crucial to evaluate the level of commitment, cooperation and participation of all the stakeholders. This final step supposed to be with high level of participation, so that proposals submitted are accepted and implemented in future activities, they can also form the basis of more brain-storming in the future.

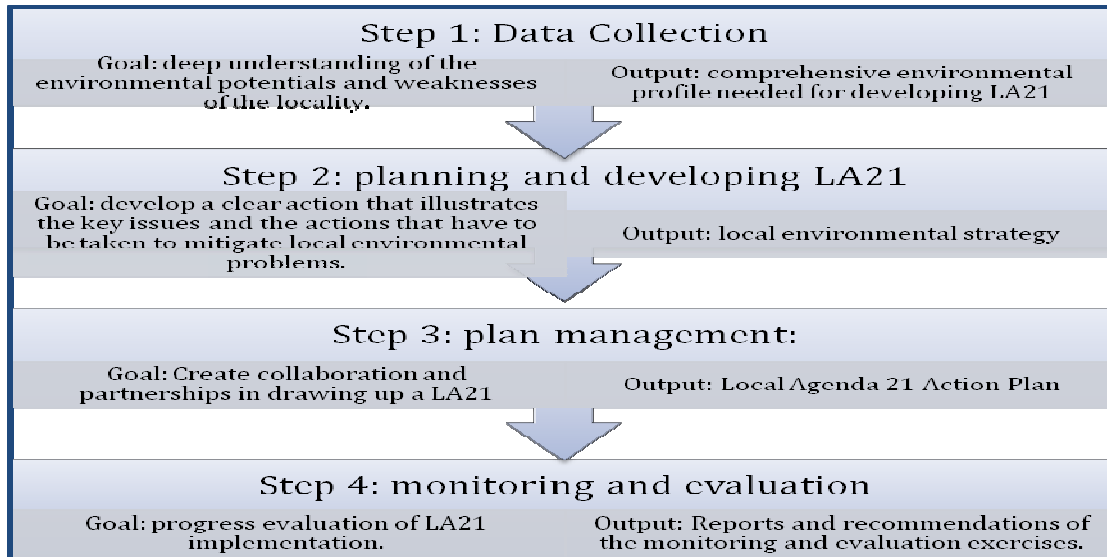


Fig (1): Steps of LA21 process: Goal & Output

Source: By the researcher; Based on GDRC web- home page, www.gdrc.org

State of Local SD in the Arab world

Ten years after Rio, about 6,500 local authorities worldwide have begun their own LA21 processes^{xi}. *It seems that a success story does exist in this sphere!*

According to ICLEI second^{xii} global survey of LA21 processes, local authorities and local authority associations representing 113 countries have completed this survey. Results revealed that 6,416 local governments in 113 countries were involved in LA21 activities, Of these, 44% of municipalities were actively undertaking LA21 programs while the remaining were committed to the process but may not have moved beyond this stage^{xiii}. Thirty-six European countries dominate 82% of total LA21 around the world, while Middle East countries contribute with only 1%.

Most Arab Countries have started or completed their National Environmental Strategy (NES), and/or National Environmental Action Plan (NEAP); however, progress in formulating an umbrella of National Sustainable Development Strategy (NSDS) or National Agenda-21 remains vague. This is partially due to considering NES & NEAP (conceptually) as adequate substitute for NSDS formulation. This misconception has in a few cases resulted in national strategies & action plans focusing on environmental management, rather than on SD (Khordagui, 2004). Moreover, the prevailing culture, traditions & political norms, and top-down approach to decision-making in the Arab countries, cannot easily accept public pressure, public accountability or a participatory bottom-up approach.

However, on the positive side, most of the NES and NEAP, particularly in the ESCWA Region, were prepared using the participatory bottom-up approach

with the involvement of most stakeholders & relevant sectors including the national socio-economic development sectors. Furthermore, the participation of public & civil society in planning & implementing SD was finally realized in most of the Arab Region at various degrees (Khordagui, 2004).

Despite some signs of progress and reasons of hope, in general the Arab countries are lagging behind the rest of world in many important environmental and sustainability areas. This statement is supported by the coming analysis that relies heavily on the 2005 Environmental Sustainability Index (ESI)^{xiv} and 2010 Environmental Performance Index^{xv} (EPI)^{xvi}. Only sixteen of the twenty two Arab league members were among the 146 countries included in the 2005 ESI. Then, the 2010 EPI included 163 countries, among which only eighteen Arab states.

These two recent measurements emphasized that Arab states are in serious sustainability and environmental trouble compared the whole world. Arab states are on average 7.6 points lower than other countries on both indices; ESI (which ranges from 29.2 to 75.1) and EPI (which ranges from 32.1 to 93.5). It seems also striking that for both indicators, the lowest worldwide score are found in the Arab world^{xvii}.

Table (1): Arab states in comparison with the world: Sustainability & Environmental indicators

	ESI 2005 Score		EPI 2010 Score	
	Arab states	The world	Arab states	The world
Minimum	33.6 (Iraq)	29.2(N.Korea)	33.7(Mauritania)	32.1(Sirloin)
Maximum	51.8(Tunisia)	75.1(Finland)	67.4(Algeria)	93.5(Iceland)
Average	42.3	49.9	52.1	59.7

Source: Figures computed based on; Environmental Sustainability Index 2005, Environmental Performance Index 2010.

It worth saying that, these efforts to quantify sustainability are to facilitate more effective decision-making, assigning blame or praise is not the goal.

Based on the 2001 LA21 global survey done by ICLEI, Forty-three formally committed LA21^{xviii} were found in 16 Arab countries from a total number of twenty-two Arab countries, representing 0.7% of world LA21. Compared with, only Five LA21 in Three Arab states according to 1996 Survey.

Table (2): LA21 in Arab States-Number of formally committed municipalities

Country	1996	2001	Traced activation
Algeria	..	3	NO
Bahrain	..	1	NO
Egypt	1	7	NO
Jordan	..	4	YES
Kuwait	..	1	NO
Lebanon	..	6	YES
Libya	..	2	NO
Morocco	3	5	YES
Oman	..	1	NO
Qatar	..	1	NO
Saudi Arabia	..	4	NO
Sudan	..	1	NO
Syria	..	2	NO
Tunisia	1	1	YES
U.A.E	..	2	NO
Yemen	..	2	NO
Total LA21	5	43	

Source: ICLEI 2001, Second LA21 Survey, Background Paper Number 15, NewYork: UNDESA.

The above data shows sort of commitment even with a modest level. Few countries have made tangible progress such as; Morocco, Tunisia and Jordan, but deep research has proofed that the majority of the committed municipalities did not take serious steps in this regard. Moreover, the Arab countries are largely absent from international processes targeting urban environmental quality and developing LA21, such as "ICLEI" LA21 campaign.

The previous analysis shows that Arab states lag behind the rest of the world regarding sustainability and obviously delayed in developing their LA21 aiming at LSD. However, they have potentials to step forward.

The next part will identify Strengths, Weaknesses, Opportunities and Threats facing Arab states concerning SD activation, with some special focus on LA21.

SWOT Analysis

This analysis will present the impact of the internal (strength and weakness) and external (opportunities and threats) factors on the modest Arab world's performance regarding SD and LA21.

What are the Strengths in the Arab states? What makes it successful?

- Many Arab countries have resources and capacities that make better environmental performance possible, if commitment to greater environmental sustainability is made (Esty, Levy, & Winston, 2003).
- Increase in the number of NGOs working on environmental issues and targeting SD in the Arab region.
- Implementation of Structural Adjustment Programmes in many Arab countries, and the attached austerity measures, expanded the participation of civil society and the private sector on the local level (Salem, 2003)
- Arab governments are gradually encouraging participation of non-public sector actors to contribute resources and exert efforts in improving local environmental conditions.

What makes Arab states lag behind other countries?

What are the points of Weakness?

- Improper identification & understanding of SD, hinders the establishment of suitable scope of SD efforts.
- Absence of national LA21 campaign.
- National targets and priorities based on traditional paradigms that support national security, economic growth and cultural preservation.
- Governments are conservative about environmental integration at the operational level; they still consider SD the domain of environmental institutions.
- Weak public awareness about SD specifically on the local level.
- Inadequacy of complementary infrastructure.
- Shortage of funding for SD and LA21 adaptation.
- Many Arab governments still believe in a tradeoff between empowering local environmental actions

and economic growth. The high unemployment rates make job creation and investment a matter national security issue, while, supporting investment in cleaner production and green industries comes after more critical priorities.

- Lack of permanent, active mechanisms for monitoring SD activities.
- Insufficient information and data.
- Lack of trained individuals in local authorities

Moreover, the broadest reaching Weaknesses are related to the governance systems that have reflections on SD possibilities. The Arab states share several commonalities regarding their governance systems, such as;

- Strong national leadership with centralized governance and planning with limited decentralization. Such lack of decentralization in planning and financing limits the ability of local governments to formulate or implement LSD strategies & action plans.
- Top-down political culture & limited public participation. Heads of government institutions & agencies tend to be appointed, not elected. This makes them accountable to the head of government more than to the public. Therefore, public participation & bottom-up approaches to decision-making are limited.
- Institutional rigidity and resistance to institutional change^{xix} (Khordagui, 2004).
- Poor horizontal communication and harmonization between line ministries & government agencies regarding environmental responsibilities.
- Low level of vertical communication between national ministries and local governments. This difficulty is primarily due to a lack of clarity between national and local institutional mandates, as well as to the challenge of going against a political culture of centralized governments.
- Lack of national framework for decentralized environmental management in the Arab states. The deep seated tradition of centralized governance means that national governments maintain a tight grip on policy and institutional aspects of local governance.
- Procedural aspects of planning and management and the corresponding organizational set-ups are not easily changed at the local government level.

What external factors that could be Opportunities to enhance the performance?

- Global attention, international support and commitment to SD and environmental issues, would put sustainability and environmental issues on the political agenda of many governments in the region. Moreover, this will be reflected in

launching various initiatives in cities of the region, funded and supported from the international organizations and developed countries. for example the Sustainable Cities Programme (SCP) of UN-Habitat and UNEP the Urban Management Programme (UMP) of Habitat, UNDP and the World Bank; Localizing Agenda 21 of UN-Habitat, and the LIFE programme of the EU and UNDP.

Some ESCWA Arab members that joined Mid-cities Network^{xx}, have done actual progress in SD and developing their LA21.

- Higher education in Arab states could have a role in prevailing knowledge and building social capital on the subject of SD. Arabian colleges and universities are capable of partnering with state and local governments, assisting decision makers in understanding the scientific, economic, and social challenges entailed by sustainable development.

What are the external factors that might Threaten the progress of the Arab states` performance?

- Low levels of national income and unfair income distribution in most Arab countries, will affect country short run agenda of priorities.
- Arabs` traditions of public action and civil society make many leading NGOs linked directly to members of the ruling families. Civil society organizations without such political backing would face the risk of being under-resourced, thereby limiting the scope of their activities.
- Access ban to modern technology that serve SD.
- The successive global economic crisis.
- The biggest challenge is not the capability, but some of the traditions and norms deeply rooted within the Arab region.

Accordingly, Arab states face profound sustainability challenges that will influence their future ability to achieve lasting economic, social and environmental targets. Unless actions are taken to address these challenges major problems concerning social and economic consequences will emerge in future

The previous SWOT analysis shows a lot of strengths and opportunities in the Arab countries, which if used efficiently would lead to reach the targeted SD. However, these countries face evitable threats and challenges that will influence their future ability to achieve lasting economic, social and environmental targets. These threats should be recognized and terminated through newly applied recommendations and policies tailored to each community. Lessons can be drawn from looking to neighbors for best practices, but no single blueprint exists for local government sustainability. ***The following tips highlight the main lessons;***

- Working on capacity building and proper identification and understanding of SD.
- Public awareness campaigns for SD and LSD.
- Finding alternative funding resources for SD implementation and developing LA21.
- More engagement in the international organizations concerned with SD and LSD, to take advantage of their financial and technical support.
- Adopting decentralized environmental management, and generating active mechanisms to monitor and assess SD practices.
- Launching a national campaign for LA21, Country experiences suggest that local environmental actions require national level commitment to become sustainable and institutionalized.
- Provision of adequate data and information with complete transparency.
- Development of further policies that support the trend towards decentralization.
- Rearranging national and local priorities based on modern paradigm.
- Reforming institutional responsibilities to integrate SD.
- Enhancement of more vertical and horizontal communication at different government levels.
- Using education at all levels to achieve changes in attitude and behavior of Arab citizens' social capital regarding SD at all levels and to fight the internal resistance against change.
- Adopting the bottom-up approaches in dealing with local environmental initiatives. Regarding this point, there are signs of hope already have appeared in the region. Morocco's national decentralization programme would contribute to more bottom up approaches, and Egypt is also about to pass a national decree that may strengthen the organizational status and competence of environmental management units at the local government level. These are good indicators for positive change towards more inclusive governance at the local government level in the Arab States. The 21st Century might witness further milestones towards institutionalized local environmental action and inclusive local governance in the region (Salem, 2003).

The Road Towards Localizing SD in Egypt

- ***In the last two decades Egypt has created a number of several references to SD. As for policies,*** Egypt proofed its concern in environmental issues by establishing the "Egyptian Environmental Affairs Agency" (EEAA) for tackling different environmental issues, drawing the general policy, and preparing the necessary plans to protect the environment.

In 1994, Egypt has issued Law 4/1994; as the first law for the environment protection. This law has been considered the highest institutional framework for actions regarding protection of the environment. The law restructured EEAA and widened its mandate. Later in 1997, the Ministry of State for Environmental Affairs (MSEA) was formed to focus, in close collaboration with national and international partners, on designing environmental policies, setting priorities, implementing initiatives/agreements within the context of SD.

National Commission on Sustainable Development; In the year 2006, the Cabinet of Ministries had issued a decree establishing the National Commission on Sustainable Development (NCSDD) under the leadership of the MSEA, and with membership of a number of different line ministries. This reflected the government ***political commitment*** towards achieving SD through integration and co-operation among different ministries. This Commission has several tasks; adoption of national SD policies through integration of the environmental issues within development and service sectors framework, review and approve of a National Strategy for SD, ratification of National plans with providing technical support to the national authorities in order to reach the goals of SD, evaluate action plans and funding proposals according to the priorities of the national action plan, adopting modern methodologies to support decentralization and helping different institutions on sectoral level to carry out their SD mandates. ***The National Environmental Action Plan (NEAP; "2002-2017")^{xxi}*** was published in the year 2002, is the main national framework for action and activities supporting environmental management for SD. The main goal of this plan is enhancing participatory and demand-driven environmental planning process which support SD, as well as targeting development that is economically, politically, and environmentally sustainable^{xxii}. The NEAP would consider the foundation for developing environmental initiatives at the local level, as it integrates with sectorial plans for the economic growth and social development. It delivers programs and projects that address environmental issues in several sectors relevant to the protection of human health and the management of national resources. ***Additionally,*** Egypt has issued its ***National Sustainable Development Framework Strategy*** in 2008, to prove its commitment to SD. This manuscript facilitates the process of building upon and harmonizing various sectors of economy, social and environmental, together with the current policies and action plans operating in the country. The SD strategy identified and presented its eleven priority areas/challenges, which have been addressed by the stakeholders taking into consideration the economical, social, institutional and environmental dimensions. Worth mentioning, that this strategy puts

the broad directions within each priority area in order to implement the main strategy objectives.

In regard to Agenda 21; Egypt adopted its own Country Profile of Agenda 21 in 2002 according to the UN context. The purpose of the profile is to help in monitoring the country's own progress, track and record the national actions undertaken to implement the agenda. In relevance to Sustainable Consumption and Production (SCP), Egypt has mentioned some implemented programs and projects within chapter 4 of the Agenda, at the national level including concerned parties and stakeholders involved^{xxiii}. Regarding chapter 7 that dealt with promoting sustainable human settlement development, Egypt has mentioned programs and actions in place aiming to achieve geographically balanced and sustained settlement structure^{xxiv}. Chapter 41 of the Agenda had dealt with the national strategy for industry; a set of programs and projects are being implemented in the context of environmental protection^{xxv} (ENCPC, 2008). Concerning **Chapter 28 (LA21)** that dealt with LSD; the Government of Egypt supports Local Agenda 21 initiatives in its country profile documentation, with no further information submitted.

Egypt and Sustainability

The international indicators (ESI and EPI), have shown improvement in the state of sustainability for Egypt. Egypt jumped up 47 places in the international rank and 4 places in the Arab states' rank. Also, Egypt position has changed from being below average international score in 2005 to be slightly above the average in 2010.

Table (3): Egypt status in the international sustainability indicators

	ESI 2005	EPI 2010
Egypt Score	44	62
Relative to international average score	6 points below average	2.3 points above average
Relative to Arab region average score	1.7 point above average	10 points above average
International Rank	115	68
Arab region Rank	7	3*

* After Algeria and Morocco

Source: Figures computed based on; Environmental Sustainability Index 2005, Environmental Performance Index 2010.

Albeit sustainability progress was noticed for Egypt during the last five year, it is considered modest compared to the large commitment made by the government in the international forums.

Egypt and LA21

With reference to Egypt country profile submitted to the UN^{xxvi}, the Government of Egypt announced its

readiness to support LA21 on its territory, with no further information submitted.

"Status: The Government of Egypt supports Local Agenda 21 initiatives" **Quoted from Egypt country profile**

With reference to NEAP of Egypt 2007-2017, the government understands the importance of LSD and the prerequisites to formulate and implement LA21.

"There is a need to build the capacities of local administrations to be able to formulate and implement Local Agenda 21 for their settlements. This will require training administrators, developing new cadres capable of planning and updating plans for the sustainable development of their communities. Capacity development will also encompass institutionalizing participatory structures for decision-making, building partnerships between stakeholders and enabling the locals to control their destiny" **Quoted** (EEAA, 2002)

According to the second LA21 survey by ICLEI in 2002, Egypt submitted a number of seven formally committed municipalities to LA21, which is considered the highest number among the Arab countries that completed this survey. Despite all previous evidence that indicates a strong commitment from the Egyptian government to the LA21, but the reality on the ground is something different. Where that, however several LSD initiatives do exist in the Egyptian municipalities, some of them are NGOs-led, and the others are Business Sector-led in form of CSR projects, but no comprehensive LA21 for any of the Egyptian municipalities has been developed yet. This raises the need to identify the main reasons and factors causing this wide gap between the strong government commitment and the actual actions undertaken. The paper in the next section will use the **Lack-Gap-Mismatch (LGM) analysis** to find out and analyze the reasons behind this gap.

GM Analysis for LA21 in Egypt

The Lack-Gap-Mismatch (L-G-M) Analysis is a method devised to evaluate the existing status and shortcomings of any situation or issue. As the name suggests, there are three problem areas being studied here; *'lacks'; that which are not there, 'gaps'; that which are not sufficient;* and *'mismatches'; that which are not compatible*^{xxvii}.

Thus, reasons behind a *"hole between strong Egyptian government commitment and the facts regarding LA21"* fall into one of these three categories. Accordingly, the deduced recommendations from this analysis, will direct resources where they are most needed while retaining its good or beneficial points.

Table (4): LGM analysis for LA21 in Egypt

Lack	▪ National campaign for LA21 in Egypt.
	▪ Decentralized governance system in Egypt, Government has long history of being highly centralized. In much of Egypt's history, the hegemony of the state has constrained local development and resulted in a highly centralized approach to development. This checked local participation, local initiatives and prioritizing of local needs. A greater allocation of resources was given to the decision making centers, the urban areas and the capital, resulting in disparate and inequitable development across the various regions of the country (Goell, El-Lahham, Hussen, El-Khishin, & Soliman, september 2009)
	▪ Sufficient financial resources for SD practices.
	▪ Clearly articulated and widely accepted guiding SD vision, and well-defined, achievable goals and objectives of LSD.
	▪ Lack of action & support regarding LA21.
	▪ Lack of coordination and cooperation among different government agencies, municipalities, and policy makers.
	▪ Lack of coherent dialogue and congruence between different political levels.
	▪ Lack of integration of social and environment considerations in the economic decision making.
	▪ Clear involvement of local authorities and local stakeholders in SD.
	▪ Lack of capacity required to develop LA21 at high political levels.
	▪ SD Basic data on both national and local levels.
	▪ Appropriate trained individuals on municipality staff.
	▪ Sufficient knowledge, awareness within the local authorities and different stakeholders.
	▪ Incentives for SD practices.
	▪ The public on the local level are seen to lack expertise and knowledge of science and disqualifies from participation
▪ Public awareness and education activities thus lack of public backing for sustainability initiatives.	
▪ Public norms regarding resistance to change.	
Gap	▪ Gap exists between commitment and implementation, planning and activation. Egyptian consumers consider that government's efforts towards preserving the environment are insufficient and that environmental laws and policies are poorly communicated and enforced (Tantawi, O'Shaughnessy, Gad, & Ragheb, March 2009). Moreover, although many consumers say they are pro-environment, they often do not act that way (Hume, 1991)
	▪ Gap exists between the true definition of SD, and understanding SD in Egypt; creates a misunderstanding in the rationale of integrating SD in the development strategy of the municipalities.
	▪ Updated technology and appropriate R&D on new SD practices.
	▪ "Power gap" between what people can do and what system encourages them to do.
Mismatch	▪ Environmental policy in Egypt has always been reactive rather than proactive, pragmatic and uncoordinated over the past five decades ^{xxviii} .
	▪ Between environmental legislation and enforcement.

Potentials for developing LA21 in Egypt

Filling LGM and benefiting from internal strengths

Egypt has a lot of embodied strengths that could help overcome Lacks, Gaps and Mismatches identified before, and at the end be able to develop its LA21. Moreover, LA21 in Egypt will not start with a completely blank sheet; many activities in relation to SD are undertaken on the local level almost without the realization that they do make a significant contribution to a better quality of life. Therefore, LA21 can and should build on existing policies and partnerships, and provide a framework for changes in attitudes and in practices, which can help move the whole society towards SD. Accordingly, in order to leap over the gap between government commitment and actual preparation of LA21 by local governments, whether they are metropolises, cities, municipalities, councils, towns, or villages, serious actions and deep corrections should be taken in order to pave the way and overcome the LGM previously analyzed. **These actions could be classified among three categories; Exogenous to local level, Local government's interaction with its citizens, Internal to the local government.**

a) Exogenous to local level:

There are some actions that could be taken outside the control of local governments, often on the national

level, would defeat LGM and help enhancing LA21 process, such as:

- **Egypt National campaign for LA21;** identifying a guiding vision, clear and well defined SD and LSD concept, creating community awareness, and giving strong push for implementation.
- More support towards decentralized governance that would give local authorities more power and resources, giving them the opportunity to focus on their local objectives through LA21. Incidentally, considerable attention has been placed recently on decentralization. Since variety of local government related laws have been passed and amended in favor of empowering local authorities. Yet, the traditional government structure remains firmly in place. Local governments are administrative units of the national governments and its ministries, with little authority having been delegated to the field in this de-concentrated structure. There are, however, some promising, though slowly, evolving signs of change. A local political structure has been established parallel to the administrative structure. Some fiscal devolution has taken place, albeit, outside the traditional budget structure (Goell, El-Lahham, Hussen, El-Khishin, & Soliman, september 2009).
- Establishing a National committee for LA21.

- Incentives policies for SD practice; through taxation and special energy rates that enhance efficient allocation of resources^{xxix}.
- Specialized LA21 training for local authority officials.
- More national engagement with the international organizations concerned with SD and LSD, to benefit from their technical and financial support.
- Special incentives for SD foreign direct investments (FDI).
- More vertical and horizontal coordination and communication within the Egyptian government.
- Integrating environmental dimension in the economic decision making at all levels. And adapting life-cycle based approach in environmental policies.
- Develop a national action plan for dealing with slums, through the integration between the currently on-going programs to ensure the upgrading on a sustainable basis.
- Devoting more national R&D in the field of SD practices

b) Local government's interaction with its citizens:

A local governments' interaction with its citizens to realize the goals, is the key for a successful LA21 plan. Egyptian consumers are concerned with environment; this concern is not limited to only wealthy people^{xxx}. Local authorities should get use of this embodied consumer concern, by engaging them in proper effective policies for SD on the local level. Local Authorities should start by;

- Creating local community awareness on issues associated with waste that would lead to stimulate local stakeholders' participation. This awareness would be generated by education, information and training campaigns on SD and environmental issues, using both formal and informal channels. Information materials have to be available for public such as; Brochures, Leaflets, Newsletters, Environmental Action Packs, Internet resources/websites, Local radio and other media channels.
 - Develop public awareness campaigns for local marginalized groups (slum dwellers) to introduce ideas dealing with LSD.
 - Educating the local public and business sector on; the fate of water that enters sewers, the cost of treatment, waste that needs disposal.
 - Also, build the capacity of decision-makers and stakeholders to reach integrated decision-making for sustainable community.
 - Besides, monitoring and evaluation including; community opinion surveys, involving the civil society in action plans, for example, in the 3Rs (Reduce, Reuse and Recycle).
- Local authority should make workshops with local business, farming, trade union and local community to illustrate how their economic practices can affect SD in their localities.
 - Requesting selected suppliers of materials, services or products to submit details of their product specification and environmental policy for review.
 - Investing in "Social Capital" by promoting awareness of the social and environmental impact of goods' production, as well as, introduce the ideas of LCA, exchange of waste,

Internal to the local government

In the context of LA21, the main issues and objectives of each local authority should be identified, fully address both environment and development concerns and reflect the community's overall vision regarding SD. Clarity and transparency about; what is LSD? How it should? And who is responsible? Besides how to monitor and evaluate? Is considered crucial, to end with a clear and simple LA21 that is generally acceptable to the wider community.

- The local authority of any Egyptian municipality should adapt the "leading by example approach"; by starting endogenously by "Internal Greening" before moving on to externalizing the process into the wider community
- Furthermore, local authority should train their staffs who are involved with liaising with the public to reflect commitment, encourage and support effective participation, especially by groups at risk of social exclusion, as well as ability to communicate effectively on LA21.
- It seems important to establish a steering group^{xxxi} within each municipality, as a forum for discussion and coordination. Furthermore, consideration might be given to the establishment of a LA21 Committee within each local authority, made up of public officials and members from all local stakeholders and the steering group. This committee is to identify LGM of local economic activity, social inclusion and environmental quality and developing strategies to counteract them.
- Increasing pre-planning application information provided to developers (e.g. environmental design guides), highlighting examples of good environmental/ energy management.
- Bringing derelict land back into active use, this will re-use available resources, contribute to energy efficiency, sustain the urban fabric, reduce the need to develop Greenfield sites and protect the countryside.
- Having a clear demarcation in the development plan between urban and rural land use to help prevent urban sprawl.

- Moreover integrating coastal zones management^{xxxii} and biodiversity in the dimensions (built in) of LA21.
- Follow up, monitor, assessment for all local activities^{xxxiii} to ensure they accord with A 21 principles.
- Conducting studies for introducing new local un-traditional solutions for providing infrastructure and services, which will be consistent with the nature of the local slums.
- Establishing ideas data base (directories) for SD products, services, practices to be available for business sector within the locality.
- Finally, working on building a comprehensive local database capturing sustainability indicators, is so vital for measuring the progress.

Based on the previous LGM analysis on Egypt, we can accept the hypothesis concluding that developing LA21 in Egypt is possible, if the prerequisites are fulfilled

As a final point, the paper will propose a simple, primarily LA21 toolkit for any Egyptian local authority to start with. The presented LA21 incorporating the three dimension of SD within all local activities. Each local authority would reconcile its situation according to its local resources and problems, that what makes each LA21 unique and non-recurring.

Toolkit for Preparing LA21 by Local Authority Led

LA21 process, developed by the local authority of the municipality, is not just an environmental statement, but it is a process to establish a LSD strategy that integrates environmental consideration into the center of policy in all aspects of local community development. Local authority will take the led to develop the municipality LA21 based on the previous explained exogenous actions, local authority interaction with citizens and its in-house conditions.

For a local authority to develop LA21 three pillars of SD in it municipality should be taken into consideration:

Economic Dimension of LA21

The economic dimension of the LA21 should aim at maximizing local needs self sufficiency, along with preserving local resources as possible. This could be achieved through promoting local investment, purchasing, trading, good quality and secure employment, local good, along with conserving local resources. The local authority would give incentives, like tax exemption, discounts on energy prices...etc, to encourage local business sector to produce environmentally friendly local products^{xxxiv} and to adapt SD practices. Since the industrial sector is the most economic activities drain of resources and impact on the environment, LA21 should ensure achieving sustainable

industrial development along with achieving acceptable profits for the sector. The concepts of Industrial Ecology, Waste Exchange, Zero Emissions and Eco-Industrial Parks (EIPs) have to take good place in the local agenda of the municipality (El-Massah, May 2009). Methods like, Life Cycle Analysis (LCA) and Life Cycle Costing (LCC) are important to determine the overall environmental impacts of products, and their lifetime cost. In this regard, LA21 should start developing an integrated industrial environmental management programme, for one of the local industrial zones as a pilot for integrating both social and environmental dimensions within the economic one, which would facilitate the promotion of efficient resource utilization and reduced environmental impacts from the industrial activities.

Social / Community Development Dimension of LA21

LA21 for the municipality should include programs targeting local social and community empowerment, such as programs

- In favor of personal debt, and training on good money management practices and implementing early warning systems in respect of their debtors, the experience of the "Grameen Bank"^{xxxv} is a very good example for such programs.
- For matching local job vacancies with the unemployed in collaboration with local agents involved in the delivery of this service.
- Designed for assisting targeted groups (e.g. long-term unemployed, ethnic communities, women and early school leavers) to obtain employment.
- In support of, developing rural transport, childcare facilities, flexible work arrangements and home working arrangements.
- For organizing the usage of recycled products in hand crafts in a large scale within slum areas, through free-taxing crafts, which contains recycled products.

Environmental Dimension of LA21

The environmental dimension should declare itself within the LA21 in the form emphasis on adequate open space for out-door recreation, on planting and landscaping. Moreover, environmental dimension *is reflected in the local agenda through efficient use of resources and application eco-efficiency on all activities.*

❖ **Heating and Electricity;** Carrying out “energy checks” and recording energy consumption for all major local building project and local factories. Along with, checking electricity tariffs with promotions on reducing bill for energy rationing projects. In addition to, advice proposals to face fuel poverty related to renewable energy and in line with best environmental practice.

❖ **Transport;** strict local enforcement of vehicular emissions standards, banning fuel-inefficient vehicles, building good and efficient infrastructure for river Nile transportation in localities on Nile taking into account the safety considerations, encouraging community and local authority staff to use public transport, engage in car-pooling etc., and encouraging environmentally friendly modes of transport by providing safer facilities, such as cycle lanes and secure bicycle parks for cyclists, special pedestrian areas and footbridges.

❖ **Housing;** programs for energy and water efficient designs for local housing sector, practices for reusing local material, providing ideas to local residents on energy conservation and efficiency, providing facilities for recycling, evolving tenants in management and maintenance of their homes and estate. And considering environmental factors such as site topography, aspect and water supply in site selection, design and landscaping of new local housing developments.

❖ **Waste;** This is considered to be the spotlight of LA21, local authorities are expected to focus on developing operational programs in the following aspects

Municipal Waste and Solid Waste Management

Develop and implement a municipality programme promoting the application of the '3 R' principles^{xxxvi} of local waste at or nearby the source, with more focus on the reduction of generation of waste and maximizing the waste-to-resource conversion. Furthermore, create local markets of waste exchanges and establish secure landfills sites. Additionally, Encourage sorting and separation at source, to decrease the unit price of the produced recycled products, providing separation sites to for plastics, cans, glass paper, toxic, clothes and batteries. Introduce the usage of recycled paper bags, bio-degradable plastic bags; minimize paper use by establishing comprehensive e-mail system, and use recycled paper for all local official documents. Moreover, expanding in recycling activities by establishing more recycling factories for conversion of waste to compost, and establishing of plastic recycling factories.

Waste Water, Water Quality and Water Treatment

Put measures to avoid groundwater and surface water pollution, adopting water conservation and demand management as central principles to ensure that natural resources are protected, implement BAT^{xxxvii} rather than depending on assimilative capacity as the sole approach to limiting discharges, would limit the water pollution even with new industries entrance. Promotion for water efficient appliances and devices, introducing a programme for water conservation shows good examples e.g., repair leaks quickly, fit plugs to

sinks.LA21 would include sustainable water policy on protection, management and optimizing environmental quality, economic performance and efficiency of water usage.

By the end of developing a LA21 for any of the Egyptian municipalities, the following results should be satisfied^{xxxviii}.

- Resources are used efficiently and wastes are minimized.
- Pollution is limited.
- The diversity of nature is valued and protected.
- Where possible, local needs are met locally.
- Everyone has access to good food, water, shelter and fuel at reasonable cost.
- Everyone has the opportunity to undertake satisfying work in a diverse economy.
- Peoples' good health is protected by creating safe, clean, pleasant environments and health services which emphasize prevention of illness as well as proper care of the for the sick.
- Access to facilities, services, goods and other people is not achieved at the expense of the environment or limited to those with cars.
- People live without fear of personal violence from crime or persecution because of their personal beliefs, race, gender or sexuality.
- Everyone has the skills, knowledge and information needed to enable them to play a full part in society.
- All sections of the community are empowered to participate in decision-making.
- Opportunities for culture, leisure and recreation are readily available to all.
- Places, spaces and objects combine meaning and beauty with utility. 'Human' Settlements in scale and form. Valuing Diversity and local distinctiveness.
- Links are developed with other parts of the World.

CONCLUSIONS & RECOMMENDATIONS

Evidence showed a noticeable international progress in developing LA21 since 1992 Earth summit, when Agenda 21 was released. As By year 2002, 113 countries have been formally committed to 6416 LA21. Thirty-six European countries dominated 82% of them, where factors of National campaign, decentralization, local authority empowerment and high level of community participation were the key factors of that success. The reason behind worldwide limited spread of LA21 could be referred to; that some countries especially with low income levels, still see a tradeoff between empowering local environmental actions and economic growth. Regarding Arab countries sustainability status, international indicators showed that, they are lagging behind the rest of the world. However, sixteen Arab states have committed formally with forty-

three LA21 (0.7% of the worldwide LA21), but the actual serious undertaken steps towards activating this commitments were very limited namely; Morocco, Jordan and Tunisia. Based on SWOT analysis, the study concluded some strength points for the Arab states, but even with several obstacles that explain this delay of LA21 activation. For the Arab countries, these main obstacles are; strong national leadership with centralized planning, top-down political culture, absence of national LA21 campaign, fund insufficiency and most important the traditions and norms that resist change. Then the paper concluded some policies that would help Arab countries move forward in-line with other world countries such as; Launching a national campaign for LA21, enhancing decentralization, working on capacity building and proper identification of SD, more engagement in the international organizations concerned with SD and LSD, to take advantage of their financial and technical support, adopting decentralized environmental management, provision of adequate data and information with complete transparency, more vertical and horizontal communication in the governments and supporting the role of education in changing attitude and behavior of Arab citizens regarding participation, SD and LSD.

Considering the future of Egypt, we can expect that the ongoing rapid economy growth and changes in people's lifestyle will continue to add environmental pressures on the domestic eco-system and resources. This would in turn affect the future production and human wellbeing. Thus, SD is considered the proper choice for Egypt to overcome these future threats. As SD would create the required linkage between economic progress and environmental protection in an integrated way, by which an answer could be found for the question of; how can we afford the Egyptians quality of life we want and simultaneously spare our domestic natural resources? However, SD as an answer for the former question is not a responsibility of one institution in Egypt, but it is all Egyptian institutions and stakeholders' responsibility. Accordingly, a broad and intensive dialogue across social and economic sectors and interest groups is inevitable. The easiest way for such a dialogue to take place is on the local level; the level where people live their daily lives. Therefore, if Egypt is going to take SD seriously, the municipality is the appropriate key players by developing its LA21. Egypt has shown high level of international commitment for developing LA21, along with several existing emerging signs such as; government environmental policies supporting SD, moving forward towards decentralization and growing practices of SD on local level weather by NGOs led or in form of CSR. Despite this announced commitment, the facts indicate that no actual activation for LA21 in Egypt has yet been

done. The study used LGM analysis to conclude several Lack, Gap and mismatch elements that explains this distance between commitment and activation. It was concluded that Egypt has some internal strength points would make it possible to develop LA21 for Egypt if lacks are made up for, gaps are filled and mismatches are corrected. In order to achieve this, the paper recommended three categories of actions;

Exogenous to local authority: Egypt National campaign for LA21, More support towards decentralized governance, Incentives policies for SD practices, more national engagement with SD & LSD international organizations, more vertical and horizontal coordination, integrating environmental dimension in the economic decision making and devoting more national R&D in the field of SD practices.

Within the interaction between local authority and local citizens: Creating local community awareness by education, information and training campaigns on SD, monitoring and evaluation.

Internal to the local authority: "leading by example approach", train their staffs, establish a steering group, establishing ideas' and indicators' database

Accordingly, the paper accepted the hypothesis concluding that developing LA21 in Egypt is possible, if the prerequisites are fulfilled. Finally the paper presented a simple and primarily LA21 toolkit for a local authority to develop its LA21. This kit incorporates the three dimensions of SD within all local activities. But it should be clear that LA21 describes a process and not only an elaboration of a document as a product. Moreover, different local realities for each municipality, would mean differentiated LA21s in Egypt, LA21 could never be "ONE SIZE FITS ALL".

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¹ Starting from the High Dam, moving on to the loss of agricultural lands, and most recently Cairo's black smog cloud in 1999.

² From natural increase, R-U migration

³ “Congestion costs appear in high urban density places; workers may face higher transportation and shelter costs, progressive overloading of housing and social services may require higher wages to cover these costs. That lead to outpace the growth of human and physical infrastructure needed for efficient economic life (Todaro, 2008)

⁴ Congestion costs make it costly to build an officially legal house, hence responsible for the explosion in urban slums.

⁵ Environment, society, and economy

⁶ Local Sustainability Strategy was introduced in 1997 by the Council of European Municipalities and Regions as a synonym for LA21 (GTZ, 2008).

⁷ Many of the principles of A21 are to be found in the Rio Declaration on Environment and Development

⁸ Chapter 28 is one of the shortest chapters in the A21 document and is, therefore, accessible .

⁹ ICLEI – Local Governments for Sustainability is one of the main supporters of the LA21 process, it is an international association of local governments and national and regional local government organizations that have made a commitment to sustainable development. See their website at www.iclei.org.

¹⁰ THE GLOBAL DEVELOPMENT RESEARCH CENTER is an independent nonprofit think tank that carries out initiatives in the spheres of environment, urban, community, economy and information, and at scales that are effective. GDRC was inaugurated on 25 May 2000. Visit: <http://www.gdrc.org/>

¹¹ Considering that similar processes are being conducted under different names (“Sustainable Cities Program”, “Healthy Cities Program”, etc.), the number of cities in this process would be higher.

¹² With the UN Secretariat for the World Summit on SD and in collaboration with the UN Development Programme Capacity 21, while the first LA21 survey by ICLEI was in 1997.

¹³ For municipalities to be included in the survey results, it was necessary for the association to use the following criteria to define LA21: include a participatory process with local citizens, include a consensus on a vision for a sustainable future, address economic, social, and ecological needs together, establish a roundtable, stakeholder group, forum, or equivalent multi-sectoral.

¹⁴ (ESI) was a composite index published from 1999 to 2005 that tracked 21 elements of environmental sustainability covering natural resource endowments, past and present pollution levels, environmental management efforts, contributions to protection of the global commons, and a society's capacity to improve its environmental performance over time.^{[11][2]} It was superseded by the Environmental Performance Index in 2006.

¹⁵ The 2010 (EPI) ranks 163 countries on 25 performance indicators tracked across ten policy categories covering both environmental public health and ecosystem vitality. These indicators provide a gauge at a national government scale of how close countries are to established environmental policy goals. The EPI's proximity-to-target methodology facilitates cross-country comparisons as well as analysis of how the global community is doing collectively on each particular policy issue.

¹⁶ These indicators are considered the best assessment for the society ability to preserve critical environmental conditions several generations into the future (Levy, 2002).

¹⁷ Eight Arab countries out of sixteen lies within the lowest Twenty-two rank, the ranks are: (143:Iraq)-(140:Sudan)-(138:Kuwait)-(137:Yemen)-(136:SaudiArabia)-(129:Lebanon)-(126:Libya)-(124:Mauritania) (Yale Center for Law and Policy, January 2010).

¹⁸ From a total of 6,416 LA21 worldwide (ICLEI 2001 survey)

¹⁹ While heads of governments might be open to appoint new ministers or create new SD institutional frameworks, the ability of technocrats to quickly impose such changes renders government bureaucracies to be risk averse, and fearing openness and transparency of their operations.

²⁰ Med-cities is a network of Mediterranean coastal cities created in Barcelona in November 1991 at the initiative of the Mediterranean Technical Assistance Programme (METAP), URL: <http://www.medcities.com/>

²¹ Prepared by the Capacity-21 unit at EEAA, under the auspices of the UNDP.

²²EEAA; (2002); "The National Environmental Plan Of Egypt 2002/2017"; Egyptian Environmental Affairs Agency; Ministry Of State For Environmental Affairs; Egypt.

²³ These programs are: Energy; Natural gas supply for households, providing alternatives to unsustainable energy resources for urban and rural households, Supply energy to low-income households, Energy Efficiency Improvement and Greenhouse Gas reduction. Transport; Hybrid-Electric Transportation Bus Technology, Underground mass transit system and implementation of Ring Roads (ENCPC, 2008).

²⁴ Such as; the national program for upgrading and development of informal areas within urban context; and the supply these areas with potable water and sanitary drainage.

²⁵ Such as; The Egyptian Pollution Abatement Project and The elimination and reduction of ozone depleting substances.

²⁶According to the Information Provided by the Government of Egypt to the UNCSD Fifth Session 7-25 April 1997, and to Johannesburg summit 2002 New York, United Nations Department for Policy Coordination and Sustainable Development, Division for Sustainable Development, URL: <http://www.un.org/dpcsd/earthsummit>

²⁷ For more information about LGM analysis visit: <http://www.gdrc.org/ngo/lgm.html>

²⁸ Starting from the High Dam, moving on to the loss of agricultural lands, and most recently Cairo's black smog cloud in 1999.

²⁹ Policies on energy efficiency issued by the Energy Supreme Council and the higher taxation on certain wastes would set the foundation for the movement towards sustainable industrial development.

³⁰ These results based on a survey conducted on 122 Egyptian consumers (Tantawi, O'Shaughnessy, Gad, & Ragheb, March 2009).

³¹ The steering group is crucial to provide local knowledge and cross the distance between the local community members provide local knowledge.

³² Balancing development with the protection of sensitive areas, establishing a management policy for the coastal zone, taking account of the interdependence of the marine and land environments

³³ The facilitation of public transport, recycling, culture and healthy leisure activities, repair services, home insulation, local food production, alternative energy, car sharing schemes and the sustainable exploitation of natural resources.

³⁴ By advertising, awareness, encouragement, promoting and supporting, eco labeling and open markets...etc. Some of the existing bio products in Egypt need this very much.

³⁵ The Grameen Bank is a microfinance organization and community development bank launched 1983 in Bangladesh by Professor Muhammad Yunus, the bank makes microcredit to the impoverished without requiring collateral with overwhelming majority(98%) of its borrowers are women, it was awarded the Nobel Peace Prize in 2006.

³⁶ Reducing, Reusing and Recycling.

³⁷ Best Available Technology.

³⁸ Local authorities are to develop or supplement these options according to the needs and circumstances in their localities.

THE POTENTIAL OF COMPANY INCOME TAX ON THE SEARCH FOR SUSTAINABLE ALTERNATIVE FINANCING IN NIGERIA

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ABSTRACT

This paper examines company income tax in the light of its potential for alternative financing for sustainable development in Nigeria. This inquiry has become important because of the need to diversify and increase the revenue base of the government which is currently in distress owing to many factors. The study employed Ordinary Least Square (OLS) method and Co integration Test over the period of 1987 – 2013 to analyse the long-run relationship between company income tax and revenue generation in Nigeria and also to evaluate the effect of major macroeconomic indicators (foreign direct investment, interest rate, corruption perception index, inflation rate, and exchange rate) on company income tax generation in Nigeria. Results show that increasing the contribution of CIT by one per cent increase revenue generation by 0.42%. Then macroeconomic determinants of CIT portray that there is a long run relationship with foreign direct investment, interest rate and corruption proxied by CPI. The study recommends that, since CIT has shown potential as source of alternative income, conditions for companies to flourish so that taxes from them can be beneficial and should be set in the long-run.

KEYWORDS: company income tax, revenue generation, sustainable development, alternative financing, nigeria

INTRODUCTION

According to World Commission on Environment and Development (WCED) (1987), sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This needs can be achieved with secure stable and sufficient long-term financial resources by allocating them in a timely and appropriate form (WCED, 1987). It is necessary to develop ways to harness and distribute resources, especially with Nigeria present financial problems resulting from volatility of oil prices because governments responsibilities are on the increase. Sustainability matters because of the competition between the present increasing need for infrastructural development, grow investments to promote development, and the securing future generations. Hence, government examines and evolves different mechanisms for generating additional revenue to meet these needs. This search for diversification will impact on development planning and poverty reduction in the country in the long-run. While these may be different potentials, this paper examines the CIT to give it a place among alternatives for raising resources sustainably. In Nigeria, this need calls for diversification of the resource base to non-oil income sources which includes taxes. The tax handle that this paper sheds light on is the Company Income Tax (CIT) as one of key components of tax revenue with the view to examine its potentials for contributing to the revenue base.

History records that man has had to pay tax in one form or the other, that is, in cash, or in kind. Previously tax was paid to the chieftains and later onto a form of organized government. As this practice evolved different scholars came in with different views on the role of government in the development of the economy with regards to public financing through taxation and other sources. The Keynesians with the emergence of the great depression in the 1930, advocated government intervention in the economy using fiscal policy and monetary policy to strike a balance in the economy, which they believed was due to decrease in aggregate demand.

Taxation became a matter under the exclusive and concurrent legislative power with the introduction of federal system in early 1950s. Taxation of companies was retained as a federal matter (1954 ordinance), direct taxation, a regional matter (1943 ordinance). The report of the 1958 Raisman fiscal commission was the origin of dividing taxing powers between the federal and state governments Ogjji, (2004). This commission substantially influenced the empowerment of the federal government to make laws embodying uniform principles of taxations applicable to all parts of the country, as well as for the regulation and taxation of companies. Subsequently, the following tax laws were enacted: The Income Tax Management Act (1961), the Company Income Tax Act (1961), the Personal Income Tax Act (1961), the Petroleum Profits Income Tax Act

(1959). Other direct and indirect tax laws in conjunction with the above provided the legal cover for tax administration in Nigeria.

In 2004, the federal government set up the Pius Okigbo working group to review and recommend a new national tax policy that would strengthen tax administration in the country. This was sent to the national assembly as the “national tax amendment bill 2007” for deliberation and it was subsequently passed into law in 2010. It was meant to widen and improve the machinery of tax collection. Included was the Company’s Income Tax Amendment Act, 2007 (CITA) that streamlines the provisions of the CIT. The establishment of the Federal Inland Revenue Service (FIRS) under an independent statute was to adopt a simple tax system with a low tax burden comprising a few broad-based taxes. The Nigeria Company Income Tax rate currently stands at 30%.

Ever since Companies Income Tax Ordinance was enacted in 1939, the federal government of Nigeria has maintained exclusive jurisdiction over the taxation of companies. Companies Income Tax is a compulsory levy by government on the profits made by registered companies in Nigeria and it is a sub-set of an example of a direct tax because the incidence of payment and burden of tax are borne by the companies and cannot be transferred to a third party. The relevant tax authority charged with the responsibilities of assessing and collection of Company Income Tax (CIT) is the FIRS.

STATEMENT OF PROBLEM

The contribution of tax revenue including Company Income Tax does not look like it is significant compared to total revenue generated. There are records that total revenue derived from taxation between 1990-1998 and 2000-2012 petroleum profit tax generated an average of 66.0% and 72.09% whilst Company Income tax on the other hand generated an average of 4.8% and 13.76%, also taxation hardly contributes more than 4% of the GDP in government revenue (CBN, 2006, 2012). Recently, the Minister of Finance stated that about 75% of registered firms were not in the tax system and 65% of them had not filed their tax returns in the 2years preceding the report. Further reports, over N80 billion was lost monthly from these companies, estimating the total CIT leakages in that period to about \$250million (Iweala, 2013).

Nigeria’s total tax revenue was 8.6% of Gross Domestic Product (GDP) in 2012 and 7% in 2013 this is far from International Monetary Fund (IMF) generally acceptable sustainable threshold of 15% tax revenue share to GDP. According to FIRS Report (2013), the implementation of CIT in Nigeria is deep in litigations,

there are issues between British America Marketing Nigeria Limited which has dragged the Federal Inland Revenue Service (FIRS) before the tax appeal tribunal, Oando also has taken FIRS to the same tribunal on the same issue of tax assessment of N61.52 million for 2004.

Recognizing the need for improved and sustained efforts by government to raise revenue in Nigeria as a matter of urgency, the study therefore assesses the contribution of Company Income Tax to revenue generation in Nigeria in a bid to assess its potentials of salvaging the threatening financial crisis. The focus on the CIT handle is as a result of the large number of company not capture in the tax net and even those captured there are incidence of tax evasion and avoidance hence having adverse consequence on revenue.

OBJECTIVES OF STUDY

The specific objectives of the study are to: (i) evaluate the contribution of CIT to revenue generation in Nigeria and (ii) analyse the major macroeconomic determinants of CIT revenue in Nigeria. The null hypotheses of the study tests are that CIT does not contribute significantly to revenue generation in Nigeria and there are no significant macroeconomic determinants of CIT revenue in Nigeria. The method of analysis is the Ordinary Least Square (OLS) multiple regression and Co-integration Test under the theoretical framework of Adam Smith’s Economy Principle and Public Finance Experts’ Revenue Productivity Theory.

Company Income Tax and Revenue Generation

A Company is defined by Section 93 (1) of the Companies Income Tax Act CAP 60 Laws of the Federation of Nigeria (LFN), 1990 as “any company or corporation other than a corporation sole, established by or under any law in force in Nigeria or elsewhere”. The registration of limited liability companies is being carried out by the Corporate Affairs Commission (CAC) in Nigeria. The world Limited (Ltd) or Public Company (Plc) is expected to end each name of a registered company.

Companies’ Income Tax is a compulsory levy by government on the profits made by the registered companies. This type of tax is a sub-set of direct taxes because the incidence of payment and burden of the companies’ income tax are borne by the companies and not transferable to third parties. The relevant tax authority charged with responsibility of assessing and collection of companies income tax among others is the federal Inland Revenue service (FIRS) under the supervision of a board called Federal Board of Inland Revenue (FBIR). It deals with the taxation of all limited

liability companies in Nigeria with the exception of those engaged in petroleum operations.

Ariwodola (2000) emphasized that Companies Income tax is chargeable on: (i) The global profits of Nigerian companies irrespective of whether or not they are brought into or received in Nigeria. (ii) The portion of the profits of non-Nigerian companies derived from such companies operations in Nigeria. (iii) Dividends, interests or royalties due to non-Nigerian companies which are assessed at ten percent (10%) withholding tax rate. Company Income tax is chargeable on the income of all companies operating in the country except those specifically exempted under the Act. There is some emphasis in the Act on the distinction between Nigerian and non-Nigerian companies. A Nigerian company is defined as one incorporated under the Companies and Allied Matters Act, or any enactment replaced by that Act. The total profits of such company are assessable to Nigerian tax irrespective of whether or not all the profit have been derived from, brought into or received in Nigeria. A foreign company (non-Nigerian company) is defined as any company or corporation established by or under any law in force in any territory or country outside Nigeria, that is a company that is not incorporated under the Companies and Allied Matter Act. The profits of a non-Nigerian company shall be subject to Nigerian tax only to the extent to which such profits are attributable to the company's operations in Nigeria subject to provisions in the respective double taxation agreements if any is available with the country where the foreign company is registered.

In defining public revenue, Anyafo (1996), maintains that revenue generation is a direct policy of the government which involves the manipulation of parameters that directly affect government income and expenditure. The use of tax as an instrument of fiscal policy to achieve maximum revenue to achieve macroeconomic stability is acceptable has become paramount.

According to James (2008) tax administration is the process of assessing and collecting taxes from individuals and companies by relevant tax authorizes, in such a way that current amount assessed is collected efficiently and effectively with minimum tax avoidance or tax evasion. The administration of taxation on the profit of incorporated companies is vested on the federal board of Inland Revenue service (FIRS) (section 1 (1) CITA).

THEORETICAL FRAMEWORK

This study is hinged on Economy Principle and Revenue Productivity Theory. Adam Smith argues that it makes little sense to institute a tax system for which

the cost of collection is higher than the realized tax revenue. Scholars like David Ricardo and J.S Mills emphasized this distinction by putting revenue first in their division of public finance into three namely; "revenue, expenditure and public debt". Also, Public Finance Expert based their arguments principally on Revenue Productivity as important criteria for judging a good tax system. This theory lay emphases on having a large tax base to cover minimum cost through efficient tax administration by providing direction towards more productive endeavors through lowering the tax rates, eliminating tax on tax and widening the base so as to enforce compliance because this are likely to provide this sort of platform. The taxes introduced should be appropriate and sufficient to finance the expenditure needs of the government over time. Well-designed tax systems would encourage competitive growth across various sectors of the economy with high prospect of tax revenue. An effective CIT tax system will encourage an efficient economy and provide an environment conducive for business, thereby reducing the costs. When taxes fund the essential 'public goods' like public security and the 'rule of law' on which company income depends. It promotes Revenue Productivity.

EMPIRICAL REVIEW

Mutti (2003) considers the determinants of changes in corporate income tax rates across countries. The analysis focuses on 60 countries in the years 1984, 1992, and 1996. Mutti finds that small countries and countries with higher initial statutory tax rates are both likely to see greater reductions in their statutory corporate income tax rate than other countries.

Swiston, Mühleisen and Mathai, (2007) consider the role of personal and corporate income tax, capital gains and income distribution as factors explaining the vast majority of variations of tax revenue. Swiston et al.'s analysis of time series adjusted for tax policy changes suggests that corporate income tax is the most volatile revenue component. They conclude that because of capital income volatility over the analysed business cycle, the observed surge in tax revenue buoyancy is a temporary phenomenon.

Ekeoha, Ekeoha, Malaolu, Onyema (2012) investigated revenue implications of Nigeria's tax system from 1970 to 2008, using Co-integration test and posited that company income tax and personal income tax are the most economically sensitive, responding positively to changes in the current state of the economy, moving in close step with the economy and falling when the economy declines.

Duru, (2009) postulates in his research that many corporate bodies keep different sets of financial reports

including statement of profit and loss balance sheet. He also asserted that many individual and corporate bodies set up non-profit making organizations including non-governmental organizations (NGOs) and religious bodies and siphoned profit recorded by various corporate bodies through donation to such organizations purposely to reduce the amount of tax paid.

Ebeke and Ehrhart (2010) in their work, the sources and consequences of the instability of tax revenue in sub-Saharan Africa countries, using panel for 39 countries over the period 1980-2005, gave credence to Loayza et al (2007), Diallo (2009), that tax revenue instability in sub-Saharan Africa is leading to public investment and government consumption instability which in turn generates lower public investment ratio and is therefore detrimental to the long term economic growth.

Adegbe and Fakile (2011) concentrated on the Company Income tax and Nigeria economic development relationship. Using Chi-square and multiple linear regression analysis in analyzing primary and secondary data respectively, they concluded that there is a significant relationship between company income tax and Nigerian economic development. And that tax evasion and avoidance are major hindrances to revenue generation as income tax revenue has generally been grossly understated due to improper tax administration arising from under assessment and inefficient machinery for collection (Ola, 2001; Oluba, 2008). There are few literature on CIT and revenue generation in Nigeria. The few that exist did not examine CIT as a single tax handle, but in aggregation with other sources of revenue. Hence, little emphasis is given to its contribution, determinants and analysis. This paper also focuses on investigating the long-run relationship because of the quest to examine its potential for increasing government's revenue generation activities.

MODELS, RESULTS AND DISCUSSIONS

To examine company income tax potentials on revenue generation in Nigeria, this study took a cue from Ekeoha, Ekeoha, Malaolu, Onyema (2012) and Okwori and Ochinyabo (2014), whose theoretical underpinning centers on Adam Smith's Economy Principle and Public Finance Expert (United Nation Summit) (2002) Revenue Productivity Theory. However, in this study, the models are modified to fit the stated objective. Data for the study were obtained from various CBN Bulletins, National Bureau of Statistics [NBS] which cover the period 1987-2013. The time period is adopted because it makes the work contemporary, as it covers the period of the inception of the Companies and Allied Matters Act (CAMA Act) in 1990 to a recent period. The first hypothesis to be test is CIT does not contribute

significantly to revenue generation in Nigeria and the mathematical form of the model is;

$$TDT = F(CIT, PPT, OOR, PIT) \quad (1)$$

The Mathematical form is

$$TDT = b_0 + b_1 CIT + b_2 PPT + b_3 OOR + b_4 PIT + U_t \quad (2)$$

Where:

TDT = Total Direct Tax ; CIT = Company Income Tax;

PPT = Petroleum Profit Tax

OOR = Other Oil Revenue; PIT = Personal Income Tax;

U_t = Error Term

The ADF test was employed to check the stationarity properties of the series and table 1 holds the results.

Table 1: Stationarity Test

Variable	ADF Test Statistic	Critical values			Prob.	Order of integration
		1%	5%	10%		
TDT	-5.64	-3.71	-2.98	-2.63	0.0001	I(0)
CIT	-5.36	-3.71	-2.98	-2.63	0.0002	I(0)
PPT	-5.09	-3.72	-2.99	-2.63	0.0004	I(0)
OOR	-4.94	-3.72	-2.99	-2.63	0.0006	I(0)
PIT	-4.79	-3.71	-2.98	-2.63	0.0007	I(0)

Source: Author's Computation from Eviews7 in Appendix

From the unit root tests results, all the variables (TDT, CIT, PPT, OOR and PIT) are integrated or stationary (that is no unit root) at level I(0). These results allow us to directly estimate the model using the OLS technique and table 2 holds the OLS results.

Table 2: Ordinary Least Square Results

TDT	=	-15.23	+ 0.42CIT	+ 0.33PPT	+ 0.50OOR	+ 0.02PIT
SE	=	[5.77]	[0.14]	[0.04]	[0.05]	[0.003]
t*	=	(-2.64)	(2.96)	(7.99)	(10.55)	(4.89)
R ²	=	0.916585;	R ² = 0.901418;		D.W = 2.72;	
F-Stat.	=	60.43524;	Prob. = 0.000000			

Source: Author's Computation from E-views 7.0 in Appendix

The coefficient of CIT is positive and correctly signed and statistically significant at 5% level of significance. This implies that, a unit increase in CIT will lead to 0.42 increase in TDT. The test of significance indicates that, the parameter estimate is statistically significant in influencing positively the long run growth of the revenue generation in Nigeria this agrees with economic theory. This result is in line with the findings of Ekeoha, Ekeoha, Malaolu, and Onyema, (2012). The small magnitude is a reflection of the contribution so far which Duru, (2009), Ola (2001) and Oluba (2008) separately stated has been grossly understated due to improper tax administration, assessment and collection. Adegbe and Fakile (2011) in their study on company income tax – asserted that tax evasion and avoidance are major hindrances to revenue generation. It is also a

pointer to the size of the room for improvement in its contribution. Overall, the results show that if the long run relationship is nurtured, CIT can serve as a source of finance that can grow to make significant contribution to development financing in Nigeria and helping to tackle poverty in the long run.

The second model to capture objective two and test the H_{02} is stated below;

$$CIT = F(FDI, INTR, CPI, INFL, EXR) \quad (3)$$

The Mathematical form is

$$CIT = b_0 + b_1FDI + b_2INT + b_3CPI + b_4INFL + b_5EXR + U_t \quad (4)$$

Where:

CIT = Company Income Tax, FDI = Foreign Direct Investment; INTR = Interest Rate; CPI = Corruption Perception Index proxied for Tax Evasion; INFL = Inflation Rate; EXR = Exchange Rate; U_t = Error Term. Symbolically; $b_1, b_3, >0$, $b_2, b_4, b_5, <0$

Unit Root Test

This section analyses the major macroeconomic determinants of CIT revenue in Nigeria. A unit root test was also carried out to check the stationarity properties of the series in which case the ADF unit root test was used for this purpose.

Table 3: Stationarity Test

Variables	Level	1 st Diff.	Critical values			Prob.	Order of integration
			1%	5%	10%		
CIT	5.10	-9.76	-3.72	-2.99	-2.63	0.0000	I(1)
FDI	0.02	-6.72	-3.72	-2.99	-2.63	0.0000	I(1)
INTR	-0.06	-6.54	-2.66	-1.96	-1.61	0.0000	I(1)
CPI	-0.23	-6.84	-3.72	-2.99	-2.63	0.0000	I(1)
INFL	-1.15	-4.42	-3.77	-3.00	-2.64	0.0024	I(1)
EXR	-0.58	-4.84	-3.72	-2.99	-2.63	0.0007	I(1)

Source: Author's Computation from E-views 7.0

From the unit root tests results, all the variables (CIT, FDI, INTR, CPI, INFL,) are integrated or stationary (that is, does have a unit root) at the first difference that is I (1). This result requires that Co-integration tests be carried out.

Co-integration Result

The Johansen hypothesized co-integration was carried out to determine the number of stationary long-run relationship among the variables included in the study. It offers two tests, the trace test and the Max-Eigen value test, with a view to identifying the number of co-integrating relationships. The results are shown in the tables 4 below:

Table 4: Cointegration Test

Null hypothesis	Trace statistic	0.05 critical value	Null hypothesis	Max-Eigen Statistic	0.05 critical value
$r = 0^*$	108.1065	83.93712	$r = 0^*$	48.54398	36.63019
$r \leq 1$	59.56249	60.06141	$r \leq 1$	23.32253	30.43961
$r \leq 2$	36.23996	40.17493	$r \leq 2$	15.72941	24.15921
$r \leq 3$	20.51055	24.27596	$r \leq 3$	14.16051	17.79730
$r \leq 4$	6.350035	12.32090	$r \leq 4$	4.566356	11.22480
$r \leq 5$	1.783678	4.129906	$r \leq 5$	1.783678	4.129906

Source: culled from Appendix

Both Trace and Max-Eigen test indicates 1 co-integration equation(s) at the 0.05 level *denotes rejection of the hypothesis at the 0.05 level. **Mackinnon – Haug – Michelis (1999) p –values

Table 4 revealed that there is co-integration among the variables. This is because the Trace and Max-Eigen Statistic of 108.11 and 48.54 is greater than the critical values of 83.94 and 36.63 at 5% level of significance respectively. Accordingly, Trace and Max-Eigen statistic test indicates 1 co-integrating equation at 5 percent level of significance.

The Long Run Model

The long run relationship existing between the variables is shown in the model below:

$$CIT = 0.27FDI + 1.07EXR + 2.96INFL - 21.64CPI - 6.67INTR$$

(0.12) (0.16) (0.38) (012.78) (0.82)

Source: Author's extract from E-views 7.0 results

Note: The standard errors are stated in parenthesis.

From the equation above, the coefficient of FDI is positive and correctly signed. This implies that despite the flow, FDI has the potential to improve CIT in the long-run. FDI flows to the country have been substantial but the size shows that other sectors apart from manufacturing which companies benefit more. The dominance of higher foreign investments in oil may account for the majority of FDI inflows. The coefficients of exchange rate and inflation in the model above are positively signed and do not conform to a priori expectation. The coefficient of CPI, proxied for Tax Evasion is -21.64 and INTR which are negatively signed and conform to a priori expectation. From the equation above, a 1% change in corruption perception index causes the company income tax revenue to decrease by 21.64% of that unit change. This is in line with the findings of Ola, (2001); Oluba, (2008). Similarly Adegbe and Fakile (2011) also asserted that tax evasion and avoidance are major hindrances to revenue generation in Nigeria. Improving CIT's contribution will require reduction in tax evasion.

Further, a 1% increase in interest rate (INTR) decreases Company Income Tax Revenue by 6.67% of that unit change. This is in agreement with Hinricks, (1966) theory, of negative relationship between inflation, interest and tax revenue and also in the work of Ebeke and Ehrhart (2010). Higher costs of capital will reduce company's output and profits and CIT. The results here show that increased FDI can increase CIT significantly and so as FDI is sought, it should be directed to the manufacturing sector whose improvements will expand the CIT bases. The results also affirm that rising inflation and fluctuating exchange rates reduce the potentials for higher CIT. Deliberate effort must be made by the government to deal with these variables in the best way so that the easing potentials of CIT can be improved, and harnessed as an alternative source of financing for development.

CONCLUSION AND POLICY RECOMMENDATIONS

Having tested the two hypotheses to examine the contribution of Company Income Tax to revenue generation in Nigeria and to evaluate the major macroeconomic determinants of Company Income Tax revenue in Nigeria; paper concludes that there is a positive and significant relationship between company income tax and revenue generation in Nigeria. The sign of the coefficient is the index of potential which is a good sign. This potential can be sustained if productive bases expand and in Nigeria, there is plenty of room. This will have an interesting multiplier as increasing companies, generate employment and incomes and increased welfares all in one package. The size of the coefficient is however small showing that there is plenty

of room to extend its coverage. Secondly, foreign direct investment as one of the major macroeconomic determinants of company income tax revenue contributed little to revenue generation component of company income tax. FDI needs to be sought and directed to companies especially in manufacturing. The coefficient of CPI and INTR depicts negative relationship in the long run. These are indications of the fact that interest rates must set out levels that encourage production and tax evasion must be seriously and consistently tackled so that the CIT accruing to government is collected as at and when due.

Based on the findings, the study recommends:

FIRS should properly monitor the activities of companies to achieve optimum collection of taxes payable to the government as CIT is a potential source of alternative income as well as improve condition for companies to flourish. FIRS should be engaged in discussions to learn what limits their optimal performances and then it should be empowered to succeed. CIT will increase if the tax bases also increase. The provision of an environment with the required infrastructure, and monetary policies cannot be overemphasized and must be pursued deliberately in order to increase the existing tax base.

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SOCIAL IMPACT ASSESSMENT PROCESS FOR SUSTAINABLE SOCIAL ENTREPRENEURSHIP

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ABSTRACT

Sustainable social entrepreneurship (SSE) is a kind of entrepreneurship that meets the needs of the present without compromising the ability, efficiency and values of future generations to meet their own needs. SSE leads to sustainable development. Social entrepreneurs were developed through well-conceived and well directed training programmes around thrust areas, thus advancing the frontiers of theories and practice SSE. The concept of SSE challenges that fosters long-term protection of the society, environment and its habitants as the technological or engineering developments are guided by efficiency, productivity, profitability, health and environmental impacts, resource and energy conservation, waste management, and social impacts such as public convenience, unemployment and crime. The design of the study is cross sectional. SIA is defined as the systematic identification and evaluation of the potential social impacts of proposed projects, plans, programs, policies or legislative actions relative to the socio-economic components of the society and total environment. Social factor has been considered in project planning and decision-making process in order to arrive at action which should be socio-economically compatible. Environmental health impact assessment process has been conducted in order to mitigate the environmental health impacts. Socio-economic environment is a man-made environment related to a set of considerations such as demographical study including population trends and population distribution, population interaction and interrelation to the social problem and solution, economic indicators of human welfare services, educational systems, transportation systems, environmental protective infrastructural facilities such as water supply system, waste water treatment system, solid and hazardous waste management, resource conservation and recovery process, environmental public health services and medical facilities. Social impact assessment process should be enacted as social policy act in order to encourage the considerations of human society in project planning and decision making process. Extension learners were equipped with the knowledge, skills and motivation to set up their sustainable social enterprises and function dynamically and manage successfully. DPRs proposed by learners have been investigated as per guidelines provided by EDI. Entrepreneurial business planning assessment regimes (EBPARs) have been accomplished for their credibility and communicability. DEBM projects were screened for the seven fatal flaws viz., (i) Scientific feasibility, (ii) technical feasibility, (iii) economic feasibility, (iv) marketing feasibility, (v) environmental feasibility, (vi) social feasibility and (vii) fundamental legality. Social entrepreneur of an entrepreneurial team should need skills in ethics, accounting, law, finance, team creation and marketing aspects in order to avoid failures in the process. The result analysis of forty- three learners has been discussed. Based on comprehensive socio-economic analysis, a green socio-economic system model has been presented. A famous project case of a DPR-I has been presented on unsafe chromium pollution and contamination of about 18 000 to 30 000 mg/kg from Indian cotton roller ginneries and development of green design roller gin rollers for cotton gins duly investigated in a ginning factory. Such low-carbon and energy-efficient agricultural technologies of agricultural hi-tech industries have made important contributions to mitigating the impacts of economic growth on global warming. Hitherto state-of-the-art literatures, market effects have been considered. It is reported that non-market impacts such as social and environmental impact assessment should be considered for proposed projects, plans, programs, policies and legislative action. It is concluded that this action-based and extension learning field study on SSE shall promote sustainable socio-economic policies for sustainable development and poverty alleviation.

KEYWORDS: action, efficient, entrepreneurship, environmental impact assessment process, project, social impact assessment (SIA) process, transformation

INTRODUCTION

Entrepreneurship is a process of setting up of new enterprises to pursue opportunities (Legg, 2004). An entrepreneur, who organizes, manages, assumes risks

and enjoys profits of enterprise or business successfully (Iyer, 2014). Social entrepreneurship is introduced which is as a process of setting up of social enterprises at considerable risk. Social entrepreneurship has been

involved all the functions, activities, and actions associated with the perceiving of new sustainable social opportunities and the creation of sustainable social enterprises to pursue them. Social entrepreneurs perceive new social opportunities and create social enterprises to pursue it (Iyer, 2014). The concept of sustainable development challenges that fosters long-term protection of the environment and its habitants as the technological developments are guided by efficiency, productivity, profitability, health and environmental impacts, resource and energy conservation, waste management, and social impacts such as public convenience, unemployment and crime (Hendry, 2004). A sustainable social entrepreneur combines efficiently and effectively of six kinds of input resources can be referred to as “The six Ms” such as man-power, machinery, material, method, money and market in order to transform to output social goods, products or services (Iyer, 2013). Social entrepreneurs consider the human society in project planning and decision making and to arrive at actions which are more socially compatible plans. The concept of sustainability can become success when the resources do not get depleted due to business endeavors. The expert counselor and coordinator and author has got an autonomy to conduct one year Diploma in Entrepreneurship and Business Management (DEBM) duly awarded by Entrepreneurship Development Institute of India (EDI) to forty three DEBM extension learners during the research year (RY) 2007-2014. The proposed approach is called social impact assessment process and social entrepreneurship. DEBM counselor should provide the social extension learners for necessary academic support and guidance, conduct of course work, two contact sessions, evaluation of assignments and tutorials, guidance for detailed project reports (DPR) and conduction of term end examination (TEE). All DPRs have been formulated and appraised on social products and services. DEBM course is recognized by All India Council for Technical Education (AICTE), University Grants Commission (UGC) and Distance Education Council (DEC) as per reference <http://www.debm.ediindia.ac.in>; reference agency code number 80410. Website: www.ediindia.org & <http://debmcourse.blogspot.in/>

RATIONALE AND BACKGROUND

Education coupled with entrepreneurship is an intricate sustainable social educational process that is focused on sustainable development and poverty eradication alleviation from the emerging enterprise spirit (Iyer, 2014). The poverty is a result of inefficient use of resources (Iyer, 2014). If it aids for sustenance then that can be eradicated. About 88% of socio-economic growth is created by innovation (Iyer, 2013). To achieve

this degree of excellence, resources must be utilized at optimum and sustainable levels at maximize efficiency as per the results analysis of optimum competitive and social markets (Iyer, 2014). The referred “A.K” economic model for an optimum output level of economic growth is the product of engineering or technical factor level (A) and the capital (K) (Iyer, 2014). The solution is the creation of new social enterprises by innovation. The social entrepreneurial idea generation is based on the concept of social entrepreneurship and innovation management. The economic growth development is explained by three factors which are given below:-

The natural increase in the accumulation of labor potential, Capital accumulation or money with which a business is being started and run, and Technological momentum can be referred as total factor productivity (TFP) or efficiency in industrial processes.

The fundamental socio-economic momentum keeps the capital development dynamic which comes from the new social enterprise creation process, new social products or service requirement from customers, the new methods of production and processes, new transportation, and new social markets and new forms of industrial organization as well as corporate social responsiveness.

Standard Production Function (SPF) is expressed as

$$Y = f(C, L)$$

Where Y=Output, C=Capital, and L=Labor

As knowledge is an important factor for the economic growth,

Standard Production Function (SPF) is modified as

$$Y = A(C, L) f(C, L)$$

‘A’ represents Knowledge on engineering or technical extension

Y= Output, C= Capital, L= Labor, f = Standard production function

As per the given standard production function, knowledge is a decisive production variation, innovation is required for socio-economic growth and transformation.

METHODS AND PROCEDURES

“Social impact assessment “ (SIA) has been employed as the systematic identification, evaluation and mitigation of the potential social effects of proposed projects, plans, programs, policies or legislative actions relative to the socio-economic components of the society and total environment. Prior to the enactment of Environmental Impact Assessment (EIA) process in USA during the year 1970, only technical and economic factors dominant the project planning and decision making process (Canter, 1996). Hence the proposed

approach was SIA process for the socio-economic problem.

One year DEBM course is offered by EDI and sponsored by Friedrich-Naumann-Stiftung (FNSt)-A foundation of International repute from Germany (Entrepreneurship Development Institute of India, 2011). Professional expert counselor and the author has conducted DEBM course independently to forty- three extension learners during the research year (RY) 2007-2014 in eleven batches as per EDI guidelines. EDI has provided guidelines to conduct the course as per the website reference <http://www.debm.ediindia.ac.in> .

Social entrepreneurship was the targeted research area. The methodology of the DEBM course to extension learners included self-instructional study material, assignment and tutorial study, personal counseling through professional expert counselors and contact sessions during the course. The award of the diploma is based on assessment of assignments and tutorials, DPRs submitted by the learners and performance during the final (TEE) examination. Forty three projects were submitted by DEBM learners under research guidance. List of forty-three extension learners and their academic records have been uploaded in *URL* <http://www.debm.ediindia.ac.in/counsellors/studentrecord/candidates.jsp>, and counselor code number (User ID) 80410. Website: www.ediindia.org & <http://debmcourse.blogspot.in/> http://www.ediindia.org/doc/List_of_Institutions_for_website_latest.pdf serial number 68.

Figure 1 represents the innovation track that contains a map of the sustainable social enterprise creation process

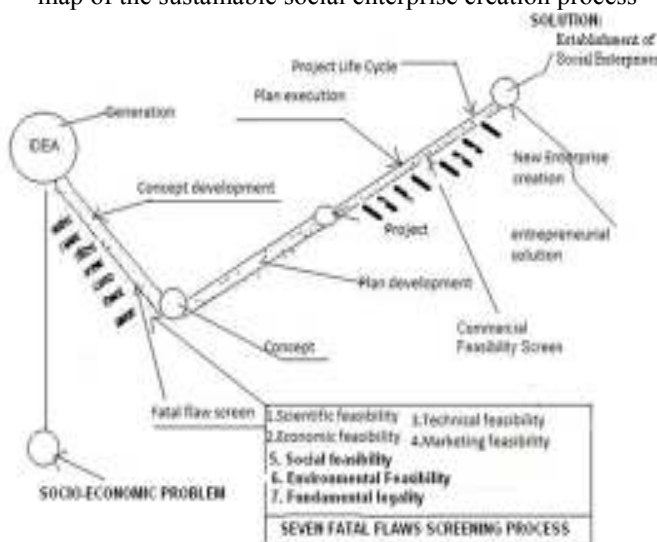


FIGURE-1 | INNOVATION TRACK AND SCHEMATIC MAP OF SUSTAINABLE SOCIAL ENTERPRISE CREATION PROCESS

All DEBM projects were screened for the seven integrated fatal flaws, namely, (i) scientific feasibility, (ii) economic feasibility, (iii) technical feasibility, (iv) marketing feasibility, (v) environmental feasibility, (vi) social feasibility and (vii) fundamental legality. A social entrepreneur or a trusted member of an entrepreneurial team should need skills in ethics, accounting, law, finance, team creation and marketing aspects in order to avoid failures in the process.

The projects were screened for socio-economic feasibility. Socio-economic absurdity for project has been tested that was whether a selling price lower than the minimum cost of its components. Therefore, a project may be technically and economically viable, but it has been formulated and appraised upon socio-economic viability as well environment sustainability (Iyer, 2014). Hence, SIA process has been conducted. Quality of Life (QOL) is described as the overall man-made environmental characteristics with respect to socio-economic environment (Canter, 1996). Information has been sought with reference to prediction and assessment (P & A) of QOL which is a part of SIA study being conducted for all DPRs through a questionnaire based on indexing system namely, (i) basic needs such as income, housing, food, clothing, (ii) well being needs such as employment, health and safety aspects, (iii) opportunity needs such as education coupled with entrepreneurial process and (iv) amenity needs such as pleasant environmental and aesthetic factors (Iyer, 2014). Social analysis of development projects has been combined with three factors of Human Development Index (HDI) for developing countries, such as income, literacy, and life expectancy (Asian Development Bank, 1991).

The importance of the conduct of SIA process is to consider social factor in an organizational planning and decision making process which will arrive at actions consistent to society and the total environment. Therefore project planning and decision-making process has been included the combined factors of technical or engineering, economical, environmental and social factors including other man-made environmental circumstances. These combined factors mathematically expressed as 'socio-economic process approach production function (SEPAPF) for an efficient socio-economic transformation theory .

$$Y = f(X_1, X_2, X_3, X_4, \dots, X_n)$$

Where, Y= Socio-economic output element and

- X₁= Socio-economic input element -1
- X₂= Socio-economic input element -2
- X₃= Socio-economic input element -3
- X₄= Socio-economic input element -4
- X_n= Socio-economic input element-n



Figure-2; Schematic Diagram of Socio-Economic Process Approach

Figure 2 depicts schematic diagram of socio-economic process approach. Figure-3 represents socio-economic process approach with important elements.

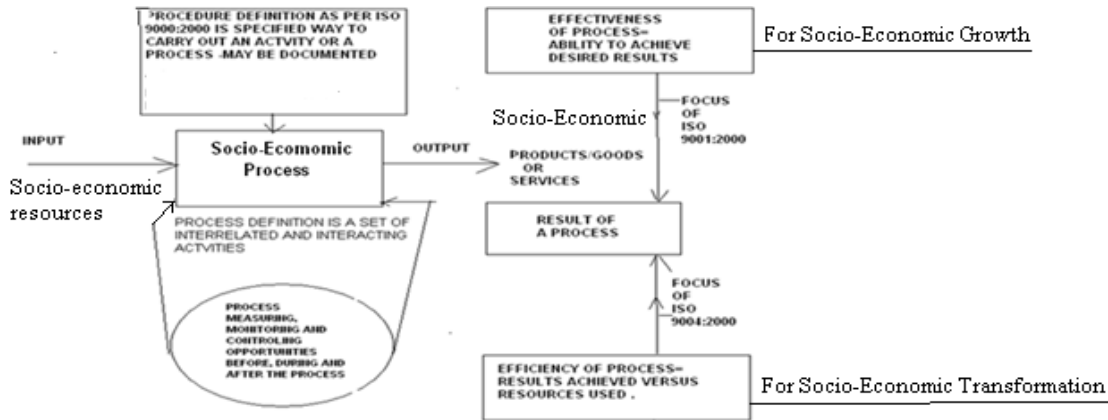


Figure-3; Schematic Representation of Socio-Economic Process With Important Elements

Project formulation and appraisal of preliminary project reports (PPRs) and detailed projects reports (DPRs) have been assessed as per the EDI guidelines during the RY 2007-2014. Socio-economic input elements have included the human society including its organizations integrated with economics. Socio-economic efficiency is defined as a ratio of socio-economic output element to socio-economic input element (Iyer, 2014). Socio-economic effectiveness is defined as the ability to achieve desired socio-economic results (Iyer, 2014). Figure 4 shows important elements of social impact assessment to predict and assess socio-economic effects.

SIA process has been applied to all projects, plans, programs, policies, legislative actions which were subjected to potential social effects. Integrative technical, economical, environmental and social alternative solution have been identified and evaluated during the preliminary project reports (PPRs). Social impact statement (SIS) describes only affected socio-economic environment (Canter, 1996). SIS has been written as a social document for concluding an efficient policy decision. SIA has included public participation in all steps resulting an efficient socio-economic transformation.

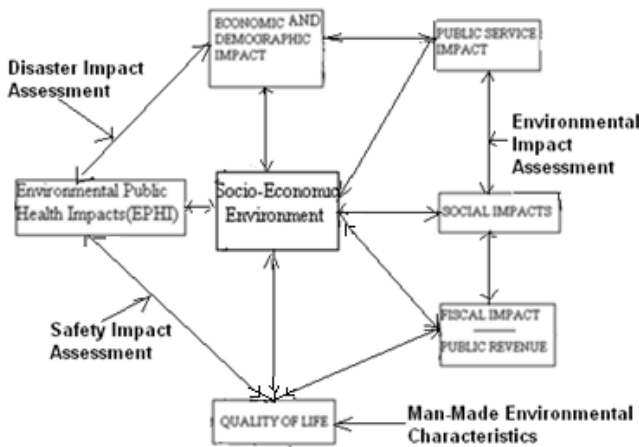


Figure-4: Important Elements of Social Impact Assessment to Predict and Assess socio Economic Impacts

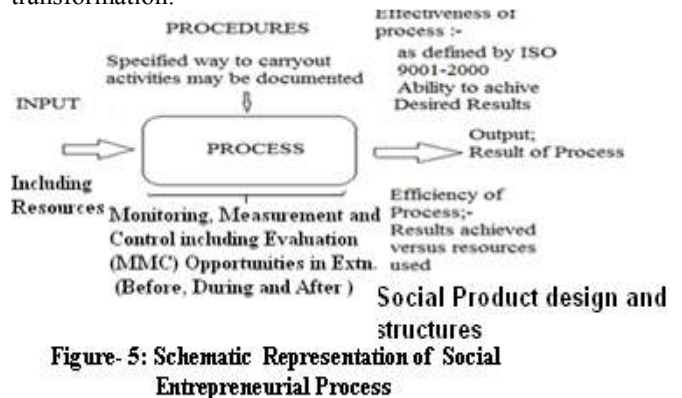


Figure-5: Schematic Representation of Social Entrepreneurial Process

Figure 5 shows schematic representation of social entrepreneurial process. It has been performed through measurement, monitoring and control opportunities for an efficient socio-economic transformation process employing socio-economic process documents and

procedures. Social Assessments (SA) were documented as mentioned in socio-economic process approach. SA describes detailed project information concerned to SIS (Canter, 1996). SIS has provided statement about the affected society. Socio-economic cost benefit analysis of proposed projects, plans, policies, programs, and legislative action have been identified and evaluated assessed by using Break-Even Analysis (BEA) and Cost-Volume- Profit (CVP) analysis as well P/V graph , cash flow diagrams . Project evaluation methods have been employed.

SIA process has been proposed as Social Policy Act (SPA) to encourage the considerations of the society in planning and decision making process. A famous project case study on airport generated municipal solid waste (MSW) reveals that only 5 % to 10% of waste is recycled or composted and remaining 90 % to 95 % discharged in to unsustainable landfills (Iyer, 2014) . An another project case study indicates that about 60 % to 65% percent of airport generated solid and hazardous

waste is recycled by intensive recycling or composting programs and thus saving is about fourfold. Carbon credit revenue of one-third is saved. Implementation of SIA and EIA processes have eliminated most of airport generated MSW and building up of solid and hazardous waste to an extent of two-third in to environment (Iyer, 2014) .

In order to make the venture a dynamic and growing social enterprise, the entrepreneurs have to skillfully bring about and manage resources efficiently to do dedicated social entrepreneurial process. A process approach has been developed in order to bring labor, capital, technology, management, market, machineries, land and information together in new ways and to establish a new mechanism for socio-economic development and eradicating poverty. A famous project case on eco-friendly rubberized cotton fabric roller development for cotton roller gins elaborates in WSEAS. (Iyer, 2014).



Figure-8: Green Design for Socio-Economical Benefits Waste Prevention and Better Material Management

All projects have been scrutinized for the fatal flaws. A famous project case study of a DPR-I on unsafe chromium contamination and pollution of 18 000 to 30 000 mg/kg from Indian cotton roller ginneries and development of green design roller gin rollers for cotton gins duly investigated in a ginning factory (Iyer, 2014). This study realizes the hazards of chromium contamination and pollution caused in the use of chrome composite leather-clad (CCLC) rollers commonly employed in Indian cotton roller ginning industries and attempts to eliminate the chromium contamination and pollution during the complete process(Iyer, 2007). The cotton roller ginning process is the mechanical separation of cotton fibres from their seeds by means of one or more rollers to which fibres adhere while the seeds are impeded and struck off or pulled loose (Gillum, 1974). Most of the cotton ginning operations

are done using roller gins. The CCLC roller coverings contain about 18 000 to 30 000 mg/kg (ppm) as total chromium of trivalent and hexavalent forms which are toxic to human health (Iyer, 2007). When the seed-cotton is ginned, due to the persistent rubbing of CCLC rollers over the fixed knives, the cotton and its products get contaminated with the total chromium of trivalent and hexavalent forms (Iyer,2007). Hexavalent chromium leaks threat to cotton mill workers and to those who wear cotton garments(Iyer, 2014). Cotton garments contaminated and polluted with toxic hexavalent chromium. Consumers of cotton garments and ginning mill workers were exposed to chromium pollution and are susceptible to health hazards. Toxic effects are produced by prolonged contact with airborne or solid or liquid chromium compounds even in small quantities. There are many chromium based diseases

that come out of the case industries (Iyer, 2014). To avert the problem in Indian cotton roller ginning factories, an eco-friendly rubberized cotton fabric roller has been designed and developed. Figure-9 shows green design gin rollers of a double roller ginning machine. Eco-friendly rollers have been successfully demonstrated for its performance (Figure-9). The objectives of DPR-I were; (1) To identify and study the environmental and health related problems existing with the present CCLC rollers employed in cotton roller ginning industries and 2) To design and develop green design cotton roller gin rollers for cotton roller gins and evaluate its performance with a particular reference to technical, economic, environmental and social aspects in cotton ginning industries (Iyer, 2014). The design of study is cross sectional .



Figure-9: Green Design of Gin Rollers of Double Roller Cotton Ginning Machine

RESULTS AND DISCUSSIONS

Entrepreneurial process is a set of inter-acting and inter-relating social entrepreneurship activities in an organized manner (Iyer, 2014). Forty three DPRs were formulated and appraised. The study material of the DEBM course and help provided by EDI counselor succeed the extension learners to set up their own social enterprises. DEBM course targeted the learners to assess their entrepreneurial competencies and understand weakness and strength to start sustainable social business. Overall the extension course equipped learners to function dynamically and acquire the requisite knowledge and skill to plan and successfully launch their own ventures. The result analysis of all projects have been uploaded in website reference <http://www.debm.ediindia.ac.in/counselors/studentrecord/candidates.jsp>, and counselor code number (User ID) 80410. Website: www.ediindia.org & <http://debmcourse.blogspot.in/>

Success of a good social entrepreneur is determined by a sustainable business plan development (Iyer, 2014). Business plan is an important document that provides critical aspects, basic assumptions, and financial projections regarding the business venture (Iyer, 2014). It is the basic document used to interest and attract financial support (Iyer, 2014). All entrepreneurial

business planning assessment regimes (EBPARs) have been appraised for their credibility and communicability. A sustainable social entrepreneurial process includes four key ingredients:

- ❖ A talented lead sustainable social entrepreneur with a balanced and compatible team.
- ❖ A technically and environmentally sound and marketable idea for green products or service.
- ❖ A thorough venture analysis leading to a complete sustainable social business plan.
- ❖ A clear statement of the cash required, phased over the period until the venture becomes cash flow positive and an indication of the minimum equity component.

DEBM extension learners were focused to work on social products and services during the RY. Social enterprises have reduced social and environmental impacts associated with the manufacture, use and disposal of products. The resultant output of green social products and services that are sustainable production, environmental advantages with good performance and price (Masters, 2008). A famous case study of a DPR on unsafe chromium contamination and pollution from Indian cotton roller ginning industries and development of green design rollers for cotton roller gins duly investigated and demonstrated in a cotton ginning factory. Such low-carbon and energy-efficient agricultural technologies of agricultural hi-tech industries have made important contributions to mitigate the impacts of economic growth on global warming. SSE has provided innovation to improve science and technology (S & T) and sustainable rural mechanization for mitigation of poverty (Iyer, 2014). All DEBM extension learners were equipped with the knowledge, skills and motivation to set up their sustainable enterprises and function dynamically and manage successfully. The DEBM programme has promoted the application of multidisciplinary technologies to industries and sustainable production and quality .

All DPRs are accessed from the reference website <http://www.debm.ediindia.ac.in>.

Website: www.ediindia.org & <http://debmcourse.blogspot.in/>

As per the characterization and assessment of DEBM extension learners, guidelines are presented with respect to entrepreneurial requirements to become a sustainable social entrepreneur and to set up sustainable enterprise (Iyer, 2013). Nevertheless step number 6 has been researched and proposed solution approach on SSE.

Step- 1: Decision to be self-employed to become a social entrepreneur and to set up a social Enterprise.

Step- 2 : Social product and innovative process selection including marketing feasibility .

Step -3 : Deciding on size of the unit

Step -4 : Location of the unit

Step- 5 :Technical and economical feasibility of the unit
Step- 6 :Environmental and social feasibility of the unit.
Step -7 :Awareness on statutory requirements including fundamental legality.
Step -8: Infrastructures for the unit
Step -9 : Working out project cost
Step -10: Provisional micro, small and medium scale industry (SSI/MSME) registration
Step- 11: Bio-data of the social entrepreneur
Step- 12: Preparation of sustainable social business plan
Step- 13: Project implementation schedule (PIS)
Step -14: Project report preparation –Bankable project report
(Preliminary project report and detailed project report)
Step- 15 : Financial assistance for setting up a social enterprise.

A project may be technically and economically feasible but has been implemented only if environmentally and socially feasible. Environmental impact assessment (EIA) is defined as the systematic identification and evaluation of the potential projects, plans, programs, or legislative actions relative to the physical-chemical, biological, cultural, and socio-economical components of the total environment(Canter, 1996) . The purpose of the EIA process was to encourage the consideration of the environment in planning and decision making and to ultimately arrive at actions which are more environmentally compatible. Hitherto environmental and social factors are combined as an environmental impact assessment (EIA) process or National Environmental Policy Act (NEPA) process in USA (Canter, 1996). The unknown and contribution to the knowledge has been identified and evaluated that should separately consider social and environmental factors in a project planning and decision-making process. Hence, it is very important to conduct social impact assessment (SIA) separately for all projects.

This action-based research study on social entrepreneurship promoted policy recommendation to identify and evaluate social policies in order to transform an efficient socio-economic development. In SIA Process, such of those social assessments (SAs) which were involved considerable severity impacts (or effects) to the human society require to write Social Impact Statements (SIS). Such of those SAs which did not involve considerable severity of impacts to the human society have not been described SIS. SISs are prepared for land , air and water pollution (Iyer, 2011). Strategic social assessment (SSA) has been applied to the SIA process .Ten-step methodology for SIA study has been followed .

SIA study has been involved based on the following activity -based management approach with public involvement in all steps;

1. Definition of a socio-economic problem
2. Identification of socio-economic effects
3. Evaluation of socio-economic effects
4. Prediction and assessment (P & A) of socio-economic environment
5. Statement of significant finding
6. Public Participation
7. Solution for the given socio-economic problem such mitigation strategy
8. Incorporation of mitigation measure
9. Reviewing action plan
10. Continuous project improvement.

Conduct of Social Impact Assessment (SIA) Study

After the Second World War, both the industrial and urban development are severely affected the society and total environment towards unsustainable development in terms of copious amount of building up of solid and hazardous waste (Iyer, 2011). This rapidly deteriorates land, air and water quality as well quantity including sanitation and quality of life (Canter, 1986). Hence it was an important to consider social factor in planning and decision making of proposed projects, plans, programs or legislative actions in order to alleviate or mitigate the social and environmental impacts. Socio-economic environment is a resultant of man-made environment (Canter, 1996). It was related to a wide range of considerations concerned to human society in the environment. The various considerations of the present study for an efficient transformation of socio-economic environment were concerned to demographical study including population trends and population distribution , population interaction and interrelation to the social problem and seeking solution, economic indicators of human welfare services such as quality of life , sustainability index, human development index, educational systems providing higher education and advancement in education and research, transportation systems , environmental protective infrastructural facilities such as water supply system, waste water treatment system, efficient solid and hazardous waste management, resource conservation and recovery(RCR) environmental public health services , medical facilities and qualified as well as experienced faculty in Higher Educational Institutions (HEIs).

It is reported that at present only minimum amount of industrial generated waste is being recycled or composted (Iyer, 2014). For most industrial waste about 60 % to 65 % could be recycled or composted and potentially saving of fourfold with intensive recycling or composting programs. This research experience has shown that about 65% percent of the solid and hazardous waste has been recycled and thus saving of four times in terms of socio-economical cost.

Design and development of green economic system modeling for an efficient Social economic transformation

Based on the economic system model study, SIA and EIA processes , comprehensive and green socio-economic system models are discussed in self

explanatory figures 10 to 16 . These economic system models have been designed and developed based on traditional, free market, social , and mixed economic system models which are in self-explanatory figures 10-16 .

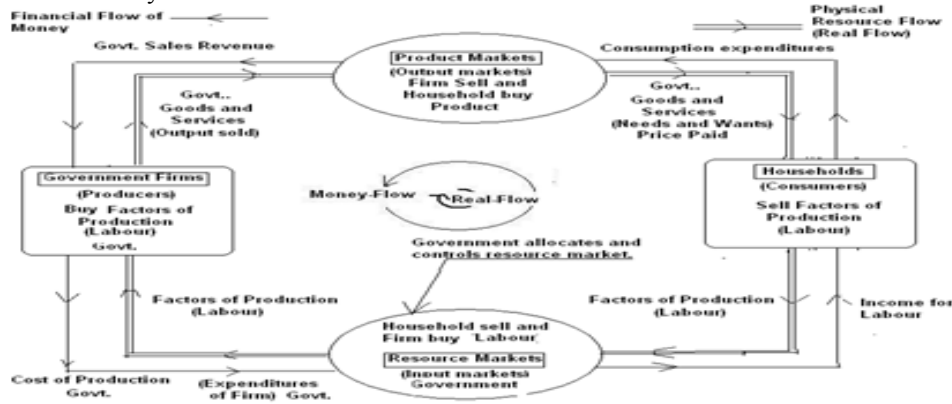


Figure -10; Circular Flow Economic Model of Command Economy for Exchange of Resources with Money

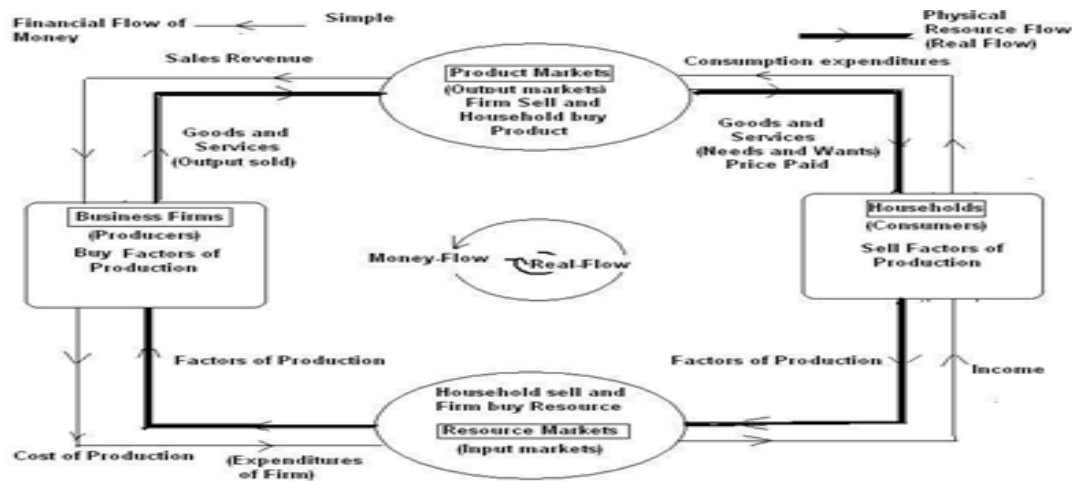


Figure-11: Circular Flow Economic System Model of a Free-Market Economy for Exchange of Resources with Money

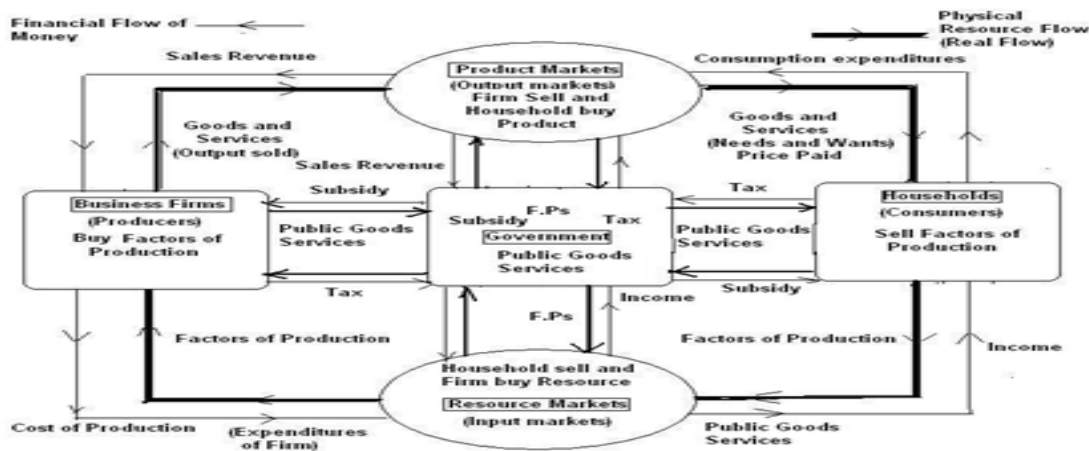


Figure- 12: Circular Flow Economical System Model of a Mixed Economy for Exchange of Goods and Services

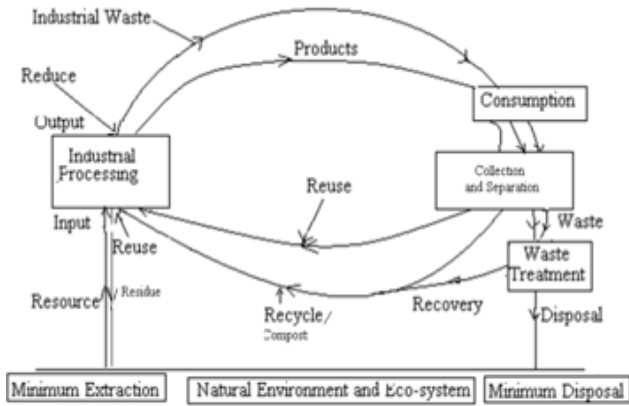


Figure-13: Closed-Loop Shaped Green Economical Model

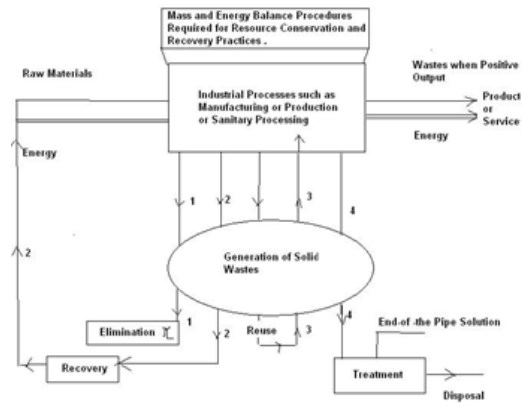


Figure-16: An Efficient Model of Industrial Process for Sustainable Socio-Economical System

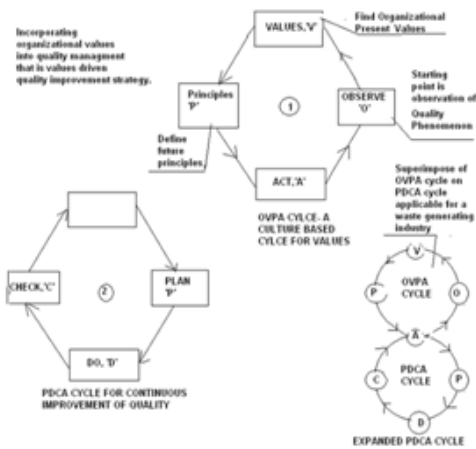


Figure-14: Expanded PDCA cycle for Resource Conservation and Recovery (RCR) for green economical system

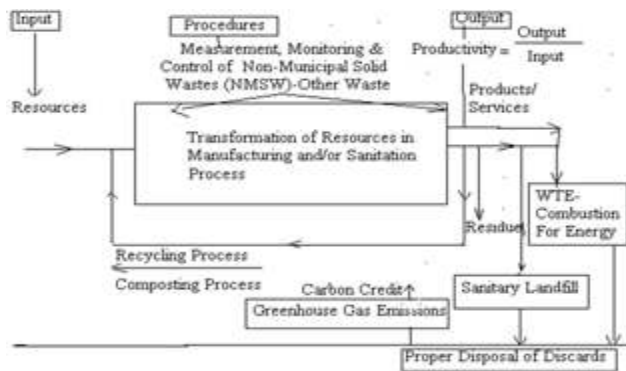


Figure 15 Process Model for Green Economy

CONCLUSIONS

Social impact assessment process has been proposed for sustainable social entrepreneurship which is defined as the systematic identification and evaluation of the potential effects of proposed projects, plans, programs, policies or legislative actions relative to the socio-economic components of the society and total environment. Prior to the implementation of environmental impact assessment (EIA) process, only technical and economic factors dominant in the project planning and decision making process. It is concluded that the project planning and decision making process should consider the integrated considerations of technical or engineering, economics, environment and social factors. It is necessary to consider separately the factor of human society in project planning and decision-making process of proposed projects, plans, programs, policies or legislative actions which is called Social impact assessment process or social policy act process. Environmental public health impact (EHIA) assessment as part of SIA process has been conducted in order to mitigate the environmental health impacts that were likely to occur in the socio-economic environment. A famous case study on airport generated MSW has been discussed.

Sustainable social entrepreneurs should be developed through well-conceived and well directed extension learning and training programmes around thrust areas, thus advancing the frontiers of theories and practice sustainable social entrepreneurship. This action-based research and extension learning field study shall provide an avenue for sustainable development and poverty alleviation through a proposed innovative process approach called an efficient socio-economic transformation process. Sustainable social entrepreneurship that challenges and prospects that fosters long-term protection of the society, total environment and its habitants as the technological

developments are guided by efficiency, productivity, profitability, health and environmental impacts, resource and energy conservation, waste management, and social impacts such as public convenience, unemployment and quality of life. The development of new knowledge is an important factor for the socio-economic growth. The standard production function has indicated that knowledge is a decisive production variation. About 88% of socio-economic growth is created by innovation. The most important of these considerations can be referred to as “The four *Es*” (engineering or technical, economics, environment and ethics) in planning and decision making process. A project or business plan may be technically and economically feasible but should be implemented only if socially and environmentally sustainable. A process approach has been proposed as a solution in order to bring labor, capital, technology, management, social market, machineries, land and information together in new ways and to establish a new mechanism for sustainable development and poverty alleviation. Monitoring, measurement and control opportunities before, during and after the process have been identified and evaluated in a socio-economic system by means of a process approach during the RY.

The objective of the DEBM course is “New Sustainable Social Enterprise Creation and Management”. DEBM course have developed motivation to extension social learners and reinforces social entrepreneurial traits with the spirit of setting up sustainable social enterprises. Forty-three social projects have been proposed by DEBM extension learners attached with the counselor as well author during RY 2007-2014. Counselor has formulated and appraised all DPRs. Projects were screened for seven fatal flaws, viz., (i) scientific feasibility, (ii) technical or engineering feasibility (ii) economic absurdity and feasibility, (iii) marketing feasibility, (iv) social feasibility, (v) environmental feasibility and (v) fundamental legality. All EBPAs have been appraised for their credibility and communicability. All social entrepreneurial learners have set up their own sustainable social enterprises based on a sustainable social enterprise creation process under the research guidance of expert counselor as well author. Social enterprises were established to focus on social products and services that reduce social and environmental impacts associated with the manufacture, use, service and disposal of products. The results were socially and environmentally advantages with sustainable production, good performance and price. All extension learners have been duly awarded DEBM.

Education coupled with entrepreneurship is an intricate sustainable educational process that has been on an efficient socio-economic transformation and poverty

alleviation from the emerging enterprise spirit. Cleaner technologies have been investigated that shall produce more output than conventional technologies by causing less damages to the society and environment. Greener technologies as those that are less polluting, use resources in a sustainable manner, recycle more of their wastes and products and handle all residues in a more environmental and socially acceptable way. SIA process has been proposed as Social Policy Act (SPA) process to encourage the considerations of the society in planning and decision making process. A famous project case study on airport generated municipal solid waste (MSW) reveals that only 5 % to 10% of waste is recycled or composted and remaining 90 % to 95 % discharged in to unsustainable landfills. An another project case study indicates that about 60 % to 65% percent of an airport generated solid and hazardous waste is recycled by intensive recycling or composting programs and thus airport saving is about fourfold. Carbon credit revenue of one-third is saved. Implementation of SIA and EIA processes have eliminated most of airport generated MSW and building up of solid and hazardous waste to an extent of two-third in to environment. A pilot plant of a DPR-I on unsafe chromium of 18 000 to 30 000 mg/kg from Indian cotton roller ginneries and development of green design roller gin rollers for cotton gins duly investigated which has been demonstrated successfully in a ginning factory. A comprehensive and green socio-economic system model has been presented for sustainable development and poverty alleviation.

DEBM study material and help provided by the counselor succeed the learners to set up their own social enterprises. DEBM course has enabled the social entrepreneurs to assess their social entrepreneurial competencies and understand weakness and strength to set up their own sustainable social enterprises. The study shall promote social policy act process in order to efficiently transform socio-economic status of any country based on the entrepreneurial research conducted in India. Also, the programme promotes the application of multidisciplinary technologies to social industries. It is imperative that such a dynamic and pragmatic approach be implemented to create sustainable social entrepreneurs on a large scale. Hitherto state-of-the-art literatures, market effects have been considered. It is reported that non-market impacts such as environmental and social impact assessment process including environmental health impact assessment process should be conducted for proposed projects, plans, programs, policies and legislative action. It is concluded that this action-based and extension learning field study on SSE promotes social policy act (SPA) process for sustainable development and poverty alleviation. For further

reading http://www.ediindia.org/doc/List of Institutions for website_latest.pdf serial number 68.

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THE EFFECTS OF INSECURITY AND POVERTY ON HUMAN DEVELOPMENT AT THE MUNICIPAL LEVEL IN THE NORTHERN NIGERIA

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ABSTRACT

Human development is a factor which every Nation may desire so as to move forward. The term is evidence in growth, its enlarging or expanding scope is acceptable when it brings about a quality of life to the people in a country. Likewise the challenge post by insecurity in Nigeria has assumed a formidable dimension that not only requires a multistate holder approach, as it is being touted in various quarters, in quelling this conflagration threatening Nigeria's statehood, but also necessitates a revival and reinforcement of the nation economy growth which can be done through human resource development. The thirst for blood and the preference for violence in expressing pent-up frustration and disenchantment with the state, its citizens and national totems may be a pointer to the need to revive poverty level and the level of human resource development. Insecurity is caused sometimes by poor socioeconomic culture, political, religious and educational institutions. Therefore the paper concerns itself with the discussion of the concept of poverty and insecurity, Causes of poverty and the effects of it on human resource development, causes of insecurity its effects on human development in Nigeria. It was concluded that inadequate economic growth is the main cause of poverty and insecurity in Nigeria.

KEYWORDS: security, insecurity, poverty, poverty eradication and human development

INTRODUCTION

Human development is a factor which every Nation may desire so as to move forward. The term is evidence in growth, its enlarging or expanding scope is acceptable when it brings about a quality of life to the people in a country. Development has a variety of definitions ranging from the one that refers to an event or happening and even biological changes evidenced in growth. We will be concerned here with the meaning with relationship to the act of improving, enlarging or expanding the scope of a people to enjoy an acceptable quality of life. When this is applied to a nation the sense could be of economic, political, socio-cultural or physical development among others. Development is not just about quantitative change but qualitative. In any effort made to enhance human development the absence of two factors are important; poverty and insecurity

Poverty and insecurity retards development. Poverty in its very broad terms, can be seen as being unable to meet "basic needs" – (physical; such as food, health care, education, shelter etc. and non – physical; such as participation, identity, etc required for a meaningful life (World Bank, 1996). On the other hand it is the duty of a government to keep its citizens safe because like Hobbes observed, only the state has the wherewithal to guarantee security and save society from anarchy (and since government represents the state), the state through its government should provide adequate security to justify its *raison d'être* (Gaskin, 1996). In this wise,

Omede (2012) sees security as a dynamic condition which involves the relative ability of a state to counter threats to its core values and interests. McGrew (1988) holds that the security of a nation hangs on two important pillars which are (1) the maintenance and protection of the socioeconomic order in the face of internal and external threat and (2) the promotion of a preferred international order, which minimizes the threat to core values and interests, as well as to the domestic order.

PROBLEM STATEMENT

Some few studies have been carried out to investigate the state of insecurity and poverty in Nigeria, its effects on human resource development. Poverty can be view as insufficient income for securing basic goods and services, while insecurity according to McGrew (1988), the security of a nation hangs on two important pillars which are (1) the maintenance and protection of the socioeconomic order in the face of internal and external threat and (2) the promotion of a preferred international order, which minimizes the threat to core values and interests, as well as to the domestic order. For Beland (2005), insecurity is "the state of fear or anxiety stemming from a concrete or alleged lack of protection." It refers to lack or inadequate freedom from danger. This definition reflects physical insecurity which is the most visible form of insecurity, and it feeds into many other forms of insecurity such as economic security and social security.

In this paper, insecurity is conceived as a situation where human and national security of a state is compromised by internal or external forces or interests exacerbated by the formers' weak or poor economic, military and/or human resource development conditions. Thus, insecurity and poverty is a continuous threat in the society especially its effect on human development and no empirical studies have been established in Nigeria and in the northern Nigerian in particular. This is the knowledge vacuum that this study would fill.

SIGNIFICANT OF THE STUDY

The findings emanating from this study would therefore be a good contribution to knowledge in this area. By extension, the study of poverty and insecurity and its effects human resource development will provide stake holds with data on how to manage or address insecurity and poverty related issues in, that Poverty and the activities that causes insecurity are associated to rural people and less educated segment of the society. In the same vein the study will help government improve coordination and consultation so as to establish and consolidate political stability. Since it has been observed that political instability and neglect of common man by not involving him in developmental programmes meant for him which can provoke/emanate insecurity and economic setback, resulting into poverty.

Despite all efforts put by the Nigerian Government, more is still needed to be done by the stake holds, that is the wealthy individual who can help the poor by assisting them with capitals and sanitize them to go into businesses and other self- reliance programmes instead of depending on the Government in totally. As long as the populaces' poverty is not alleviated, insecurity will continue to be on a winning side.

The study will also serve as a reference material for any future user.

CONCEPTUAL ANALYSIS

POVERTY: The concept of poverty can better be defined and understood when combine with its causes as well. Universally accepted definition of poverty is the conventional view of it to be as a result of insufficient income for securing basic goods and services. The term "manage" is the general language on the tongue of the populace where people want to expand limited income or money at hand to buy sufficient and enough. The result is just to buy the goods and service that are inferior, less qualified, and not enough to meet the desired need. Poverty is a failure of functioning of education, health and life expectancy World Bank (1996). Poverty is unable to meet "basic needs physically such as food, health care, education and shelter, while non physically are factors such as non

participation in most of the human developmental programmes which are said to be directed towards the poor masses to improve their living standard". But often times these are lip services carried in the media channels rising hope for the masses but at the end of the day they are excluded. They are not allowed any say in such programmes, their contributions are not needed. They may not beware when such development meant for them may start or end. That is to say they are not involved in decision concerning society-economic condition Anyanwu, (1997)

THE FACTORS CAUSING POVERTY

What are the factors that cause poverty and what are the resources that enable development. Poverty is what prevents people from leaving a long, healthy and creative life as well as from enjoying dignity, self-respect and the respect of others.

To remove poverty, we must first understand the factors that generate poverty; then we must generate political and cultural consensus to remove these factors. And generating this consensus is much more difficult than making statements of good intentions about the "removal" of poverty.

Lack of development is often seen as the factor that determines poverty. But in fact it is poverty that also prevents development. So, here we have a chicken-egg situation (does poverty come first or under-development?) we must get out of if we want to tackle the real causes of poverty.

It is ignorance and conflict that lead to the vicious circle of poverty and the lack of development, while, knowledge and cooperation lead to the virtuous circle of prosperity and progress.

Poverty can also arise from changes in average income or changes in the distribution of income. When there is cut in salary, loose of job or source of living or even retirement from well-paid service, then poverty is obvious. Poverty will generally be greater in the country with higher unequally of distribution of income.

According to sociologist Poverty is an exceptionally complicated social phenomenon, and trying to discover its causes is equally complicated. The stereotypic (and simplistic) explanation persists—that the poor cause their own poverty—based on the notion that anything is possible in America. Some theorists have accused the poor of having little concern for the future and preferring to "live for the moment". As the case of Nigeria, others have accused them of engaging in self-defeating behavior. Still other theorists have characterized the poor as fatalists, resigning themselves to a **culture of poverty** in which nothing can be done to

change their economic outcomes. In this culture of poverty—which passes from generation to generation—the poor feel negative, inferior, passive, hopeless, and powerless.

The “blame the poor” perspective is stereotypic and not applicable to all of the underclass. Not only are most poor people able and willing to work hard, have they done so when given the chance. The real trouble has to do with such problems as minimum wages and lack of access to the education necessary for obtaining a better-paying job.

More recently, sociologists have focused on other theories of poverty. One theory of poverty has to do with the flight of the middle class, including employers, from the cities and into the suburbs. This has limited the opportunities for the inner-city poor to find adequate jobs. According to another theory, the poor would rather receive welfare payments than work in demeaning positions as maids or in fast-food restaurants. As a result of this view, the welfare system has come under increasing attack in recent years.

SOME CAUSES OF POVERTY IN NIGERIA

Nigeria like other countries has no one cause or determinant of poverty. On the contrary, combination of several complex factors contributes to poverty. They include low or negative economic growth, inappropriate macroeconomic policies, deficiencies in the labour market resulting in limited job growth, low productivity and low wages in the informal sector, and a lag in human resource development. Other factors which have contributed to a decline in living standards and are structural causes or determinants of poverty include increase in crime and violence, environmental degradation, retrenchment of workers, a fall in the real value of safety nets, and changes in family structures (Ajakaiye and Adeyeye, 1999; Ogwumike, 2002 and NPC, 2004).

Poverty especially in the urban area has been made severe by low labour absorption capacity of the nonagricultural sector, especially manufacturing, which is as a result of limited growth of investment and technological innovation. Weak governance which is manifested in corruption, rent seeking, inappropriate planning and neglect of the private sector have contributed immensely to corruption in Nigeria.

THE EFFECTS OF POVERTY ON HUMAN DEVELOPMENT

The effects of poverty are serious. Children who grow up in poverty suffer more persistent, frequent, and severe health problems than do children who grow up under better financial circumstances.

- Many infants born into poverty have a low birth weight, which is associated with many preventable mental and physical disabilities. Not only are these poor infants more likely to be irritable or sickly, they are also more likely to die before their first birthday.
- Children raised in poverty tend to miss school more often because of illness. These children also have a much higher rate of accidents than do other children, and they are twice as likely to have impaired vision and hearing, iron deficiency anemia, and higher than normal levels of lead in the blood, which can impair brain function.

Levels of stress in the family have also been shown to correlate with economic circumstances. Studies during economic recessions indicate that job loss and subsequent poverty are associated with violence in families, including child and elder abuse. Poor families experience much more stress than middle-class families. Besides financial uncertainty, these families are more likely to be exposed to series of negative events and “bad luck,” including illness, depression, eviction, job loss, criminal victimization, and family death. Parents who experience hard economic times may become excessively punitive and erratic, issuing demands backed by insults, threats, and corporal punishment.

Homelessness, or extreme poverty, carries with it a particularly strong set of risks for families, especially children. Compared to children living in poverty but having homes, homeless children are less likely to receive proper nutrition and immunization. Hence, they experience more health problems. Homeless women experience higher rates of low-birth-weight babies, miscarriages, and infant mortality, probably due to not having access to adequate prenatal care for their babies. Homeless families experience even greater life stress than other families, including increased disruption in work, school, family relationships, and friendships.

Climbing out of poverty is difficult for anyone, perhaps because, at its worst, poverty can become a self-perpetuating cycle. Children of poverty are at an extreme disadvantage in the job market; in turn, the lack of good jobs ensures continued poverty. The cycle ends up repeating itself until the pattern is somehow broken.

THE NATIONAL POVERTY ERADICATION PROGRAMME

(NAPEP) was established in 2001 to address the challenge of unemployment in Nigeria and poverty reduction by the year 2010 in line with United States Millennium Development (MDGs). The programme was designed to empower the youth by

means of providing training opportunities, skills acquisition, employment opportunities, and wealth creation through enhanced income generation. NAPEP was given a take-off grant of N6 billion and to be use in establishing NAPEP structures in 36 states. Part of the money was also used in the NAPEP employment generation intervention, which leads to the training of 100,000 youths, training over 5000 people in tailoring and fashion design by attaching 50,000 unemployment graduates to various training centers for the acquisition of skills (CBN 2005). It is believed that provision of skills in public and private sectors of the society will translate to entrepreneurship development and self reliance, in a state of high level of unemployment situation like Nigeria, entrepreneurship development can serve as a solution and a more realistic option to development. Entrepreneurship programmed are being introduces in most Nigerian institutions, intended to increase human capacity for national development.

Navilyn, (1995) in Alumonah, (2010) noted that “our country’s economic growth will hinge on our ability to create new jobs through entrepreneurship and that successful entrepreneurship in turn, will require well trained aspiring entrepreneurs willing to take the helm of ventures creation”. It is in this direction that, our Nigerian educational institutions deemed it necessary to embrace the teaching of entrepreneurship. This will make our students ready to face the challenge of creating their own jobs rather than seeking for jobs after graduation. To achieve this objective the educational sector needs to be sanitized and directed towards self-reliance as against the colonial type of education, which was design to serve the purpose of the missionaries who were interested in creating a class of interpreters, clerks and preachers to satisfy their interest (Bulus, 2010).

The current reforms in the educational system are meant to enhance vocational and technical education to create employment for people by encouraging educational entrepreneurship (Bulus, 2010). The Europeans commission (2007) in Bulus (2010) defined entrepreneurship education as individual’s ability to turn idea into action. This includes creativity innovation and risks taking as well as the ability to plan manage projects in order to achieve objectives. To achieve this, the society needs qualify and capable technical teachers that can impart the technical knowledge to the students.

Dependency Theory: This theory was developed from the works of karl max and expand by scholars such as Emmanuel, Baran, Rodeny, frank and Amin. The dependency theory stated that the dependence of less developed countries (LDCs) on developed countries (DCs) is the main cause of lack of development of the former. It focuses on the center-periphery relationship whereby dependence of the periphery on the center has

resulted in the poor development of the periphery of the periphery (Hingan, 2007).

The dependency theory in relation to the topic suggests that the inability of the government to projects will reflect on the cultures and values of the people which are the major constraints to development. Policies that were sought from western developed economics have been contributing immensely to the development of the country. Indeed, policies are not to be imposed upon people. The failure of the Structural Development Programme (SAP) to revamp the Nigeria economy can be associated with the fact that it was an imported policy which was designed to suit the interest of the west and their domestic agents. Nigeria has highly in needed of capital for the development of project and thus dependent on the west who dictates almost everything. Over the years Nigeria has been busy implementing western induced policies and the little domestic policies such as the National Directorates for Employment (NDE), Family Economic Advancement Programme (FEAP), National Economic Empowerment and Development Strategy (NEEDS), could not be successfully implemented and internally financed largely owing to large scale corruption in the country. Also loans borrowed from the developed societies to finance poverty reduction programmes are diverted by the few.

POVERTY REDUCTION STRATEGIES

The poverty Alleviation Programme like other poverty reduction programmes introduced earlier has failed to achieve the target for which it was set. The poverty situation in Nigeria continues to worsen and this motivated the government to embark on an elaborate anti-poverty initiative known as National Poverty Eradication Programme (NAPEP) in 2001. NAPEP was created to Eradicate absolute poverty in Nigeria through streamling and rationalization of existing poverty Alleviation Institutions and coordinating the implementation of relevant schemes and programmes. In order to make the institution more powerful and functional, twelve ministries were co-opted into NAPEP. These are the Ministries of Agriculture and Rural Development, Education, Water Resources, Industry, Power and Steel, Employment, Health, works and Housing, Environment, Finance, and National Planning Commission. Nine agencies were also made integral part of NAPEP. There are as follows: Nigeria Agriculture Co-operative and Rural Development Bank (NACRDB), Universal Basic Education (UBE), River Basin Development Authorities (RBDA), Small and Medium Industries Development Authorities (SMIDA), bank of Industry (BOI), Power Holding Company of Nigeria (PHCN), National Directorate of Employment (NDE), National Primary Healthcare Development

Agency (NPHCDA) and Federal Mortgage bank (FMBN). NAPEP was set up with the following objectives: □ To reduce the social unrest occasioned by unemployed youth □ To reposition the private sector so as to make it more productive □ To create opportunities for empowerment and wealth creation □ To invest in education, Provision of social programmes for the vulnerable.

The above objectives of NAPEP were strengthened by the introduction of a new development initiative known as the National Economic Empowerment Development Strategy (NEEDS). NEEDS is conceived as a national driven policy initiative that seeks to address Nigeria's long term goals to poverty reduction, wealth creation, employment generation, and value orientation. NEEDS is heavily linked to the Millennium Development Goals (MDGs). The millenniums Development Goals are a series of eight times bound development goals that seeks to address issues of poverty, Education, Gender Equality, Health and Environment (Ibrahim, 2008). The Musa Yar'Adu'a led government demonstrated her support and commitment to the Millennium Development Goals mission by introducing the Seven Point Agenda. The objective of this programme was to facilitate the achievement of the targets of the MDGs.

One of the specific goals of the MDGs is: Reduce by 50% between 2000 and 2015 the proportion of people whose income is less than one US Dollar in a day. Reduce by 50% between 2000 and 2015 the proportion of people who suffer from hunger. Attempts to eradicate poverty in Nigeria have never shown any positive results. Instead the gap between the haves and have-nots is so wide and alarming. This situation is unfair considering the resources endowment of the country. The weak nature of the leadership is its failure to effectively distribute the nation's resources among the exiting classes is responsible for the impoverishment of Nigeria population.

INSECURITY

To be able to define insecurity, it is pertinent to have a brief discussion on what security is. The first duty of a government is to keep its citizens safe because like Hobbes observed, only the state has the wherewithal to guarantee security and save society from anarchy (and since government represents the state), the state through its government should provide adequate security to justify its *raison d'être* (Gaskin, 1996). In this wise, Omede (2012) sees security as a dynamic condition which involves the relative ability of a state to counter threats to its core values and interests. McGrew (1988) holds that the security of a nation hangs on two important pillars which are (1) the maintenance and protection of the socioeconomic order in the face of

internal and external threat and (2) the promotion of a preferred international order, which minimizes the threat to core values and interests, as well as to the domestic order. For Nwolise (2006), security is an all-encompassing condition which suggests that a territory must be secured by a network of armed forces; that the sovereignty of the state must be guaranteed by a democratic and patriotic government, which in turn must be protected by the military, police and the people themselves; that the people must not only be secured from external attacks but also from devastating consequences of internal upheavals such as unemployment, hunger, starvation, diseases, ignorance, homelessness, environmental degradation and pollution cum socio-economic injustices. Nwagboso (2012) argues that in the long sweep of history, security has been about people and without reference to the security of the individual, security makes no sense at all (McSweeney, (2012). Dike (2010) and Omede (2012) have taken this argument a step further by emphasizing that Nigeria's security should be based on a holistic view which sees the citizens as the primary beneficiaries of every security and developmental deliverable that the state can offer. Thus, Nigeria's security will involve efforts to strengthen the capacity of the Federal Republic of Nigeria so it can advance its interests and objectives to contain internal and external aggression, control crime, eliminate corruption, enhance genuine development, progress and growth and improve the welfare and quality of life of every citizen. As Omede (2012) pontificates further, the nation's security should include the preservation of the safety of Nigerians at home and abroad and the protection of the country's sovereignty. Conversely, insecurity is the antithesis of security and has attracted such common descriptors as want of safety, danger, hazard, uncertainty, want of confidence, state of doubt, inadequately guarded or protected, instability, trouble, lack of protection and being unsafe, and others (Achumba, Ighomereho & Akpor-Robaro, 2013). Achumba et al argue further that these common descriptors point to a condition where there exists a vulnerability to harm, loss of life, property or livelihood. Therefore, they consider insecurity to be a state of not knowing, a lack of control, and the inability to take defensive action against forces that portend harm or danger to an individual or group, or that make them vulnerable. For Beland (2005), insecurity is "the state of fear or anxiety stemming from a concrete or alleged lack of protection." It refers to lack or inadequate freedom from danger. This definition reflects physical insecurity which is the most visible form of insecurity, and it feeds into many other forms of insecurity such as economic security and social security.

In this paper, insecurity is conceived as a situation where human and national security of a state is

compromised by internal or external forces or interests exacerbated by the formers' weak or poor economic, military and/or human resource development conditions. The insecurity is an increasingly phenomena that we all can clearly perceive and know that it may have a direct impact on the welfare of a region where its hits. Depending on where one lives, the activities of Boko Haram, communal clashes, religious riots, the Niger Delta etc are threats to life, destruction of lives and properties, productive assets, can have a negative impact on both social and economic lives of the society and human development. Cook, (2011) observed that the growing incidence of this insecurity is highly correlated to the increasingly Vulnerability of households and communities in developing countries, making more difficult the process of recovery.

Many are the negative sides of insecurity. In fact insecurity is the presence of terrorism, they are of one family. Terrorism which is insecurity increases the cost of doing business for both private and public sectors. Resource that would have otherwise been invested in increasing output, fund education, health and other welfare programmes are diverted to crime control and prevention. According to the Nigeria finance minister, Dr NGOZI ONJO IWEALA, key allocation of funds in the 2013 budget include: critical infrastructure (power, works, transport, aviation, gas pipelines and Federal Capital Territory) N497 billion, human capital development (that is education and health) N705 billion, and agriculture/water resource N175 billion. Also over N950 billion was allocated to National security purposes, comprised of N320 billion for police, N364 billion for the army forces, N115billion for the office of the NSA and N154billion for the ministry of interior. A situation where the funds allocated to security alone is almost equal to the funds allocated to education (this day 2013), health and critical infrastructure combined in a fiscal year as is the case with Nigeria, is detrimental to the National Development. The development of a society largely depends on the rate of crime. If the crime rate is high, it could scare away or discourage investors (Adebayo, 2013).

At this point, one can observe clearly that the impact of poverty and insecurity on our human resource development at the municipal level in the Nation (Nigeria) cannot be overemphasized. In many quarters of Nigeria the state (Government) could have taken advantage of the Natural and human resource to utilize them to every body's benefits. God has blessed Nigeria with vast land for agriculture, cattle raring, mining and also rivers and lakes for fishing activities. Youth with great talents and skills could have been engage to be productive. Instead some "evil elements" in the society have now taken advantage of the poor and ignorant

youth by employing them to be "tools" of destructions. They destroy human lives and properties. People are no longer free and safe to carry out their normal and economic activities creating the state of insecurity and retarding development. For instance, culturally, like in some part of southern Borno Blacksmithing and Butchering which are gainful employment are disowned among the Marghi tribe and what had just happened on the 3rd of January in the town of Baga, of Borno State a place where most of the country fishing activities takes place have been devastated and destroyed by the insurgency.

SOME CAUSES OF INSECURITY IN A COUNTRY NIGERIA

Structural Violence

The pervasive violence in Nigeria is structural in nature. Structural violence refers to such unjust situations that clasp citizens in the vice grip of poverty and hunger. These are human rights infractions arising from unjust socio-economic and political systems. They often result in physical and psychological harm. With a direct implication for life expectancy this is certainly a serious driver of insecurity. An interesting interpretation of the current revenue sharing formula as being a source of violence in Nigeria was made recently by the Governor of Nigeria's Central Bank in an interview with the Financial Times. In that interview the CBN governor compared the receipts of Rivers State between 1999 and 2008 as being grossly more than the combined receipts of two northern states of Yobe and Borno. He deduced that the skewed revenue formula that allows 13% to go to the South region based on derivation principle could be a source of insecurity in the country such as the type driven by Boko Haram. The Financial Times interview surmises that Northern Nigeria's economy has traditionally depended on the government more than the south. It also notes that a number of the industries set up in the past have either collapsed or had been privatized 'during a decade of liberal market reforms, power shortages and infrastructure collapse.'

This indicates that the sharing formula does not favour the mentioned states, as they are been underfunded. Lack of enough funds made the citizens poor not been able to graduate their wards from school or create employment for the majority youth compare the south region. The result is that there avail ignorant and destructive elements.

IMPACTS OR EFFECTS OF INSECURITY ON HUMAN DEVELOPMENT

The Nation Nigeria is vast, fondly, being referred to as the giant of Africa. The sting and pledge of poverty and insecurity are all the same everywhere. Their aftermath is always disastrous, it deter (retard) human

development. For the purpose of the research I will dwell on the North east of Nigeria, especially the two states of Borno and Yobe. The later was annexed from the former, that is to say they are similar in characteristic same of the Sahel Savannah region. The related cultural people are engaged in Agriculture both for local consumption and commercial. The large number of Nomadic Fulani leaves cattle excretion as manure on farms providing natural fertilizer. This region controls the nation's cattle markets at Gamboru Ngala in Borno and Potiskum in Yobe. Both the cattle markets trades a hundred of thousands cattle. The market holds twice a week especially Potiskum town. Baga town in Bonrno State supplies the Nation with fish through its fishing activities done at large scales. The aforementioned three trades of Agriculture, cattle rearing and fishing activities are some of the economic activities that provide gainful employment to the predominate populace there. Most of the man power involve in these trades are the potential youth, which is a good sources of human development in Borno and Yobe State respectiviely. The international community observed that the insurgency conflict in the North East region of Nigeria has left more than 13,000.00 people dead and over one million displaced and homeless. To this, General David Rodriguez head of U.S African command, said the Islamists gains in the battle field are cause for concern and "the number of people displaced is just staggering", (David, 2015). Most of the displaced people are potential youth who are involve in farming and fishing, all agriculturally related. This devastating effect of insecurity has thrown many people out of their profession, causing underdevelopment in the area of agriculturally activities.

"People across all value chains feared movement outside protected areas because of attacks by insurgents," they wrote, explaining that farm workers feared attacks while grazing animals, processors lost workers when families left the conflict zone, and traders began limiting their movements. Meanwhile, the agricultural sector became a target for militants in need of supplies. Their data shows that cash, food and equipment were more likely to get stolen. Lastly, the danger has made other things like transportation more risky and therefore more expensive, again putting pressure on the economic output. "The impact of [Boko Haram] on the Nigerian economy is localized for now, but the instability has had an effect on the agricultural products from the north and has severely reduced cross-border trade with Cameroon, Chad and Niger," the report says.

However, the impact is still most felt in these northern states, which have always been far from Nigeria's positive development story. Indeed, though the number

of Nigerians living in poverty has increased 55 percent in the past decade, the number of Nigerian millionaires topped 15,700 last year, up 44 percent since 2007.

Insecurity may also cause in equalities. The poor who suffer from income fluctuations, and also have limited access to financial services in the aftermath of insecurity may be more phones to reduce consumption and have a decreasing shock in other household indicators as a consequence. In addition there are a number of non poor or close to be who are not insured against from risks and then may fall into poverty as consequence of recapitalizing coping with the shocks depending on the impact and likelihood of falling into poverty of the initial stock as sets and coping mechanisms. Moreover, vulnerability to insecurity is a complex issue, as it is determined by the economic structure, the stage of development, prevailing of social and economic condition coping mechanism, risks assessment, frequency and intensity of disaster etc the impact of all these on the poor could be losing access to some basic services, reversals in accumulation of physical and human capital, and perhaps an increase in child labour and criminal activities.

RECOMMENDATIONS

Restoring Security For National Development National dialogue is essential to enable the basis of our relationships as a nation of multiple nationalities to be agreed on. This can be handled on zonal or state basis and finally as a national convocation to compare notes and reach a comprehensive agreement on all facets of national life.

The Government can also create a dialogue forum comprising the traditional rulers; inter religion leaders, the youth wings and the official security operators. Through this, the combination can deliberate on public awareness of peace co-existence to avoid communal violence. Another critical step to be taken must be on economic empowerment including a special focus on youth employment and education. The current arm of unemployed youths and others who cannot find places in our tertiary institutions is a recipe for insecurity. This needs to be tackled head-on. It is essential that youths be engaged in the process of formulating the strategies drawn up to resolve the situation.

There are basic infrastructural provisions that have direct impacts on security and development. A good example is that of the provision of constant and accessible electric power. 60 percent of Nigerians do not have access to electricity and indeed most of those who do have access depend on private portable electric generators. Cost of productive activities is grossly distorted by a lack of power in the country. With a

heightened sense of insecurity shops are forced to close early, while some were utterly destroyed especially in the southern and north-west of Borno and Yobe. Related services such as public transportation provision get restricted. Thus, lack of electricity exacerbates crime, poverty and unemployment in the country.

Corroboration in terms of defense between the neighbouring countries and international communities has to be encouraged. This is with the view to curb terrorism whenever the need arises. Every nation needs a police force that provides a cover for order in the society. A cursory look at our police barracks and police stations show clearly that it is unreasonable to expect our police officers to provide adequate security. They live in rotten environment that are worse than refugee camps. We wonder why police barracks have to be so decrepit whereas those of the military, the air force and the navy are habitable places in Nigeria

The ubiquitous roadblocks that have created obstacle courses on our highways have been a big shame. Apart from the nuisance value created by the rubbish hurled from the bushes to form the road blocks, the flooding of our roads with those roadblocks do not engender a sense of security that would attract business. The security roadblocks along our highway as an effort to delect crime have caused our road to be cumbersome. They delay and cause havoc to transportation. For instances it takes (as at the time of this write up) more than seven days for a truck loaded with cattle from Gamboru Ngala in Borno state to reach Lagos or Portharcourt in the southern part of Nigeria instead of the former three days before the advent of the insurgency. Sometimes these trucks have to sleep at the gates as a result of curfews, thereby causing some thirsting and starving cattle to die and bringing lost to the trader. For instance, there exist about eleven (11) Roadblocks between Damaturu and Potiskum only a distance of about 95 kilometers in Yobe State

The presents Government statutory allocation formula has to be revisited so that the violence ravaged (affected) states can be appeased. The state and local government funds alone may not be able to meet the cost of rehabilitation, let alone further development especially educating youth and creation of employment.

CONCLUSIONS

Inadequate economic growth is the main cause of poverty and insecurity in Nigeria. Nigeria economy has a very narrow and weak base, depending mostly on exportation of petroleum crude oil as a major source of income; the agricultural base of the economy had been frustrated and marginalized (Oyeduntan, 2003). High

and growing unemployment has also exacerbated the level of poverty in Nigeria. Other factors that have contributed to the level and evolution of poverty in Nigeria include problems in the productive sector, widening income inequality, weak governance, social conflict and gender, intersectoral and environmental issues. Poverty in especially in the urban area has been made severe by low labour absorption capacity of the nonagricultural sector, especially manufacturing, which is as a result of limited growth of investment and technological innovation. Weak governance which is manifested in corruption, rent seeking, inappropriate planning and neglect of the private sector have contributed immensely to corruption in Nigeria. Furthermore, empirical evidence shows that poverty and environmental degradation are inextricably linked in Nigeria, because 75 percent of rural people depend on natural resources for their livelihood, hence environmental degradation and insecurity especially the activities of Boko Haram in the North East reduces opportunities for poor people to earn sustainable income.

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ENVIRONMENTAL DISCLOSURES IN ANNUAL REPORTS OF SRI LANKAN CORPORATE: A CONTENT ANALYSIS

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ABSTRACT

The purpose of this paper is to examine the extent and content of environmental information disclosure provided in the annual reports of companies listed on Colombo Stock Exchange (CSE) of Sri Lanka and to test whether the size of the company determines the level of disclosure of environmental information. Sixty eight listed companies representing seventeen different sectors were selected randomly and the data was collected from the annual reports of those companies for the financial year 2011/2012 using content analysis. The finding of the study indicates that forty one companies (62.29%) provided environmental information in their annual reports and the level of the disclosure varies across industries. It can be seen that the highest level of the environmental disclosure items are reported under sustainability reporting and the next level of disclosure is under the CEO reports and the vision, mission, and value statements. The study identifies that the extent of environmental disclosure varies across industries. Environmental reporting across industries also indicates a wide variation in terms of emphasis on themes and the average number of words devoted to them. However, maximum disclosure across all the industries can be seen for the theme "Green product" while the lowest disclosed theme is "Spills." Further, the finding on the relationship between amount of environmental disclosure and the size of the firms are significantly negative and inconsistent with the prior studies which found a positive relationship between size of the company and amount of environmental disclosure. The value of this study contributed to the literature by evaluating voluntary environmental disclosure made by Sri Lankan Listed companies of different sectors in their annual report. Further this study can be extended to assess the status and determinants of their environmental disclosure for a large sample of Sri Lankan corporate sectors.

KEYWORDS: corporate environmental disclosure, sustainability, reporting, size of the firm, content analysis

INTRODUCTION

Sustainability is rapidly becoming a mainstream component of corporate strategies to support 'triple bottom line' results focused on people, planet and profit. Stockholders, and more broadly company stakeholders, are looking for companies to implement sustainable practices that simultaneously produce financial, social and environmental results. The spectrum of sustainability maturity today is broad, and the challenges likewise range from strategic to tactical. Pressed by market demands, mid to large sized companies are faced with the expectation of developing, executing, and continually improving sustainability practices. Compounding this challenge is the pressing need to develop tools, measurements and data analytics that consistently report sustainability progress, risks and opportunities. And with the broad set of interests across many stakeholder groups, prioritizing sustainability initiatives and defining a return on investment requires a whole new level of effort and creativity.

In the present perspective, the stakeholders regard business entity not only as an economic unit, but as a socio-economic entity and hold the organisation responsible for all of its activities which have a bearing on the society. Consequently there is an increased pressure on corporate communication strategies to evolve beyond existing annual reports (that are dominated by economic transactions), that address broader concerns such as the environmental impact of the company. In this regard, environmental reporting became very important for organization to communicate to effectively communicate their sustainability progress to stakeholders.

RESEARCH PROBLEM

Environmental reporting covers the preparation and provision of information for use of multiple stakeholders (both internal and external) on the environmental status and the performance of their company, Brophy & Starkey (2002). Environmental disclosure has been defined by Wilmshurst and Frost

(2000) as “those disclosures that relate to the impact company activities have on the physical or natural environment in which they operate”. There has been a significant increase in the number of companies in both developed and developing countries making environmental disclosures in their annual reports and other communication media in the last two decades (Deegan & Gordon, 1996, Kolon, 1996, Kolk, 2003). There is an increased pressure on corporate communication strategies to evolve beyond existing annual reports (that are dominated by economic transaction), that address broader concerns such as the environmental impact of the company. Companies that perform well, but communicate poorly, are subject to risk of under-leveraging their assets. Many companies that publish comprehensive reports believe that quality reporting helps in building strong corporate reputations and brand images. Some companies take this a step further and link a reputable corporate brand image indirectly to environmental reporting of the business. Corporate environmental reporting therefore becomes a key ingredient in maximizing the benefits that corporate responsibility can offer.

Corporate Environmental disclosure (CED) was reemerging as an era of interest to both accounting academics in particular and the accountancy profession in general. At that time, there already, existed a sizeable body of research which explored Corporate Social Responsibilities (CSR) and CSR, including CED (Gray et al., 1996; Mathews, 1984, 1991, 1997; Ullmann, 1985). Many studies of environmental disclosure in annual reports have focused on companies in developed countries such as Europe, United States of America, United Kingdom, Canada (Carson, 1962; Bowman 1975; Davis, 1979; Beesley et. al., 1978; Fred Luthens, 1980; Davis, 1983; Goodin, 1983; Ryle, 1998; Archibugi, 1989, Katyal, 1989; Hansell, 1991, Carsson et al., 1991; Hopfenbeck, 1993, Kolk, Whalin, & Wateringen, 2001 and others. However, hardly few studies have looked at environmental reporting aspects in developing countries like Sri Lanka.

Under this backdrop, this study aims to address this gap by conducting an investigative study on environmental reporting of Sri Lankan companies listed in Colombo Stock Exchange (CSE) and its link with the size of the company. The objective of this paper is to ascertain the existing extent and nature of environmental disclosure practices by Sri Lankan listed companies and to find its relationship with the size of the company.

This paper is organized as; the first section introduces the paper followed by a brief review of some earlier work on environmental disclosure practices by corporate sectors both international and Sri Lankan context in the second section. The next section discusses

the research methodology adopted for the study and the last section describes the results and analysis. Finally, the findings and conclusion is provided in section five.

LITERATURE REVIEW

Corporate Environmental disclosure (CED) has reemerged as an era of interest to both accounting academics in particular and the accountancy profession in general. In the last two decades, the accounting literature has witnessed a growth in the number of studies regarding corporate environmental disclosure all over the world. This section provides a review of the relevant literature both in international context and as in Sri Lankan context.

Studies in International Context

A recent study of 3,400 companies about corporate responsibility (CR) reporting from 34 countries around the world including the largest 250 global companies based on fortune global 500 ranking by KPMG (2011) has reported that extent of CR (social and environmental) reporting has been increased to 100%, 99%, 94%, 83% and 79% in 2011 comparing with 91%, 93%, 59, 74% and 62% of companies in 2008 in United Kingdom, Japan, France, United States America and Canada respectively, among others.

In United States, the pattern of environmental disclosure (20 disclosures items) in internet verses annual reports over the years 2000, 2004 2008 in 102 listed companies studied by Razzed (2010). He found that “the mean levels of environmental disclosure in hard copy reports decreases from 9.67 (48.3% in 2000) to a high of 11.10 (55.5% in 2004) and to a fall of 10.12 (50.6%) in 2008. However, the mean levels of environmental disclosure on the Internet has increased steadily from 9.98 (49.9% in 2000) to 13.50 (67.5% in 2008)” (Razzed, 2010, p.9).

But, in the case of Australia, amount of environmental disclosures was higher than USA, Canada and UK in 1995 (Gibson and Guthrie, 1995) whereas its place was 23rd among the 3,400 companies in 2011 (KMPG, 2011). O’Donovan and Gibson (1994) studied the trend of environmental reporting by examining 41 companies for a ten year period (1983-1992). They found that environmental information was descriptive which increased from 43% in 1983 to 67% in 1992. Industry specific study of mining companies in Australia, Tilt and Symes (1999) also affirmed that amount of environmental information increased due to environmental sensitive industry.

In South Asia, Thailand, Singapore and Malaysia are Newly Industrialized Countries (NIC). In Thailand, Kuasirikun and Sherer (2004) investigated comparatively corporate social and environmental

reporting using 63 and 84 annual reports in 1993 and 1999 respectively. They found the reporting companies were reduced from 86% in 1993 to 77% in 1999 due to financial crisis in 1997. Environmental information was the second most disclosed item next to employee information.

Elijido-Ten (2009) examined quantity of environmental disclosure of companies' 2001 annual reports in Malaysia. She reported that quantity of environmental disclosures ranged from 0 to 95 sentences with average 16.37 and median 9 sentences. She also indicated the information is reported in different parts of annual report: financial statements and notes to accounts, chairman's statements, operational review and others.

Pahuja(2007) conducted a survey on Senior executive in 101 large manufacturing companies as well as 101 individual Chartered Accountants (CAs) in order to examine whether an environmental reporting expectation exist with in India. The study also identified that both CAs and executives found usefulness of environmental information in strategic decision making. Das (2008) studied annual reports of 24 companies chosen o the basis of market capitalization to identify the volume and veracity of environmental disclosures and its link with size of assets; and interestingly found that magnitude of disclosure of bad news is more than good news in annual reports. This study identified that large sized companies provide more information regarding environment than small companies to gain more public and government confidence.

Studies in Sri Lankan Context

Sri Lanka is an emerging economy in the South Asian region. CED is not mandatory in Sri Lanka as in the case of many other countries (Douglas et al., 2004). Hence, it is likely that voluntary CED by Sri Lankan firms may show structural diversity and contain disclosures varying from low to standard levels, in line with GRI G3 sustainability reporting guidelines, which are considered to be a global benchmark for sustainability reporting. Some firms may carry out corporate environmental activities without realizing that they are doing so and they do not even report them. On the other hand, some firms may try to boost the company image through CED reporting without effectively engaging in those activities.

However, the issue of environmental reporting in Sri Lankan context has received very less attention from the researchers. Rajapakse (2003), did a survey on Stakeholders' Demand for Green Reporting of Sri Lanka: A Stakeholder Theory Perspective. The findings of this study indicated that, the majority of the stakeholders demand environmental disclosures of

business organizations as they are having environmental protection and self-satisfactory motives. Consequently, demand for such information has been increased. However, there is no sign of significant improvement in financial reporting in respect of social and environmental reporting. Further, in his finding he stated that the proposition of the total group of stakeholders who seek environmental information in annual reports is greater than those who do not and the majority of the survey groups strongly believe that current environmental reporting practices in Sri Lanka do not material to make economic decision.

Senaratne and Liyanagedara (2009) studied corporate sustainability reporting practices in Sri Lanka using guidelines of Global Reporting Initiative (GRI). They found that out of 34 companies, 11 companies (32% of sample) have provided some form of social and environmental reporting where just only 2 companies have presented sustainable report. The study revealed that environmental performance indicators was the least disclosed area (12%) out of three performance indicators (environment, social and economic).

A review of the literature indicates that there have been only limited attempts to study the environmental disclosure practices of Sri Lankan companies. The present study contributes to the literature by examining the existing status of environmental reporting in the selected companies and by evaluating the impact of size on the environmental disclosure.

RESEARCH METHODOLOGY

Sample

The population for the study was all the companies listed on Colombo Stock Exchange (CSE) in 2011. Of the 287 listed companies representing 20 sectors, 68 companies were selected by simple random sampling, with a requirement that minimum 4 companies were selected from each of the twenty industries listed in CSE initially. However, three industries were excluded as they do not meet the requirement of minimum four companies listed in the respective industries. It was observed that 41 companies disclosed environmental information out of the 68 companies selected. Finally, these 41 companies were used as the sample to carry out the study.

It has been recognized that small sample size and an analysis of only one year information may not provide conclusive results, but the outcome of this study shall present useful insight for carrying out further studies on environmental disclosure. This is in accordance with Holland and Foo (2003) also contended that usage of a small sample in research work is justified if it is used to provide indication of further research.

Data Source

The aims of this study are to explore the status of environmental disclosure by Sri Lankan companies in their annual reports and to find the relationship between size of the companies and the extent of environmental disclosures. In order to accomplish these objectives, information from the annual reports has been collected for each of the companies in the sample for the accounting year 2011/2012. Sri Lankan companies are using number of other ways as well to disclose their environmental information to its stakeholders, such as annual reports, company websites, separate sustainability reports and newsletters, channel these study annual reports are selected as the source. This is based on the justification given by Wiseman, (1982) annual reports are selected as the source for corporate environmental disclosures as it is widely recognized as the principal means for communication to shareholders and is the primary source for environmental reporting by corporations.

Content Analysis

Content analysis used as the research technique in this study to collect the required data. 'Content Analysis is a method of coding the text/content of piece of writing into various groups or categories depending upon selected criteria' (Krippendorff 1980). It is a dominant method used to examine environmental disclosures in annual reports (Gray, Kouhy 1995). Abbot and Monsen (1979) defined content analysis as "A technique for gathering data that consist of codifying qualitative information in anecdotal and literary form into categories in order to derive quantitative scales of verifying levels of complexity. The selection of the recording unit for analysis is the important step in content analysis. Recording unit refers to specific segment of the context unit in the written material that is placed in a category. According to GAO (1982), there are several choices with regards to determining the recording unit, such as a word, a group of words, a sentence, a graph or an entire document.

This study uses 'word count' as a recording unit for the purpose of content study. Number of words has been used in the previous empirical studies by Burritt (1982), Wiseman (1982), Deggan and Gordon (1996) and according to them, a total of 22 themes (provided in table - 1 that can be used to categorize environmental information in annual reports). They consider number of words both as the most appropriate measure of disclosure, and also as the most appropriate basis for coding and analysis.

Table 1: Themes of environmental disclosure

Si. No.	Themes
1	Environmental Policy including list of environmental objectives, environmental issues of concern, and prioritization of environmental issues in terms of their impacts
1.	Environmental management system including ISO 14000 and responsible persons;
2.	Risk management including environmental impact assessment;
3.	Environmental audit;
4.	Goals and targets including environmental impact assessment;
5.	Compliance with standards including bench mark;
6.	Awards;
7.	input including R & D, energy management, and non renewable resource used;
8.	Process including technology employed, and capital equipment;
9.	Product stewardship including life cycle analysis, and eco-labeling;
10.	Waste consisting of recycling, reduction, and reuse;
11.	Land rehabilitation and remediation;
12.	Air emissions;
13.	Water effluent;
14.	Spills;
15.	Noise and odours;
16.	environmental spending activities;
17.	Rehabilitation costs consisting of operating costs, provisions and contingent liabilities;
18.	Environmental cost accounting;
19.	Sustainable development reporting including a statement that the company subscribe to the principle of sustainable development, details of the principle, attempts to connect the environmental and economic dimensions, impact on the biosphere and habit carrying capacity, natural trust account, eco-asset sheet, and natural capacity;
20.	Education and training; and
21.	Litigation about environmental issues.

RESULTS AND ANALYSIS

The Extent of Environmental Disclosure

Of the 68 Sri Lankan listed Companies initially sampled, based on their 2011/2012 annual reports, 41 firms (60.29%) made environmental disclosures. They averaged 644 words of environmental information per annual report (see table -2 which also indicates the categories of the disclosures and their location in the report as well as other forms of environmental disclosures). The most common location for disclosures was in sections devoted to sustainability report followed by CEO's report and sections headed, vision & mission, Environmental policy and corporate social responsibility. In relation to other forms of environmental disclosures, Tables were the form most commonly used to reveal environmental information in annual reports.

Table 2: The extent of environmental disclosure in annual reports

Description	Number of Companies	Percentage
Initial Sample size	68	
Disclosure	41	60.29
Un disclosure	27	39.71
Final Sample	41	
Other forms of disclosure		
Photo	2	2.94
Chart	1	1.47
Table	7	10.29
Graph	1	1.47
Location		
Corporate Social Responsibility	4	5.88
CEO Report / Management Report	9	12
Sustainability Report	16	21.33
Environmental Conservation	2	0.026
Vision , Mission & Value	9	12
Awards	1	1.33
Environmental Policies	8	10.67
Environmental Management	1	1.33
The Planet	1	1.33

Pattern of Disclosures by Themes

Table - 3: Themes of environmental disclosure in annual reports

Themes	Mean	SD
Environmental Policy	12.68	26.68
Waste Mgt/Recycling Waste	109	282.9
Energy Consumption	89.8	195.2
Resource usage reducing	24	145.3
Air Emissions	14	54.3
Education, training & Awareness programs	21.8	193.6
Awards	4.3	15.9
Goals & Targets	11.96	69
Reduce odor & noise	3.9	20.17
Bio remediation & Bio diversity	52	159.8
Water Effluent	37.5	80
Environmental mgt System (ISO 14001)	14.9	35.77
Sustainable Development	29.6	148.96
Spills	1.46	7.25
Green products/Green going	101.5	277.7
Cleaning & dust	14	66.13
Reuse resources	7.2	46.38
Carbon foot print	16.9	94.34
Environmental Conservation	74	244.7
Leed certification	3.5	22.48
Total	644	2186.56

The themes of the environmental disclosure made in Sri Lankan corporate annual reports are itemized in Table - 3 based on the mean word count devoted to each category of disclosure. The most common themes of

environmental disclosure in annual reports were on the topics of Waste management and recycling waste, Go green, Energy consumption and Environmental conservation. On the other hand, Spills, Leed certification and Reduce odor and noise were the least common themes of disclosures.

Environmental Reporting – Industry Wise Analysis

In table - 4 below, the companies have been separated into eight groups based on the nature of the industry as categorized by the CSE. As can be seen, the result show that the companies disclosing the most environmental information were those in the Hotel & Travel group, followed by those in the Diversified Funds group and Construction & Engineering group, with companies in the Foot wear & Textiles group, Investment Funds group and store supplier groups making the least disclosures. Further, there were only two industry groups where environmental information was provided by all the companies sampled in that group, the Diversified Funds and plantation groups.

Table 4: Environmental reporting by each industry group

Industry	Mean	SD
Bank Finance & Insurance	12.6	63.9
Beverage Food&Tobacco	45.3	237.27
Chemical & Pharmacies	44.2	244
Construction & Engineering	91.9	484.45
Diversified Holdings	105.3	384.8
Food wear & Textiles	1.17	7.49
Health Care	2.87	12.08
Hotel & Travel	164.1	917.72
Investment Trust	1.2	7.96
Land & Property	52.68	316.85
Manufacturing	10.58	188.09
Oil Palms	24.34	217.64
Plantation	66.59	294.16
Power & Energy	9.4	45.27
Motors	9.6	52.25
Store suppliers	2.17	10.38

Does Company Size Determine Environmental Disclosure?

Legitimacy theory suggests that larger companies have to respond with more disclosure to have a greater impact on social expectations because they have more stakeholders than small companies (Cowen, Ferreri, & Parker, 1987). Many previous studies (Choi, 1999; Cormier & Gordon 2001; Deegan & Gordon 1996; Ho & Taylor, 2007; Raar 2002; Stanwick & Stanwick 2006, Das 2008). Most of the prior researchers reports a positive relationship between amounts of environmental disclosure in corporate annual reports and size of companies (Heravi and Xiao 2005; Brammer and Pavelin 2008; Haddock-Fraser and Fraser 2008) although (Dabvey 1982; Ng 1985; Roberts 1992) did not find such relationship.

Size of company was measured in a number of ways such as total assets, turnover, number of employees, total assets employed and the company's average market value (Carven and Marston 1999). In this study the sales revenue of each company studied was used to measure the company size (Belkaoui&Karpik 1989; Hackson& Milne 1996).

Table – 5: Simple regression between Sales value and environmental disclosure

Statistics	Value of Sales
Intercept	70.997
coefficient (Independent variables)	-0.010
t-Value	-2.34
P-Value	0.000
F-Value	54.69
Coefficient of Determination	-0.544
Adjusted R Square	0.242
Standard Error	22.15
Number of Observation	18

The correlation coefficient between the mean values of environmental disclosure and the total sales value for sample companies is calculated and found to be -0.54 and the p value is equal to 0.036. Since the p value is less than 0.05, the relationship between the environmental disclosure negative in Sri Lankan firms and value of sales is statistically significant at 5% level.

The simple regression model is applied to examine the relationship between above two sets of variable, disclosure and sales value. The table - 5 presents its summery results. In simple regression test, t-value for the regression coefficient of size is stood at -2.34 at 0.000 probabilities (p-value). The F-value of analysis of variance is -54.69. These figures also indicate a moderate level of negative correlation between size of sales and disclosure of environmental information in annual reports. The value of R square is 0.296, which indicate that 29.6 percent of variance of disclosure is explained by sales size under simple regression test. Thus the relationship between sales size and the environmental disclosure is negative and statistically significant in annual reports of companies in Sri Lanka.

CONCLUSION

This study examined the extend and content of environmental information disclosure provided in the annual reports of Sri Lankan listed companies and tested whether there is a relationship between the amount of environmental disclosure and size of the company. A content analysis has been used to measure the extent and nature of disclosure in 41 listed companies across 17 sectors with the help of certain criteria identified in the form of environmental theme. According to the findings, 60.29 percent of the listed firms in Sri Lanka disclose environmental information in their annual

reports and these disclosures were voluntary in nature. It can be seen that the highest level of the environmental disclosure items are reported under sustainability reporting and the next level of disclosure is under the CEO reports and the vision, mission, and value statements. The study identifies that the extent of environmental disclosure varies across industries. Environmental reporting across industries also indicates a wide variation in terms of emphasis on themes and the average number of word devoted to them. However, maximum disclosure across all the industries can be seen for the themes "Green product" while the lowest disclosed theme is "Leed certification." Further, the result of the simple regression model shows that there was a significant negative relationship in determining disclosure level and size of the company. This means that companies with larger sales turnover did not disclose more environmental information than the small companies in Sri Lanka. This finding is inconsistent with the prior studies, for an example, Das, 2008; which indicate positive relationship between size of the company and amount of environmental information disclosure and suggesting that environmental disclosure in Sri Lanka has different priorities from other developed and developing countries. The limitation of the small sample size might be considered as the reason for such inconsistency in Sri Lanka. Therefore, this study suggest there is an ample scope for further research to determine the statues of environmental disclosure for other Sri Lankan companies with the largest sample size as well as sample period. And this study can be extended to identify the determinants of environmental disclosure other than size of the company in annual reports of Corporate Sri Lanka.

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SOCIO-ECONOMIC INDICATORS AFFECTING LIFE INSURANCE BUSINESS IN NIGERIA

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ABSTRACT

This study is an attempt to analyse some socio-economic factors affecting the operations of life insurance business in Nigeria. Four insurance companies were randomly chosen, categorized into four groups according to the nature of their operations and their characteristics studied using analysis of variance. The result revealed that the poor provision of some basic amenities such as health care services, potable water, high cost of living and poor economy affect the operations of life insurance. However, the general opinion of the public is that the situation could be improved upon if government should provide 60% of the needs of the populace. In addition to providing programmes and incentives to improve the standard of living, the Federal Government of Nigeria should also, as a matter of urgency, map out policies and programmes to educate and convince the public on the need to take out life insurance policies and the benefits derivable therefrom

KEYWORDS: socio-economic factors, life insurance, analysis of variance, programmes and incentives.

INTRODUCTION

Evidence from previous researchers such as Smith and Stutzer (1995) and Outreville (1996) have shown that insurance industry contributes immensely to real economic growth and development of any nation by encouraging industrial competitions generating innovations through new ideas to manage risks as well as inventions. The authors also mentioned that the industry provides opportunities for employment creation, thereby culminating in the improvement of the standard of living and quality of life of the people. The federal government of Nigeria in an attempt to promote economic growth and development has put a number of policies, programmes and incentives in place without achieving any significant changes in the economy. Among the programmes put in place are compulsory national health insurance scheme, life insurance policy for all workers and health care services to the grass root level. Hence, the main concern of this study is that, in spite of all the efforts made by the government, the management and development of life insurance policy in Nigeria have been unimpressive, leaving the nation with low industrial production and the entire populace with a low quality of life.

According to Mojekwu (2001), the operators of life insurance industry in the Nigerian business environment continuously complain about the lack of interest and low patronage by the Nigerian public toward contracting life insurance policies. These operators seem to be very myopic in the sense that they have

never bothered to investigate the factors behind the non-chalant attitude being portrayed by the general public. However, one would expect that where the basic social amenities are lacking or insufficient, people will devise survival strategies thereby creating in-balances in such society. Nigerian society, irrespective of their abundant resources, is typical of such a society. Hence, there is a great need to critically analyze the socio-economic factors in the Nigerian society creating such in-balance with a view to studying how these factors affect the life insurance industry. Therefore, this study is an attempt to examine the situation and suggest ways to improve on it. The problem can be summarized in a statement: In spite of efforts and programmes put in place by the Federal Government of Nigeria for the development of life insurance policy in Nigeria, such development has remained unimpressive. It has therefore become necessary to investigate the socio-economic factors in the Nigerian society which affect, and perhaps hinder, the development of the life insurance industry in Nigeria. A better understanding of the underlying socio-economic factors affecting the development of the life insurance industry in Nigeria should lead to putting in place the right strategies for national capacity building for sustainable development and poverty alleviation.

THEORETICAL BACKGROUND

Lawler (1971) postulated that an individual's tendency to adopt a specific course of action is determined in part by the expectancy that the action will produce certain

consequences and the evaluation of these consequences will be a significant improvement.

According to Mojekwu (2001), life insurance is very important business which seems to have been misconstrued by the insuring public, due to the high inflation in the economy, and the attitude of the general Nigerian public. For example, economic historians with interest in both commercial banking and insurance markets have consistently reported that financial intermediation assisted economic development in the early years of mass industrialization in the eighteenth and nineteenth centuries through, amongst other things, mobilising savings, mitigating risk and uncertainty, encouraging entrepreneurship, accumulating productive capital, and fostering the development of the national financial and legal infrastructure (Pearson, 1993; Smith and Stutzer, 1995, Crothers, 1999, 2004, and Adams, et al. 2006). Moreover, Outreville (1990, 1996), Adams and Zou (2004) amongst others argue, for similar reasons, that there is likely to be a strong linkage between insurance and economic growth in today's emerging economies like Nigeria. The insurance market penetrations and densities data were included to describe the underdeveloped state of Nigerian insurance market.

Overview of Nigeria Economy and Insurance Industry

Babalola (2008) stated that Nigerian economic planning and development which started after independence in 1960 has experienced setbacks and difficulties due to poor performance of most important sectors of the economy especially the financial service sectors of which insurance plays a central role. Economic growth in Nigeria was marred with dismal performance for the past forty years. However, the return of democracy in 1999 has begun to boost economic recovery and growth with several innovative policies decisions. Indeed, in the first two years of Democracy, (2000 and 2001) real gross domestic product (real GDP) has increased faster than at any time since 1991, when it increased by 4.7 percent. In 2000 and 2001, it rose to 3.83 percent and 4.21 percent respectively. The average real GDP over the period from 1992 to 1998, was just 2.6 percent, well below the rate of population growth of about 2.8 percent (Central Bank of Nigeria Statistical Bulletin, 2006). In the year 2004, the government initiated a comprehensive strategic plan for addressing the country's deep-rooted macroeconomic instability and structural bottlenecks based on the National Economic Empowerment and Development Strategy (NEEDS) document. The NEEDS blue print (covering the four year period from 2003-2007) is Nigerian home-grown Poverty Reduction Strategy Papers (PRSPs) which is crucial towards achieving the Millennium Development

Goals (MDGs). The Financial Sector Strategy (FSS 2020) is one of the most important components of NEEDS.

The Federal Government was quite politically committed to a prudent and transparent macroeconomic strategy that supports poverty reduction by achieving economic growth, price stability, sound financial system and monetary policy (NEEDS Document 2007). In fact, both the Federal Government and World Bank have projected a robust growth rate of 9% in the year 2008. Insurance industry plays a central role in Nigeria through risk bearing, and other financial investment services, employment of labour, payment of tax and provision for vehicle for investors. While the life insurance companies provide cover against risk of life and pensions Funds Administration services, the non-life business provides protection against the risk of loss or damage to property or incurred of a liability. The sources of revenue of an insurance company include premiums for covers granted, investment income from the investment of shareholders and surplus funds, commission from ceding insurance business to other insurance and reinsurance companies, and claims recovery in respect of compensation it receives from reinsuring part of her risks. The Nigerian insurance sector represents the backbone of the Nation's risk management and financing system, ensuring financial security, being one of the most important financial intermediaries, and providing a long term capital for human and infrastructural projects. Moreover, insurance mitigates the impacts of risks and is directly correlated to economic growth as industries and entrepreneurs hedge their exposures; otherwise their risk taking abilities can be hampered. Babalola (2008) stated that a strong and competitive insurance industry is a compelling imperative for Nigeria's economic growth and development. Insurance is continuously undergoing serious reforms and transformation to make it competitive and alive to its customers' expectation and play adequately its risk management role in the Nation's economy. The history of the insurance industry in Nigeria, especially post independence, has showcased among others, a continuous demand for adequate capitalization.

In recent times, we can vividly recall the recapitalisation exercises of 1997 and 2003 in the insurance industry. In 1997, life insurance companies were mandated by law to recapitalize to the tune of ₦20 million while general business insurance companies were to recapitalize with ₦20 million. However, general insurance business companies that underwrote special risks were required to recapitalize with ₦70 million. On the other hand, composite insurance companies had the recapitalisation prescription of ₦90 million while reinsurance

companies were expected to recapitalize with ₦150 million. This was successfully implemented.

RESEARCH HYPOTHESES

Based on the objectives of the study, the following hypotheses were formulated

- i. There are no variations in the growth of life insurance performance due to lack of annuities.
- ii. There are no variations in the growth of life insurance performance due to poor salary.

METHODOLOGY

Four insurance companies were randomly selected from the population of insurance companies carrying out life policy business in Nigeria. Structured questionnaires were designed and distributed to the randomly selected members of the chosen insurance companies. A total of 458 respondents who completed the questionnaires from these companies were also engaged with oral interviews to cross examine some of their views. In an attempt to achieve the objectives of the study, the respondents were grouped into three categories as shown in tables 2 and 3. Furthermore, an analysis of variance test was applied to the data sets to buttress the variations on the perception of the public on socio-economic variables identified. These three groups were based on annual wage and length of life insurance policy before allowing it to lapse.

DISCUSSION

As the lack of basic social and economic amenities have been identified as one of the major factors, the federal government of Nigeria should as a matter of urgency, map out some programmes to educate and convince the public on the need for life insurance policy. In addition, government should formulate policies aimed at improving the standard of living as well as controlling the inflation rate to encourage the public to contract life insurance policies. However, it is believed that some socio-economic indicators such as poor salary structure, standard of living, lack of social amenities will definitely bring out some variations in the society which will impede the growth of life insurance business as shown on table 1, appendix I.

The results above confirmed the postulations made by the general public. Furthermore, the result seems to support that there are some indirect relationships between some socio-economic variables and low performance of the Nigerian life insurance sector. This can be deduced from the significant differences observed amongst the groups of their respondents used in the study. This is not surprising as it is well known that the poor provision of some basic socio economic amenities had serious effect on attitudinal change towards life insurance policy. Although, contracting life

insurance policy is a formidable task, it is obviously of practical importance that attitudes towards life insurance policy can be changed. If consumers can be persuaded to reduce the expenses on the numerous societal activities, then enough money can be saved to contract life insurance policy no matter how harsh or poor the economic situation would be.

CONCLUSION

The result shows that $P < 0.05$, which implied that there seem to be variations due to length of period the use policies lasted before they are allowed to lapse. However, when the effect companies are combined with the duration of life policies, the results seem to suggest that effect of companies is not significant. Hence, one can conclude that the observed variations due to duration of life policies before lapse observed might have occurred by chance. See the tables in Appendix 11. The observed variations in the duration of life before lapse are further presented with bar chart as shown in figure 1. The effect of annual incomes in the decision to contract life-insurance policy is significant with P-value of 0.000358. However, when the effects of different companies are brought in, there seem to be variations although the variations are not as pronounced as in the case of duration of life policies before lapse. Bar chart in figure 2 shows that there are variations in the Annual Incomes of the life policy-holders for the four selected companies. In conclusion, the effects of annual incomes of the life policy holders on the decision to contract life insurance policy are fairly strong. See the tables in Appendix 111.

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APPENDIX 1

Table 1: Factors Mentioned by the Respondents for Poor Insurance Growth

Reason for Lack of Interest	No. of Respondents	Percentage of Total respondents
Poor salary	266	58
Standard of living	357	78
Cost of living	321	70
Lack of awareness	92	20
Poor economy	348	76
Poor investment	137	30
Lack of trust	366	80

Table 2: Annual Wages of the Life Policyholders Classified by Company

Annual wage Company	Annual wage			Total
	₦ <120,000	₦ 120,000 ≤ X ≤ 200,000	₦ X ≥ 200,000	
A	23	59	40	122
B	12	54	39	105
C	10	49	53	111
D	14	55	49	118
Total				456

Anova: Two-Factor without Replication

SUMMARY	Count	Sum	Average	Variance
A	3	122	40.66667	324.333
B	3	105	35	453
B	3	111	37	553
C	3	118	39.33333	490.3333
Less than 2	4	59	14.75	32.91667
2 ≤ x < 5	4	216	54	20.66667
x ≥ 5	4	181	45.25	46.91667

Table 2: Annual Wages of the Life Policyholders Classified by Company

Annual wage Company	Annual wage			Total
	₦ <120,000	₦ 120,000 ≤ X ≤ 200,000	₦ X ≥ 200,000	
A	23	59	40	122
B	12	54	39	105
C	10	49	53	111
D	14	55	49	118
Total				456

Table 3: Duration of the Life Policy before Lapse by Company

Duration of Policy Company	Duration of Policy		
	Less than 2	2 ≤ X < 5	X ≥ 5
A	48	30	12
B	50	25	17
C	35	28	20
D	45	42	13
Total			

APPENDIX 11

Anova: Single Factor

Summary

Groups	Count	Sum	Average	Variance
Less than 2	4	59	14.75	32.91667
2 ≤ x < 5	4	216	54	20.66667
x ≥ 5	4	181	45.25	46.91667

Anova

Source of Variation	SS	Df	MS	F	P-value	F crit
Between groups	3396.5	2	1698.25	50.69403	1.26E-05	4.256495
Within groups	301.5	9	33.5			
Total	3698	11				

Anova Results

Source of Variation	SS	df	MS	F	P-Value	F crit
Rows	56.66667	3	18.88889	0.4629	0.718521	4.757063
Columns	3396.5	2	1698.25	41.61811	0.000304	5.143253
Error	244.8333	6	40.80556			
Total	3698	11				

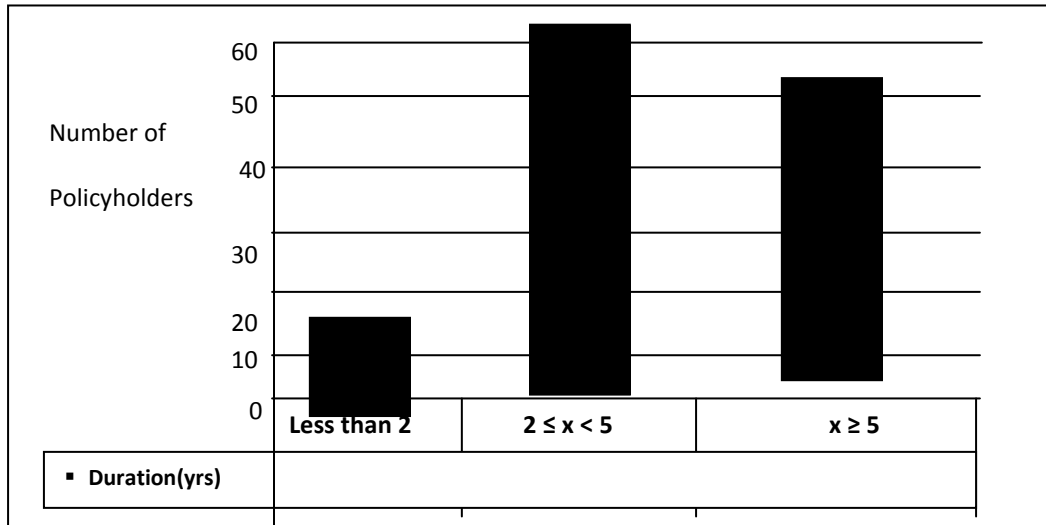


Fig 1: Duration of life-policies before lapse

Appendix III

Anova: Single Factor

Summary

Groups	Count	Sum	Average	variance
Less than 120	4	205	51.25	44.25
120 ≤ x < 200	4	163	40.75	58.91667
x ≥ 200	4	90	22.5	13.66667

Anova Results

Source of Variation	SS	Df	MS	F	P-value	F crit
Between group	1693.167	2	846.5833	21.73823	0.000358	4.256495
Within groups	350.5	9	38.94444			
Total	2043.667	11				

Anova: Two-Factor Without Replication

Summary	Count	Sum	Average	variance
A	3	111	37	324
B	3	113	37.66667	296.3333333
B	3	114	38	93
D	3	120	40	301
Less than 120	4	205	51.25	44.25
120 ≤ x < 200	4	163	40.75	58.9166667
x ≥ 200	4	90	22.5	13.6666667

Anova Results

Source of Variation	SS	Df	MS	F	P-value	F crit
Rows	15	3	5	0.089418778	0.963226	4.757063
Columns	1693.167	2	846.5833	15.14008942	0.004523	5.143253
Error	335.5	6	55.91667			
Total	2043.667	11				

AN EMPIRICAL INVESTIGATION OF MALTHUSIAN POPULATION THEORY IN NIGERIA

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ABSTRACT

This paper investigates the potency of increasing population on economic development in Nigeria hinging the background of analysis on Malthusian population theory. It is important to emphasize that while Malthus believes that increase in population leads to underdevelopment, other economists like Marx and Engels see it otherwise especially with regards to socialist and capitalist economies. Using the Vector Error Correction (VEC) Mechanism to estimate a time series covering a 31 year period of 1982 – 2012, the study found out that population growth has no significant impact on economic development in Nigeria within the study period – giving credence to the theoretical underpinning. The study recommends among others that the government should embark on enlightening campaigns to intimate the populace on the dangers of overpopulation and its attendant consequences. Also, the continuous benefits of modernization in terms of improved health care services and other social securities should be made available to the populace, the majority whom are poverty stricken. Finally, the pursuit of diversifying the economy should be relentless, so that the channels of stimulating growth and development will not be neglected.

KEYWORDS: Nigeria economy, population growth, economic development, per capita income

INTRODUCTION

The early population growth discourse which was initiated by Thomas Malthus and continued by Karl Marx and Friedrich Engels has led to a lot of controversy. While Malthus posited that population tends to outstrip resources; Marx and Engels believed that the consequences of population growth will be quite different in a capitalist society when compared to those in a socialist society. This led to reformulations in the nineteenth and early twentieth centuries by scholars such as J. S. Mill, Ludwig Brentan, and Emile Durkheim. The reformulation of the early theories by these scholars provided the background for more systematic collection of population data to test aspects of these theories. Economists are torn between three theories; one that state's that population growth helps a nation's economy by stimulating economic growth and development and another that bases its theory on Robert Malthus' findings that population increase is detrimental to a nation's economy due to a variety of problems caused by the growth. The third school of thought is that population growth does not have any impact on economic growth (Thuku, Gachanja and Almadi, 2013).

Kuznets, Lewis, Meier and other economists have shown that the growth of population has been an important factor in the growth of "developed" countries (Jhingan, 2007). Other proponents of this assertion are Bloom and Freeman (1998), Coale and Hoover (1958), Friedberg and Hunt (1995), Nurkse (1951) and Lewis (1954). However, notable economists such as Malthus

(1798), Gerald and Meier (1995) and Martin (2009) believe that population growth has an inverse relationship with economic development. Hence, in this time of increasing population growth in Nigeria (put at about 3.2% annually), great concern is raised about poverty alleviation, sustainable growth and development.

The high rate of population growth is a growing concern throughout the world and a challenge to countries' economies. The world's population was about a billion in 1800 and rose to 2.5 billion in 1950. In the year 2007 the world's population was 6.7 billion and is projected to rise to 9.2 billion by 2050 with almost all population growth projected to occur in what are now considered less developed regions – Africa, Asia and Latin America (Martin, 2009). Nigeria which is also a developing country is not excluded and has a rapidly growing population. The 1991 census figure puts Nigeria's population at about 89 million people with a growth rate of 2.82 percent and total fertility rate of 5.89 percent as revealed by Post Enumeration Survey (PES). In the 2006 National Population Census, Nigeria had a population of 140,003,542 (NBS, 2010) with a growth rate of 3.02 percent per annum, a population that is capable of doubling itself in less than twenty three years. In addition, the 2009 United Nations estimate of Nigeria's total population stood at 151,030,400 (UN, 2009).

Population is one of the central problems of poverty and sustainable economic development. For example, in the decade 1990 – 2000, Cameroon, Kenya and Zambia had population growth rates of 2.7, 2.4, and 2.6 per cent per year alongside GDP growth rates of 1.7, 2.1 and 0.5 per cent, respectively hence they experienced negative rates of growth of GDP per capita of -1.0, -0.3, and -2.1 per cent per year (World Bank, 2002). Many less developed countries have rates of growth of population that are nearly as large as their rates of growth of GDP. As a result, their standards of living are barely higher than they were half a century ago. They have made appreciable gains in aggregate income, but most of the gains have been literally consumed by the increasing population leading to poverty and decreasing standard of living.

Nigeria's average growth rate of per capita income between 1982 and 2012 stood at 1.15% which is less than half the growth rate of population of 2.49%. There has also been a striking feature of Nigeria's economy which has gone unnoticed. Since 1981, the Nigerian economy has not grown: the GDP per capita in 1981 was more than that of 2002 and almost the same with that of 2006. This brings in a sharp contrast when compared with peer countries like Indonesia and Pakistan. In 1980, Nigeria's GDP per capita was slightly higher than that of Indonesia and Pakistan (Bloom, Finlay, Humair, Mason, Olaniyan and Soyibo, 2010). Since then, Nigeria's economy has stagnated, while Pakistan, and especially Indonesia, has grown considerably. Indonesia's income per person is now roughly twice Nigeria's. Nigeria's economy in general has performed similar to Sub-Saharan Africa as a whole. Meanwhile, East Asia in particular and the rest of the world have zoomed ahead.

Part of the problems with the Nigerian economy has been demographic. Since independence, Nigeria has struggled against very high fertility rates and relatively low (or declining) mortality rates resulting in a high ratio of children in the population. Only since the 1980s did fertility rates began to decline, albeit very slowly and averaging 6.09% till date. In 2007, Nigeria's fertility rate was higher than in Sub-Saharan Africa as a whole and was more than twice the world average fertility rate (UN, 2007). The impact of fundamental demographic processes on economic growth and sustainable development has often being neglected when building strategies for poverty alleviation in Nigeria. It has been widely acknowledged that population growth leads to economic development in developed countries. However, this is not a basis to conclude for Less Developed Countries (LDCs) since the conditions prevailing in these countries are quite different.

The question with respect to Nigeria therefore is: does an increase in population lead to an increase in standard of living or otherwise population trap? This study thus sets out to achieve the following basic objectives: examining the effect of increasing population on economic development; assessing the predictive power of population growth on future development trends, and establishing how well the fitted model predicts the outcome of sample observations. In doing this, the study will be significant in that it will attract attention to the issue of bringing into perspective population growth fundamentals into policies of poverty alleviation and sustainable development. It will contribute to literature by being contemporary for updating data up to the period of 2012, it also used variables which are core variables of population growth, then it applied a robust econometric analytical tool that has optimal qualities and applicable to long term analysis. The paper is structured into 5 sections. Section 1 gives the background of the Nigerian population changes in line with sustainable economic development and poverty alleviation. Section 2 deals with literature review comprising theoretical framework and empirical review while section 3 covers the methodology. Section 4 focuses on data analysis and interpretation while the conclusion and recommendation is done in section 5.

LITERATURE REVIEW

Theoretical Framework

There had been discussions on the issue of population, its growth, desirability, and consequently its effects. Malthus was the first to integrate the ideas into a systematic line of thought as he was able to fuse the growth of population to its effects. Malthus did not subscribe to the views of early economists like Godwin, Cantillon, and Smith (Bhatia, 2006) who believed that population growth will either be counter balanced by a corresponding increase in means of subsistence or reason would help people to check population growth.

Instead, Malthus took the position that there was a natural phenomenon which triggered population in a geometric progression and food supply in arithmetic progression. The crux of Malthus thesis is summarised thus: Sex instinct is a powerful instinct in humans which if left unchecked (or unless checked through moral restraint) leads to high rate of procreation. Also, the means of subsistence that is, food supply obtained from agro-business cannot increase that fast. Therefore, so long as population and subsistence conformed to their geometric and arithmetic progressions, population was guaranteed to surpass the means of subsistence. Finally, unless population growth was slowed down through 'preventive checks,' 'positive checks' then become inevitable.

Fortunately, in most parts of the world, Malthus' predictions have been proved false for two main reasons are paramount; first, Malthus underestimated the importance of technological change. Secondly, he underestimated the extent of voluntary restrictions of population growth. Even though Thomas Malthus was termed a pessimist, his population theory has evoked a lot of interest both positively and negatively. Fiercer on the discourse concerning his theory in recent times is the relative effect of population growth on developed and underdeveloped countries. However, most underdeveloped countries have been experiencing rapid population growth and poverty simultaneously (Lipsev and Chrystal, 2004). This has spurred the interest of this research to investigate the relationship between population growth and economic development in Nigeria with a view to establishing the direction of impact.

Empirical Review

Thuku, Gachanja, and Almadi (2013) examined the impact of population change on economic growth in Kenya. The study employed Vector Auto Regression estimation technique and used annual time series data for the period 1963 to 2009. The results indicated population growth and economic growths are both positively correlated and that an increase in population will impact positively on economic growth in the country. The study concludes that in Kenya inadequate government policies, rather than population growth is responsible for the woes including, famines that besiege the nation. Adewole (2012) investigated the effect of population on economic development in Nigeria 1981 to 2007 based on a quantitative assessment. The study revealed that population growth has positive and significant impact on economic sustainability.

Dao (2012) carried out a research on population and economic growth in 43 developing countries. He applied the least-squares estimation technique in a multivariate linear regression. Based on data from the World Bank he found that the growth rate of per capita GDP is linearly dependent upon population growth, the mortality rate, He concludes that the effect of population growth on per capita GDP growth is linear and everywhere negative.

Bloom and Freeman (1998) examined the prospects for economic growth in Nigeria based on a demographic perspective. Using a cross-country growth model, their principal conclusion is that Nigeria has a substantial demographic opportunity on the horizon, and even though features of Nigeria's economy make capitalizing on this opportunity challenging, Nigeria does have policy options available that can allow it to harness its demographic transition into indefinite sustained growth.

Klasen and Lawson (2007) investigated the impact of population growth on economic growth and poverty reduction in Uganda. The paper examines the link between population and per capita economic growth, and poverty, using panel data, they found both theoretical considerations and strong empirical evidence suggesting that the currently high population growth puts a considerable break on per capita growth prospects in Uganda. In addition measures to assist households with alternative ways to smooth consumption over the life-cycle would clearly assist in reducing fertility.

Oraham (2006) examined the effects of population growth in Nigeria. He discussed the use of double time growth analysis in the explanation of the need for population control in Nigeria and the potential danger that might emanate from the continuous neglect of environmental issues presented by environmentalists and population demographers in Nigeria and the world at large. His recommendations were that Cue should be taken from China and other countries like Russia, Hungary etc.

METHODOLOGY

Model Specification

Based on the theoretical underpinning of the work of Malthus which takes into cognizance population growth and economic development; this paper seeks to empirically examine the effect of increasing population (high fertility and declining mortality) on per capita income. The Vector Error Correction (VEC) Mechanism is used to analyse data gotten from Nigerian Statistics (World Bank Estimates) and CBN statistical bulletin covering a time span of 1982 – 2012. This is done under the framework of the Vector Auto-Regressive (VAR) Model. The Unit root test and granger causality are also employed as augmenting analysis. The model to be estimated is specified below;

$$PCIG = \alpha_0 + \alpha_1 POPG + \alpha_2 FER + \alpha_3 MOR + \mu \quad (i)$$

Where; PCIG = Per Capita Income Growth

POPG = Population Growth

FER = Fertility Rate (Total Births per Woman)

MOR = Mortality Rate (per 1,000 Live Births)

$\alpha_0 - \alpha_3$ = Parameters to be Estimated

μ = Error Term

Justification of Variables

PCIG is chosen as the endogenous variable and as the proxy for economic development. Economic development is best measured by standard of living (level of welfare attained by individuals) in a country. In turn income per capita is the best index for measuring differences in the standard of living in different countries – hence, its inclusion as the dependent variable in the model.

The essence of this research is to measure the impact of “population growth” on economic development. Thus there is no better proxy for population growth other than its figures. Therefore POPG is the core explanatory variable of this research.

Economic variables are characterised by a system of joint interdependency, and as such there is need to specify other variables that are contributory either to trends in the core explanatory variable or the dependent variable. Population growth has its own stimulants chiefly amongst which are FER and MOR. Thus, they are specified in the model as explanatory variables for the purpose of unbiasedness.

Based on a plethora of empirical analysis and the Malthusian theoretical stipulations we expect population growth to be negatively related to economic development. Therefore, the individual coefficients of the parameter estimates, POPG and FER are expected to have a negative relationship with PCIG while MOR is in the reverse order. To this effect, $\alpha_1, \alpha_2, < 0$ and $\alpha_3 > 0$.

DATA ANALYSIS

Data Presentation, Result and Discussion

The unit root is used to examine the stationarity of the data series since the data is time series, the ADF test is employed. It is important because it enhances validity of results and is also a prerequisite to the VECM. The result of the stationarity test is presented below:

Table 1: Stationarity Test

Variable	ADF Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Prob.	Order of Integration
FER	-1.807848	-2.650145	-1.953381	-1.609798	0.0677	I(2)
MOR	-5.920286	-4.356068	-3.595026	-3.233456	0.0003	I(2)
PCIG	-6.260738	-3.711457	-2.981038	-2.629906	0.0000	I(2)
POPG	-3.618515	-3.689194	-2.971853	-2.625121	0.0118	I(2)

Source: Authors' Computation from Eviews7.

The result of the unit root test shows that all the variables are stationary at 2nd difference. For PCIG and MOR, the ADF test statistic is greater (using absolute values) than the critical values at all significant levels while for POPG the ADF test statistic is greater than at 5% and 10% critical values. The ADF statistic for FER is greater than the 10% critical value.

The second objective of this research paper is to examine the prediction power of population growth on future development trends. Granger causality tested the direction of causation between population growth and economic development. The result of the granger causality test is explained below.

Table 2: Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
POPG does not Granger Cause FER	29	0.87420	0.4301
FER does not Granger Cause POPG		19.2595	1.E-05

Source: Authors' Computation from Eviews7

The result reveals that there is no causality between population growth and economic development. Rather, the result shows the dominance of FER in predicting future population growth trends but not vice versa. This is established from the probability which indicates a value of less than 5% to nullify the hypothesis that FER does not granger cause POPG. The result clearly portends that POPG does not granger cause PCIG nor FER. Thus, there is no mutually reinforcing bilateral causality between population growth and economic development.

Effect of Population Growth on Economic Development in Nigeria

The VAR model is used to estimate the long run and short run dynamics of the data series. The Johansen Cointegration and the Vector Error Correction Method are used as augmenting analysis. The Johansen cointegration is analysed via the Trace statistic and Maximum Eigen value. The decision rule is that if either is greater than the 5% critical value, we reject the null hypothesis of no cointegration among the variables. Their respective results are shown below.

Table 3: Cointegration Test

Null Hypothesis	Trace Statistic	0.05 Critical Value	Null Hypothesis	Max-Eigen Statistic	0.05 Critical Value
$r = 0^*$	76.85	47.86	$r = 0^*$	29.51	27.58
$r \leq 1^*$	47.34	29.80	$r \leq 1^*$	26.86	21.13
$r \leq 2^*$	20.48	15.49	$r \leq 2^*$	17.67	14.26
$r \leq 3$	2.81	3.84	$r \leq 3$	2.81	3.84

Source: Authors' Computation from Eviews7

Note: r represents number of cointegrating vectors. Trace statistic and Max-Eigen statistic indicates 3 cointegrating equations each. * denotes rejection of the hypothesis at the 0.05 level

The Trace test and Max-Eigen value test indicates 3 cointegrating equations each. The trace statistic and the Max-Eigen statistic are greater than their respective critical values for all the cointegrating equations. Thus, the null hypothesis of no cointegrating equation is

rejected. This implies that even though the series of the variables are stationary at 2nd difference, their linear combinations are cointegrated. This further means that there exists a long run relationship among the variables at 5% significance level.

Long Run Model

$$PCIG = 1.00 - 5.39POPG + 1.53FER + 0.19MOR$$

(12.71) (3.79) (0.71)

Source: Authors' Computation from Eviews7

Note: Standard Error in parenthesis

Based on a priori expectation, the coefficient of POPG and FER are expected to be negative while the coefficient of MOR is expected to be positive. From the result, the coefficient of POPG and MOR corresponds with a priori expectation while the coefficients of FER does not. Also from the model estimate, the coefficients of POPG, FER and MOR are statistically significant (that is, $\frac{1}{2}b_2 < S.E.$). This implies that there are other factors beyond these identified variables that determine PCIG. The result further reveals that in the long run, a unit change in POPG will cause PCIG to decrease by 5.39 of that unit change. Conversely, a unit change in FER and MOR will cause PCIG to increase by 1.53 and 0.19 respectively of that unit change. This confirms that population growth in the period of study has had adverse effect on per capital income, poverty and sustainable development.

The Short Run Model

Table 4: Vector Error Correction Model

Variable	Coefficient	Standard Error	T statistics
ECM	-1.30	0.25	-5.18
D(PCIG(-2))	-0.01	0.15	-0.07
D(POPG(-2))	-1.22	47.41	-0.03
D(FER(-2))	-89.39	93.28	-0.96
D(MOR(-2))	0.13	0.77	0.18
C	-4.24	4.23	-1.00

$$R^2 = 0.59, \text{ Adjusted } R^2 = 0.45, F \text{ statistics} = 4.20, F_{0.05} =$$

Source: Authors' Computation from Eviews7

The table above shows the short run estimates of the VAR model. From the result, the coefficients of POPG, FER and MOR display signs that meet a priori expectation. In line with the long run model, all the parameter estimates are statistically significant (that is, $\frac{1}{2}b_i < S.E.$).

The R^2 (0.59) shows a moderate and positive relationship between the variables. It further shows that 59% of the variations in PCIG are accounted for by POPG, FER and MOR. The R^2 is substantiated by the adjusted R^2 (0.45) which shows that 45% of the variations in PCIG are accounted for by the independent variables. This further reveals that the additional

explanatory variables have theoretical relevance to the data series. More so, the F statistics buttresses the overall goodness of fit of the model. Since the F calculated (4.20) is greater than the F tabulated (2.052) – we conclude that the independent variables (POPG, FER and MOR) have joint influence on PCIG. Thus, the overall predictive power of the econometric model is statistically significant.

However, the coefficient of the error correction term is statistically significant with the expected sign and a magnitude of -1.30. This magnitude indicates that if there is any deviation, the long run equilibrium is adjusted moderately where about 130% of the disequilibrium may be removed in each period. This shows that the speed of adjustment to where PCIG will equilibrate even when there is initial disequilibrium is at the rate of 130%.

The result also reveals that in the short run, a unit change in POPG in the previous year will lead to a 1.22 decrease in PCIG. Similarly, a unit change in FER in the previous year will cause PCIG to decrease by 89.39. Conversely, a unit change in MOR in the previous year will increase PCIG by 0.13.

FINDINGS OF THE RESEARCH

Based on a priori expectation, FER and POPG are expected to have a negative relationship with PCIG while MOR is expected to be positive. The result of the empirical analysis table 5 shows that the coefficients of two of the explanatory variables are FER incorrectly signed, POPG having a negative sign and MOR having a positive sign. This mismatch could be explained by the decision which explains that population growth has no impact on economic development in Nigeria. This is because the higher the fertility rate, the higher the increase in population which inhibits the means of subsistence per head giving credence to the fears expressed in the Malthusian theory. Similarly, mortality rate proves circumstantial in decreasing the standard of living of citizens acting as positive checks according to Malthusian postulation.

The adjusted R^2 shows a weak relationship between the dependent and independent variables with 55% of the variations unaccounted for. This implies that POPG, FER and MOR can only explain 45% of the changes in PCIG in the Nigerian economy and thus there are other key macroeconomic variables that are core stimulants to economic development in Nigeria.

CONCLUSION AND RECOMMENDATION

The major findings of this research allow us to conclude that Population Growth has no significant impact on Economic Development in Nigeria. This is in line with

the works of Dao (2012) and Thirwal (1973). In other words, the Malthusian population theory is relevant when applied to the Nigeria economy. Therefore, if we posit that population growth is detrimental to economic development it is tantamount to averring that overpopulation and poverty are correlated which portends danger. This combination is associated with increased vices, disease and death. This could be attributed to so many reasons chief amongst which is economic backwardness that basically depicts the inadequacy of social welfare programmes, infrastructure or the wherewithal to support the existing population. The effect of population on the economy in Nigeria is much more than the food problems enunciated by Malthus. Some of these consequences are congestion, high dependency ratio and, mounting social problems, emigration, higher unemployment and/or underemployment, inequality including the current acts of insurgency and terrorism. Thus appropriate measures should be taken to curb this growing menace which may become endemic in the Nigerian economy resulting in pervasive poverty, and portends danger to sustainable development.

The following recommendations are hereby made: Constitutionally, a family should consist of one man, one wife, and four children. However, rarely is this binding duty carried out by most Nigerians. The government should therefore embark on enlightening campaigns to intimate the populace on the dangers of over population and the need to have healthy family that can be adequately catered for.

Also, family planning exercises should be encouraged by the government to help curb increasing fertility rate in Nigeria. Furthermore, a high mortality rate has grave consequences on the development of the Nigerian economy. Thus, the continuous benefits of western modernization in terms of improved health care services should be made available to the populace.

Per Capita Income grows when aggregate national income grows faster than population. Efforts should be made by government to expand the infrastructure base, create favourable environment for employment creation. Finally, the pursuit of diversifying the economy should be relentless, so that the channels of stimulating growth, poverty alleviation and sustainable development will not be curtailed.

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STRENGTHENING OF EXTENSION LEARNING AND EDUCATION FOR SUSTAINABLE ENTREPRENEURSHIP

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ABSTRACT

Sustainable entrepreneurship (SE) is a kind of entrepreneurship that meets the needs of the present without compromising the ability, efficiency and values of future generations to meet their own needs. SE leads to sustainable development. Sustainable entrepreneurs should be developed through well-conceived and well directed extension learning and education programmes around thrust areas, thus advancing the frontiers of theories and practice sustainable entrepreneurship. The objectives of the study are : (i) To implement the concept of SE based on entrepreneurial research conducted in South India , (ii) To formulate and appraise forty three number of detailed project reports of Diploma in Entrepreneurship and Business Management (DEBM) extension learners in eleven batches attached with the present author , counselor and co-ordinator of Entrepreneurship Development Institute of India -Ahmedabad during the research year (RY) 2007-2014 , (iii) To promote policy recommendation so as to strengthen scientific and technical services focusing on extension education, training and research The design of the study was cross sectional. The study has been conceptualized and launched based on an innovative entrepreneurship development programme through distance learning and personal counseling. DEBM extension learners were equipped with the knowledge, skills and motivation to set up their sustainable enterprises and function dynamically and manage successfully. All entrepreneurial business planning assessment regimes (EBPARs) have been accomplished for credibility and communicability. Project analysis for forty three extension learners has been discussed. Green design and structure of resultant products and services were environmental advantage with good performance and prices. A famous project case on unsafe chromium pollution and contamination of 18 000 to 30 000 mg/kg from Indian cotton roller ginning factories and development of green design roller gin rollers for cotton gin machine has been presented. Such low-carbon and energy-efficient technologies of agricultural hi-tech industries have made important contributions to mitigating the impacts of economic growth on global warming. SE is an innovation in order to advance science and technology and sustainable mechanization. Hitherto state-of-the-art literatures, market effects have been considered. It is reported that non-market impacts such as environmental and social impact assessment should be considered for proposed, plans, programs, policies and legislative action projects for sustainable development and poverty alleviation.

KEYWORDS: alleviation; education; enterprise; entrepreneur; environment

INTRODUCTION

Sustainable development is a kind of development that meets the needs of the present without compromising the ability, efficiency and values of future generations to meet their own needs. The concept of sustainable development challenges that fosters long-term protection of the environment and its habitants as the technological developments are guided by efficiency, productivity, profitability, health and environmental impacts, resource and energy conservation, waste management, and social impacts such as public convenience, unemployment and crime (Hendry , 2004). Extension learning education and research in the field of sustainable entrepreneurship (SE) is introduced so as to develop sustainable entrepreneurs on large scale so as to set up sustainable enterprises for sustainable development and poverty alleviation. Entrepreneurship

is a process of setting up of new enterprises to pursue opportunities. In spite of the state-of-the-art literatures available on sectoral entrepreneurship e.g. agripreneurship, edupreneurship, healthcare entrepreneurship, tourism entrepreneurship etc., research on SE for sustainable development has been introduced which is an important area in the relevant literature (Iyer, 2014). An entrepreneur, who organizes, manages, assumes risks and enjoys profits of business successfully. SE is defined as a process of setting up of sustainable enterprise at considerable risk. SE involves all the functions, activities, and actions associated with the perceiving of new sustainable opportunities and the creation of sustainable enterprises to pursue them. Entrepreneurs perceive new opportunities and create enterprises to pursue it (Legg , 2004). A sustainable

entrepreneur combines efficiently and effectively of all six kinds of input resources can be referred to as “The six Ms” such as man-power, machinery, material, method, money and market in order to transform to output goods, products or services (Iyer, 2013). Sustainable entrepreneurs consider the environment in an organizational planning and decision making and to arrive at actions which are more environmentally compatible plans. The concept of sustainability is highlighted when the resources do not get depleted due to business endeavors. Sustainable enterprise creation process is a solution for unsustainable development which is research problem under investigation (Iyer, 2014). The author, expert counselor and coordinator has got an autonomy to conduct one year Diploma in Entrepreneurship and Business Management (DEBM) duly awarded by Entrepreneurship Development Institute of India (EDI) to forty three DEBM extension learners during the research year (RY) 2007-2014. DEBM counselor has to provide the learners’ necessary academic support and guidance, conduct of course work, two contact sessions, evaluation of assignments, tutorials, detailed project reports (DPRs) and conduction of term end examinations. All DPRs have been formulated and appraised on green design and structure of products and services. DEBM learners have been awarded diploma. The course is recognized by All India Council for Technical Education (AICTE), University Grants Commission (UGC) and Distance Education Council (DEC) as per reference <http://www.debm.ediindia.ac.in>; reference agency code number 80410. Website: www.ediindia.org & <http://debmcourse.blogspot.in/>

To address the need of developing new and committed sustainable entrepreneurs, there is a need of extension learning and education programme through distance learning and personal counseling.

RATIONALE AND BACKGROUND

Education coupled with entrepreneurship is an intricate sustainable educational process towards sustainable development that can be focused on sustainable rural development and poverty eradication from the emerging enterprise spirit (Iyer, 2014). The poverty is a result of inefficient use of resources (Iyer, 2014). If it aids for sustenance then that can be eradicated. About 88% of economic growth is created by innovation (Iyer, 2013). To achieve this degree of excellence, resources must be utilized at optimum and sustainable levels to maximize efficiency as per the results analysis of optimum competitive and social markets (Iyer, 2014). The referred “*A.K*” economic model for an optimum output level of economic growth is the product of engineering or technical factor level (A) and the capital (K) (Iyer, 2014). The solution is the creation of new sustainable

enterprises. The entrepreneurial idea generation is based on the concept of entrepreneurship and innovation management. The economic growth development of is explained by three factors (Iyer, 2014).

The natural increase in the accumulation of labor potential, Capital accumulation or money with which a business is being started and run, and Technological momentum can be referred as total factor productivity (TFP) or efficiency in industrial processes.

The fundamental sustainable entrepreneurial momentum keeps the capital development dynamic which comes from the new agricultural enterprise creation process, new agricultural products or service requirements from customers, the new methods of production and processes, new transportation, and new agricultural markets and new forms of industrial organization.

Standard Production Function (SPF) is expressed as

$$Y = f(C, L)$$

Where Y=Output, C=Capital, and L=Labor

As knowledge is an important factor for the economic growth,

Standard Production Function (SPF) is modified as

$$Y = A(C, L) f(C, L)$$

‘A’ represents Knowledge on engineering or technical extension

Y= Output, C= Capital, L= Labor, f = Standard production function

As per the given standard production function, knowledge is a decisive production variation. Therefore it is importance of application of low-carbon and energy-efficient green product designs and structures for sustainable development through SE.

To address the need of developing new and committed sustainable entrepreneurs on a large scale, there is a need of an innovative scientific and technical extension education programme through distance learning and personal counseling in extension education system. A dynamic and pragmatic approach is introduced to create sustainable entrepreneurs on a large scale and to strengthen extension education.

METHODS AND PROCEDURES

One year DEBM course is offered by EDI and sponsored by Friedrich-Naumann-Stiftung (FNSt)-A foundation of International repute from Germany(EDI, 2012). Professional expert counselor has conducted DEBM course independently to forty-three extension learners during the research year (RY) 2007-2014 in eleven batches as per EDI guidelines. EDI has provided guidelines to conduct the course as per the website reference <http://www.debm.ediindia.ac.in>. SE was the targeted research area. The methodology of the DEBM course includes, self-instructional study material,

assignment, personal counseling through professional expert counselors and contact sessions during the course. The award of the diploma is based on assessment of the assignments, detailed project reports (DPRs) submitted by the learners and performance in the final (TEE) examination. Forty three green product design projects were appraised duly proposed by DEBM learners under the research guidance of expert counselor during the given RY. List of forty-three extension learners and their academic records were uploaded in <http://www.debm.ediindia.ac.in/counsellors/studentrecord/candidates.jsp>, and counselor code number (User ID) 80410. www.ediindia.org & <http://debmcourse.blogspot.in/> http://www.ediindia.org/doc/List_of_Institutions_for_website_latest.pdf serial number 68.

<http://www.debm.ediindia.ac.in/counsellors/studentrecord/candidates.jsp>, and counselor code number (User ID) 80410.

www.ediindia.org & <http://debmcourse.blogspot.in/> http://www.ediindia.org/doc/List_of_Institutions_for_website_latest.pdf serial number 68.

Figure 1 shows a schematic map of sustainable enterprise creation process for setting up of sustainable enterprises .

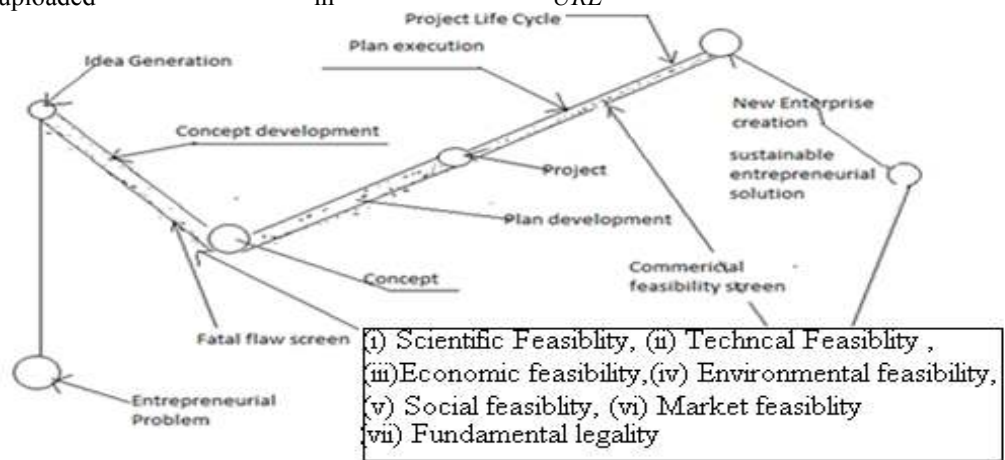


Figure-1: A Schematic Map of Sustainable Enterprise Creation Process

All DEBM projects were screened for the seven fatal flaws, namely, (i) scientific feasibility, (ii) economic feasibility, (iii) technical feasibility, (iv) environmental feasibility, (v) social feasibility, (vi) marketing feasibility, and (vii) fundamental legality. The sustainable entrepreneur or a trusted member of an entrepreneurial team have acquired skills in ethics, accounting, law, finance, team creation and marketing aspects in order to avoid failures in the process. Sustainable entrepreneur has thorough knowledge on environmental management system (EMS) and social management system (SMS) in order to skillfully bring about and manage resources efficiently to do a dedicated sustainable entrepreneurial process. EMS is a system of a continual cycle involving various processes as planning, implementing, reviewing and improving the activities for the enterprises to comply technical, economic, environmental and social obligations. EMS ensures that agricultural organizations identify and focus on improving areas where they have significant environmental and social impacts (Iyer, 2014). Sustainable entrepreneurs have followed the principle of sustainable process approach as depicted in Figure-2. . Extension learning and education system (ELES) functions as per the principle of process approach - an activity based management system as outlined in Figure 2 (Iyer, 2014). Monitoring, measurement and control opportunities in extension learning system through

process approach have been identified and evaluated during the RY.

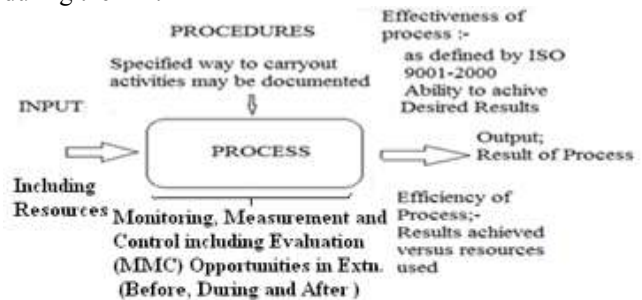


FIGURE-2 ; SCHEMATIC REPRESENTATION OF SUSTAINABLE ENTREPRENEURIAL PROCESS

In order to make the venture a dynamic and growing sustainable enterprise, the entrepreneurs have been skillfully brought about and managed resources efficiently to dedicated sustainable entrepreneurial process. A process approach has been developed in order to bring labor, capital, technology, management, market, machineries, land and information together in new ways and to establish a new mechanism for sustainable rural development and eradicating poverty by providing scientific and technical services. This approach enhanced innovation in science and

technology (S & T) through an efficient extension education system. A famous case (DPR-I) on eco-friendly rubberized cotton fabric roller development for cotton roller ginning machines elaborates in World Scientific Engineering Academy and Society (WSEAS) (Iyer, 2011).

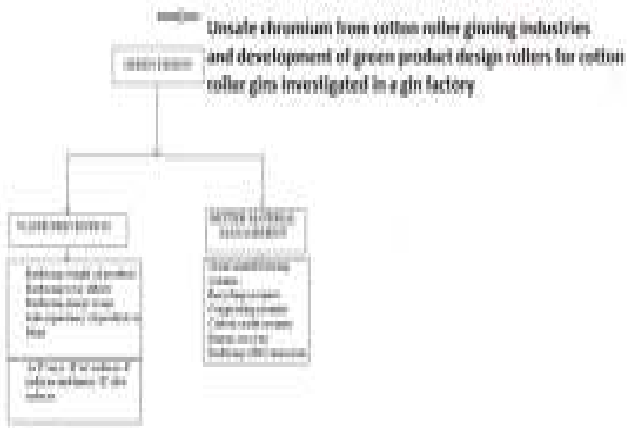


Figure-3: Green Design and Structure For Sustainable Development

Projects have been scrutinized for the fatal flaws (Figure-3). A famous case is discussed on unsafe chromium contamination and pollution from Indian cotton roller ginneries and development of green design roller gin rollers for cotton ginning machines duly investigated in a ginning factory (Iyer, 2007). It realizes the hazards of chromium contamination and pollution caused in the use of chrome composite leather-clad (CCLC) rollers commonly used in cotton roller ginning industries and attempts to eliminate the chromium contamination and pollution during the complete process (Iyer, 2014). The cotton roller ginning process is the mechanical separation of cotton fibres from their seeds by means of one or more rollers to which fibres adhere while the seeds are impeded and struck off or pulled loose (Gillum, 1974). Most of the cotton ginning operations are done using roller gins. The CCLC roller coverings contain about 18 000 to 30 000 mg/kg (ppm) as total chromium of trivalent and hexavalent forms which are toxic to human health (Iyer, 2007). When the seed-cotton is ginned, due to the persistent rubbing of CCLC rollers over the fixed knives, the cotton and its products contaminated with the total chromium of trivalent and hexavalent forms. Hexavalent chromium leaks threat to cotton mill workers and to those who wear cotton garments (Iyer, 2009). Cotton garments contaminated and polluted with toxic hexavalent chromium (Iyer, 2010). Consumers of cotton garments and ginning mill workers are exposed to chromium pollution and are susceptible to health hazards. Toxic effects are produced by prolonged contact with airborne or solid or liquid chromium compounds even in small quantities (Iyer, 2007). There are many chromium based diseases that come out of the case industries (Iyer,

2014). To avert the problems in cotton ginning factories, an eco-friendly rubberized cotton fabric roller has been designed and developed. This green design product has been successfully implemented and demonstrated for its sustainable performance (Figure -4). The objectives of DPR-I were (1) To identify and study the environmental and health related problems existing with the present CCLC rollers employed in cotton roller ginning industries and 2) To design and develop green design cotton roller gin rollers for seed-cotton roller gins and evaluate its performance with a particular reference to technical, economical, and environmental and social aspects in Indian seed-cotton roller ginning industries.



Figure-4: Seed-Cotton Ginning Using Green Design Rollers

RESULTS AND DISCUSSIONS

Entrepreneurial process is a set of inter-acting and inter-relating entrepreneurship activities in an organized manner (Iyer, 2013). Forty three DPRs were formulated and appraised. Study material of the DEBM course for learners and help provided by EDI counselors enable the extension learners to set up their own sustainable businesses (Entrepreneurship development Institute of India). The course targeted the learners to assess their entrepreneurial competencies and understand weakness and strength to start business. Overall the extension learning course equipped learners to function dynamically and acquired the requisite knowledge and skill to plan and successfully launch their own ventures. The result analysis of all projects have been uploaded in website reference;

<http://www.debm.ediindia.ac.in/counsellors/studentrecord/candidates.jsp>, and counselor code number (User ID) 80410.

Website: www.ediindia.org & <http://debmcourse.blogspot.in/>

The success of a good entrepreneur is determined by a sustainable business plan development. It is an important document that provides critical aspects, basic assumptions, and financial projections regarding the business venture (Iyer, 2013). It is the basic document used to interest and attract financial support. All entrepreneurial business planning assessment regimes (EBPARs) have been identified and evaluated for their credibility and communicability. A sustainable entrepreneurial venture has included four key ingredients:

1. A talented lead sustainable entrepreneur with a balanced and compatible team.
2. A technically and environmentally sound and marketable idea for a green product or service.
3. A thorough venture analysis leading to a complete sustainable business plan.
4. A clear statement of the cash required, phased over the period until the venture becomes cash flow positive and an indication of the minimum equity component.

DEBM extension learners were also focused to work on green design products and services with the resultant low-carbon and energy-efficient technologies during the RY. Sustainable enterprises have reduced environmental and social impacts associated with the manufacture, use and disposal of products. The output of green products and services which are sustainable production, environmental advantages with good performance and price (Masters, 2008).

A case study of a DPR-I on unsafe chromium pollution and contamination from cotton roller ginning industries and development of green design rollers for cotton roller gins investigated in a cotton ginning factory, a pilot plant of which has been implemented and demonstrated. Such low-carbon and energy-efficient agricultural technologies of agricultural hi-tech industries can make important contributions to mitigate the impacts of economic growth on global warming (Iyer, 2014). SE has provided innovation to improve S & T and sustainable agricultural farm mechanization for alleviation of rural poverty. All DEBM extension learners were equipped with the knowledge, skills and motivation to set up their sustainable enterprises and function dynamically and manage successfully. The DEBM programme promotes the application of multidisciplinary technologies to agricultural industries and sustainable production.

All DPRs are accessed from the reference website <http://www.debm.ediindia.ac.in>.

Website: www.ediindia.org & <http://debmcourse.blogspot.in/>

As per the study on characteristics and assessment of DEBM extension learners, entrepreneurial requirements have been identified and evaluated. An entrepreneurial leaflet has been compiled along with guidelines to become a successful entrepreneur and to set up sustainable enterprise (Iyer, 2013). It represents fifteen steps as given below.

Step- 1: Decision to be self-employed to become a sustainable entrepreneur and to set up a sustainable enterprise.

Step- 2 : Product and Innovative Process selection including marketing feasibility .

Step -3 : Deciding on size of the unit

Step -4 : Location of the unit

Step- 5 : Technical and financial feasibility of the unit

Step- 6 :Environmental and Social feasibility of the unit.
Step -7 :Awareness on statutory requirements including fundamental legality.

Step -8: Infrastructures for the unit

Step -9 : Working out project cost

Step -10: Provisional micro, small and medium scale industry (SSI/MSME) registration

Step- 11: Bio-data of the entrepreneur

Step- 12 :Preparation of sustainable business plan /Entrepreneurial Business Planning and Assessment Regime (EBPAR)

Step- 13: Project implementation schedule (PIS)

Step -14: Project report preparation –Bankable project report (Preliminary project report and detailed project report)

Step- 15 : Financial assistance for setting up an enterprise.

Step-6 : Environmental and Social Feasibility of the Project

Step number six (6) has been taken up as a research problem which has been focused on SE. Such of those projects, plans, programs, policies, and legislative actions which may be technically and economically feasible but has been implemented only if environmentally and socially feasible. Environmental impact assessment (EIA) is stated precisely as the systematic identification and evaluation of the potential projects, plans, programs, or legislative actions relative to the physical-chemical, biological, cultural, and socio-economical components of the total environment(Canter, 1996). The purpose of the EIA process in SE was to encourage the consideration of the environment in planning and decision making and to ultimately arrive at actions which were more environmentally compatible. Further, it is important to conduct social impact assessment (SIA) separately for all the projects (Iyer, 2014).

As per the state-of-the-art literatures on entrepreneurship is concerned, only market effects have been considered. The present research has been considered non-market impacts in addition to techno-economic feasibility of projects for sustainable development and poverty alleviation. As far as the entrepreneurship education, training and research is concerned, techno-economic entrepreneurial development is not only sufficient for sustainable development and poverty alleviation. It should be mandatory to develop social and sustainable entrepreneurship by strengthening extension learning and education. This action-based field research study on SE facilitated to promote policy recommendation to strengthen extension learning and education based on an entrepreneurial study conducted in India.

CONCLUSION

Extension learning and education in the field of SE has been concluded in order to develop entrepreneurs on large scale and to set up sustainable enterprises for sustainable development and poverty alleviation. Sustainable entrepreneurs should be developed through well-conceived and well directed learning and educational programmes around thrust areas, thus advancing the frontiers of theories and practice sustainable entrepreneurship for sustainable development. SE has challenged that fosters long-term protection of the environment and its habitants as the technological developments are guided by efficiency, productivity, profitability, health and environmental impacts, resource and energy conservation, waste management, and social impacts such as public convenience, unemployment and crime. The development of new knowledge should be an important factor for the sustainable economic growth. The standard production function has indicated that knowledge is a decisive production variation. About 88% of sustainable economic growth should be created by innovation. The organizational project planning and decision making should include the integrated consideration of technical, economic, environmental and social factors. The most important of these considerations can be referred to as “The four *Es*” (engineering or technical, economics, environment and ethics) in planning and decision making process. A project may be technically and economically feasible but should be implemented only if environmentally and socially feasible. A sustainable process approach has been developed in order to bring labor, capital, technology, management, market, machineries, land and information together in new ways and to establish a new mechanism for sustainable rural development and eradicating poverty by providing scientific and technical services. Monitoring, measurement and control opportunities in extension learning and education system through a sustainable process approach should be implemented. The objective of the DEBM extension learning and education course is “New Enterprise Creation and Management”. DEBM course has developed motivation to extension learners and reinforces entrepreneurial traits with the spirit of setting up sustainable enterprises. Forty-three green design projects proposed by DEBM extension learners attached with the counselor during RY 2006-2014 have been formulated and appraised. Projects were screened for five fatal flaws, viz., (i) scientific feasibility, (ii) economic feasibility, (iii) technical feasibility, (iv) environmental feasibility, (v) social feasibility, (vi) marketing feasibility, and (vii) fundamental legality. Hitherto state-of-the-art literature on entrepreneurship, only market effects have been considered. The present research dominant non-market impacts in addition to

techno-economic feasibility of projects for sustainable development and poverty alleviation. EBPAs have been accomplished for their credibility and communicability. All learners have set up their own sustainable enterprises based on sustainable enterprise creation process under the research guidance of author expert counselor. Sustainable enterprises were set up to focus on green design products and services that reduced environmental impacts associated with the manufacture, use and disposal of products. Such results were of environmental advantages with sustainable production, good performance and price. All extension learners have been duly awarded DEBM.

Education coupled with entrepreneurship should be an intricate sustainable educational process towards sustainable development that has been focused on sustainable rural development and poverty eradication from the emerging enterprise spirit. Agricultural cleaner technologies have produced more output than conventional technologies by causing fewer damages to the environment. Agricultural greener technologies as those that are less polluting, use resources in a sustainable manner, recycle more of their wastes and products and handle all residues in a more environmentally acceptable way. A famous project on unsafe chromium pollution and contamination of about 18 000 to 36 000 mg/kg from Indian cotton roller ginning industries and development of green design roller gin rollers for cotton gins has been demonstrated for its sustained performance. As far as the entrepreneurship education, training and research is concerned, techno-economic entrepreneurial development is not only sufficient for sustainable development and poverty alleviation. It should be mandatory to develop social and sustainable entrepreneurship by strengthening extension learning and education.

DEBM study material and help provided by counselor enabled the learners to set up their own enterprises. It assessed their entrepreneurial competencies and understood weakness and strength to start sustainable business. The design of the study has facilitated to promote policy recommendation so as to strengthen extension learning and education based on the entrepreneurial research conducted in south India. The programme has promoted the application of multidisciplinary technologies to agricultural industries and sustainable agricultural production. It is recommended that such kind of entrepreneurial learning and education system should be essential for sustainable development and poverty alleviation. As concluded in this paper, it is imperative that such a dynamic and pragmatic approach be implemented to create sustainable entrepreneurs on a large scale. For further

reading http://www.ediindia.org/doc/List of Institutions for website_latest.pdf serial number 68.

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**CAPACITY BUILDING STRATEGY FOR SUSTAINABLE ENVIRONMENTAL
SANITATION IN IMO STATE, NIGERIA**

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ABSTRACT

Environmental Sanitation is defined in this paper as the principles and practice of effecting healthful and hygienic conditions in the environment to promote public health and welfare, improve quality of life, reduce poverty and ensure a sustainable environment. Quality health and hygienic conditions is a fundamental right of all Nigerian citizens. While sanitation programmes and projects are relatively uniformly distributed throughout urban Nigeria, their impact on human welfare and life has been minimal. The Environmental Sanitation Policy and Programmes have been developed with scant attention to socio-cultural realities and contemporary challenges. The greatest challenge faced by the implementers of the Environmental Sanitation Policy and Programmes today is the exclusion of human capacity building as vital part of the programme implementation. This trend has contributed significantly to the high prevalence of communicable diseases that have continued to ravage the populace with grave health and economic consequences. No doubt, unhealthy population and damaged environment hinder progress towards developmental goals and there cannot be a healthy nation without healthy environment. Therefore, a wide range of actions are required to solve environmental sanitation problems in order to reduce and avert their consequential effects. This paper examines some cross cutting issues in the implementation of the existing environmental sanitation policy, programmes and projects. The paper also evolves a strategic framework for effective capacity building and empowerment of urban communities which could give credence to Sustainable Environmental Sanitation.

KEYWORDS: environmental, programme, urban communities, capacity building, sustainable development

INTRODUCTION

According to WHO/UNICEF (2007), environmental sanitation is the principles and practice of effecting healthful and hygienic conditions in the environment to promote public health and welfare, improve quality of life, reduce poverty and ensure a sustainable environment. The aim of a good environmental sanitation is to modify human environment towards the maintenance and promotion of health and prevention of diseases (Esrey et al, 2006). Therefore, there cannot be a healthy nation without a healthy environment. A reciprocal relationship exists between man and his physical, biological, social and economic environment. The day to day activities of man generally draw inputs from the natural base in his environment. This may be by way of raw materials for production or by direct utilization of the resources from the reserve in land, water and air. However, the use of these resources in turn results in the generation of various classes of waste. According to (Nwankwo, 2008), a major threat to the environment is the mismanagement of the waste and the resulting persistent and frequent epidemics from poor environmental sanitation-related diseases such as malaria, typhoid fever, diarrhea, hepatitis, and cholera. Jha(2007) noted that the largest risk to humans comes in the form of diseases associated with poor environmental sanitation conditions.

Essential components of environmental sanitation as documented in the National Environmental Sanitation Policy of the Federal Government of Nigeria include: i) Solid waste management; ii) Excreta and sewage management; iii) Food sanitation; iv) Sanitary inspection of premises; v) Market and abattoir sanitation; vi) Adequate potable water supply; vii) School sanitation; viii) Management of urban drainage; ix) Weed and Vegetation Control; and x) Hygiene education and promotion (Federal Ministry of Environment, 2005; 2006). In order to ensure improved environmental sanitation standards, Government of Nigeria, at various times and levels has developed environmental sanitation policies and programmes in line with the realities and prevailing challenges (Federal Ministry of Environment, 2005).

Environmental Sanitation Policies and Programmes in Imo State

The wide-ranging actions that have been taken by successive governments in Nigeria to avert the adverse health, economic and developmental effects of poor environmental sanitation conditions can be appreciated from the various environmental sanitation policies (Federal Ministry of Environment, 2005 and 2006).

During the pre-independence era (1900 – 1960), several legislative controls were put in place to address the problem of Environmental Sanitation. Prominent among the controls were the Public Health Act of 1909 on Environmental Sanitation, Township Ordinance No. 29 of 1917 on Sanitation and Environmental Management and the Public Health Laws of 1957 to combat overcrowding, diseases and squalor (National Population Commission 2008). During this era, adequate sanitation was maintained by enforcement of the Public Health Laws through routine house to house inspection. The benefits of the legislative controls and measures at this time were however not universal because they were restricted to privileged areas (Federal Ministry of Environment, 2005; 2006).

In the immediate post-independence era (1961 – 1980), legislation and authority on Environmental Sanitation were derived from the Nigerian Constitution as stated in the concurrent, exclusive and residual lists. Within this period, the sanitary inspectors were very effective in the maintenance of Environmental Sanitation from urban to rural communities (Federal Ministry of Environment, 2005, 2006).

In the current dispensation (1981 – date), all tiers of Government have developed legislative/regulatory instruments to further address the issue of sanitation. These include among others the Federal Environmental Protection Agency (FEPA) Decree No. 58 of 1988 and No. 59 of 1992 as amended; National Policy on Environment of 1989 and 1999 as amended; Environmental Impact Assessment (EIA) Decree No. 86 of 1992; and the creation of the Federal Ministry of Environment. The Federal Ministry of Environment had the overall mandate of ensuring a healthy environment for her citizenry. It was expected to address the problems of poor Environmental Sanitation; to engender improved productivity; and to foster equitable share of the job and joy of national economic development. This gave the impetus to the creation, at various times, several agencies responsible for environmental sanitation at the State and Local Government levels (Federal Ministry of Environment, 2005 and 2006; Anijah-Obi, 2013). Noteworthy within this period was the military regime of Buhari and Idiagbomin Nigeria (1983 to 1985) which started the monthly national environmental sanitation strategy with war against indiscipline. During this period, sanitation was improved across the nation. However, the public viewed the programme as a type of military order that had no public mandate. (Anijah-Obi et. al., 2013).

Further efforts include the development of the National Environmental Sanitation Policy of 2005. The National

Policy aims at providing sound Environmental Sanitation, which shall assure sustainable environment and protection of human health. The Policy was developed in accordance with the National Policy on Environment (1989); goals of the National Economic Empowerment and Development Strategy (NEEDS) in the creation of wealth, employment and poverty alleviation; Millennium Development Goals (MDG); World Summit on Sustainable Development (WSSD) targets; and the aims of the New Partnership for African Development (NEPAD) initiatives. The policy and consequent programmes were expected to improve public health and optimise the impacts of the huge investments in the sanitation and health sectors (Federal Ministry of Environment, 2005, 2006; Anijah-Obi et. al., 2013).

Earlier in years 2000 and 2003 respectively, the National Council on Environment reiterated the need for the re-introduction of the House to House Sanitary Inspection to detect environmental nuisances and to proffer solutions for their abatement. The council noted that the House to House Sanitary Inspection of Premises is the bedrock of environmental sanitation as it covers most of its facets (Federal Ministry of Environment, 2005, 2006; Anijah-Obi et. al., 2013).

STATEMENT OF THE PROBLEM

Despite the efforts of governments in the formulation of the environmental sanitation policies and in implementing the associated programmes and projects, minimal successes have been recorded. According to Chuwuemeka, Ugwu and Igbwegbe (2012), the policies, programmes and projects have been piecemeal, uncoordinated, non-conforming to the socio-cultural norms of sanitation practices in the communities and above all devoid of an appropriate strategy to provide focus and direction for implementation. This trend has contributed significantly to the prevalence of communicable diseases and high profile of dirty environment in the country. Egun (2012) reported that environmental sanitation related diseases such as malaria, cholera, typhoid, diarrhoea, pneumonia, tuberculosis and helminthic infestations are responsible for morbidity, mortality and majority of hospital admissions in the country. Studies have also shown that these conditions diminish productivity, erode household income and reduce educational potential and ultimately exacerbate poverty (Nkwocha and Egejuru, 2010). In addition, the prevailing dirty environment in most of our cities and the resulting health consequences has continued to discourage tourism and meaningful investments in the country. Iwuala (2012) observed that the national cost of lost productivity and huge curative health

costs constitute a major drain on the local and national economy.

According to Nwachukwu (2010), most of the states in Nigeria do not have adequate facilities to achieve an ideal environmental sanitation. Nwankwo (2008) opined that environmental decay is a perennial problem in Imo State. In most urban areas of the state, there is gross environmental pollution or contamination due to poor sewage and refuse disposal, lack of safe and adequate water supply, poor food hygiene practices and poor housing. These environmental hazards have continued to provoke high morbidity and mortality rates in the society leading to adverse health, economic and developmental effects. Today, Imo State has abandoned the monthly sanitation programme and only very few states in the nation still conduct the exercise with reduced popularity, enforcement, and public participation. Unfortunately, the sanitary inspection is almost forgotten in the state and the trained inspectors are less motivated because the government currently pays little or no attention in their area of service (Ohaka et al, 2013). More so, political interference with the statutory role of Sanitary Inspectors has led to the collapse of the house to house inspection programme (Oil Resources and Allied Limited 2008). The resultant effects are the use of toilet facilities by unlimited number of people, presence of overgrown trees in living areas, ecosystem destruction and general poor sanitation in the state in particular and the country in general (Nwachukwu, 2010).

The environmental sanitation challenges faced by urban centres of Imo State today are different and more complicated than before. It is worthy of note that Imo State has abundant manpower for the implementation of her Environmental Sanitation Policy. Never the less, the greatest challenge faced by the implementers of the Environmental Sanitation Policy and programmes today is the exclusion of capacity building as a vital part of the programme implementation (Oil Resources and Allied Limited, 2008; Chuwuemeke et. al. 2012).

This paper posits that community capacity building is an appropriate strategy for effective implementation of environmental sanitation projects and programmes. According to Teferra (2010), community capacity building is an evidence-driven process of strengthening the abilities of individuals, organizations and systems to perform core functions effectively, efficiently and sustainably. It involves the transfer of competencies necessary for community groups or individuals to identify their issues and address their concerns (Dressendorfer 2005; Eade 2007).

ENVIRONMENTAL SANITATION CHALLENGES IN IMO STATE

A pleasant environment that is free of hazards and promotes healthful living is a fundamental right of all Nigerians (WHO/UNICEF, 2007). Currently, the environmental sanitation situation in the country is as follows:

Solid Waste Management

Available records show that in Nigeria, 41.53% of the population dispose their refuse within their premises, 37.8% dispose into the bush and only 13% use sanitary dustbin. In all, about 81% of Nigerians used one method or the other adjudged as insanitary (National Population Commission 2013). From the study conducted in Imo State by Anunonwu et al (2009), 47.5% use refuse bins while 36.4% take to street dumping. This is not a very healthy situation since the hazards of the street dumping by this high percentage can cancel the benefits of organized refuse bins collection. According to Chuwuemeke et. al. (2012), in most cities and peri-urban centres of Imo State, refuse heaps are left unattended to. Some of the waste materials are toxic while others are non-biodegradable which pose potential health hazards to humans and the environment. The recycling of the waste is negligible while methods of storage, collection, transportation, compaction and final disposal are irregular, sporadic and very unsatisfactory. This has not only constituted visual blight and odour nuisance but also encouraged the breeding of rodents, mosquitoes and other pests of public health nuisance and ultimately questions the standard of environmental sanitation in Imo State (Chukuezi 1, 2010). The scenario calls for the promotion of effective strategy for sustainable environmental sanitation in the country.

Excreta and Sewage Collection and Disposal System

From the Nigeria Demographic and Health Survey (NDHS) reports of the National Population Commission (2009, 2013), 10.1% of the urban population of Nigerian has no toilet facilities of any kind whilst 61.1% use pit latrines and 28.7% use flush toilets. According to the reports, 34.1% of rural households have no toilet facilities at all. Many urban and semi-urban areas in Imo State have no central sewage collection and disposal system. Every home in the urban areas utilizes block lined private septic and soak away pits for excreta and sewage disposal. Even in the urban and semi-urban areas that use septic and soak-away pits, there is often a lack of water to run the system and as a result indiscriminate defecation and urination at dumpsites, gutters, bushes, rivers and any available open space in the late hours of the night and early hours of the morning are common practices (Nwankwo, 2008; Anunonwu, 2009; Ohaka et. al., 2013). The greatest dangers lie in the evacuation and disposal of the excreta and sewage from the septic and

soak-away pits when they fill up. Typically, the wastes are disposed at public drains, ditches, ravens, unreclaimed borrow pits, and in isolated bush or forest areas. Consequently, the surface and groundwater are increasingly polluted or the disposed wastes are washed back to nearby streams by the next rain (Ohaka et. al., 2013). The insanitary methods of excreta and sewage management in Imo State have tremendous untoward effects on the health of the public and the environment.

Water Supply

Studies in Nigeria have shown that less than 70% of the urban population has access to safe sources of drinking water while about 70% of the rural population depends mainly on unsafe sources such as open wells, rivers and streams for drinking (Omemu and Aderoju 2008; National Population Commission 2009; Adah and Abok 2013). As corroborated by Nwachukwu (2010), Krebs (2010) and Ohaka et. al. (2013), the coverage of water supply facilities to the urban and rural population of Nigeria has been inadequate and water in poor quality and inadequate quantity have continued to pose a major threat to environmental sanitation and public health. It is a common phenomenon in Imo State to see long queues of jerry cans and buckets in the cities especially during the dry season (Nkwocha and Egejuru, 2010). In areas, which are served by public water supply, the wholesomeness of the water is sometimes not guaranteed because of poor maintenance of pipes, which are prone to constant leakages or seepage of contaminants (Nwachukwu, 2007). Esreyet. al. (2006) discovered that unwholesome or contaminated water plays a significant role in the aetiology of water borne diseases such as cholera, typhoid and paratyphoid fevers. Esreyet. al. (2006) and Nkwocha and Egejuru (2010) have confirmed that environmental sanitation related diseases jeopardize both the physical, social and environmental health of all people.

Food Hygiene and Safety

Chukuezi (2010) in the study on 'Food Safety and Hygienic Practices of Street Food Vendors in Owerri, Imo State, Nigeria, reported that women made up 66.67% while males made up 33.33% of the food vendors. The average age group of the vendors was 31-40 years and 23.81% prepared food in unhygienic conditions. 42.86% did not use aprons; 47.62% handled food with bare hands and 52.38% wore no hair covering while 61.90% handled money while serving food. 19.05% wore jewelry while serving food and 28.57% blew air into polythene bag before use. 9.52% of the vendors stored food for serving openly in the stalls while 23.81% stored them in the wheelbarrows. 42.86% had leftovers for serving the next day with poor storage facilities. 47.62% of the vendors washed their utensils with dirty water which is recycled and used severally

by 28.57% despite the fact that only 9.52% of them complained of water shortages.

Transportation of meat from the abattoirs in passenger vehicles or motorcycles is a common practice in most towns and cities of Imo State. Contamination occurs during transportation especially while using vehicles not designated for this purpose. Unfortunately, most of the food and meat are also not routinely screened for certain serious communicable infections. Besides, food meant for sale and human consumption are hawked on the streets or in traffic and many are displayed in open containers, thereby exposing the food to the ever-ready opportunity of contamination (Nwankwo, 2008). Findings from studies carried out by Omemu and Aderoju (2008) and Nkwocha and Egejuru (2010) showed that most illnesses among the population result from basic sanitation failures that occur during food production, processing, retailing and handling. Chukuezi (2010) observed that large percentage of the poor in Imo State go hungry and for the percentage of those that have food, its wholesomeness is questionable. The sanitation practices of the food vendors have continuously created a profile of poor environmental sanitation in the state (Nkwocha and Egejuru, 2010).

Housing Sanitation

The environmental sanitation problems are made more acute by rapid urbanization and uncontrolled population growth without commensurate expansion in environmental sanitation facilities (Emeharole and Nwankwo, 1999; Amadi 2004). As observed by USAID (2008) human development and population growth exert many and diverse pressures on the quality and quantity of housing stock and on access to it. Good housing provides basic quality of life requirements, which include environmental sanitation facilities. Unfortunately, the city fringes of Imo State are predominated with slums and shanties where poor sanitary facilities and practices are common phenomenon. These slums with poor housing are particularly due to poor implementation of town planning laws and inadequate provision of infrastructure and services. According to Muta'a Hellandendu (2014), unmet housing needs results in increase in the disease burden of the urban population, which in turn, affects their health and productivity, thus perpetuating the cycle of poverty.

Drainage System

Majority of the public drains in urban area of Imo State is used as substitute facilities for toilets and waste disposal (Ohaka et. al., 2013). Besides, the public drains are characterized by poor maintenance system and as a result the drains are constantly blocked leading to environmental problems such as flooding, erosion,

landslide and stagnant pools where mosquitoes and other disease-carrying vectors breed (Federal Ministry of Environment, 2005, 2006; Anijah-Obi et. al., 2013). Muta'a Hellandendu (2014) stated that about 50% of Nigerians suffer at least one acute episode of malaria every year. Poor surface water drainage has remained a common feature in towns and cities of Imo State. This has grave socio-economic implications in terms of productivity and environmental sustainability.

School Sanitation

According to Anijah-Obi (2013), the general environmental sanitation in schools in Imo State is poor. Majority of the schools in Imo State does not have adequate toilets facilities. Even where provided, the facilities are not functional due to lack of water to flush. In some cases the toilets are vandalized leading to defecation at corners and nearby bushes by the pupils. Studies have shown that lack of adequate, functional and sanitary facilities in schools diminishes the motivation of children, especially the females, for school enrollment and attendance and which in turn affects learning and developmental achievements of affected school children (Anijah-Obi et. al., 2013; Lawani et. al. 2014). An unhealthy population and a degraded environment hinder progress towards development goals. According to the World Bank (2006) and USAID (2008), achieving a healthy environment is dependent on sound sanitation infrastructure. In this wise, an appropriate strategy for effective implementation of environmental sanitation projects and programmes is imperative.

THE WAY FORWARD: COMMUNITY CAPACITY BUILDING EXPLAINED

The focus is on community capacity building which is the process of developing and strengthening the skills, instincts, abilities, processes and resources that organizations and communities need to survive, adapt, and thrive in the fast-changing world (Dressendorfer 2005). It is a particular way of working with and supporting communities - to build skills and experience, increase opportunities, and enhance involvement in the decisions that affect them (Teferra 2010). It believes that communities are at the heart of human development and that when they are able to perform better, sustain that performance over time, and manage 'shocks' to the system; they can contribute more meaningfully to the achievement of national human development goals. It includes aspects of training, organisational and personal development and resource building, organised and planned in a self-conscious manner, reflecting the principles of empowerment and equality. According to Nu'Manet. al. (2007) and Teferra (2010), community capacity building is the element that gives fluidity,

flexibility and functionality to a program/organization to adapt to changing needs of the population that is served.

Functional Levels of Community Capacity Building

According to Eade (2007), Community capacity-building takes at three levels: individual, institutional and societal levels. Community capacity-building at the individual level requires the development of conditions that allow individual participants to build and enhance knowledge and skills. It also calls for the establishment of conditions that will allow individuals to engage in the process of learning and adapting to change. At an institutional level, community capacity building involves modernizing existing institutions and supporting them in forming sound policies, organizational structures, and effective methods of management and revenue control. At the societal level, community capacity building supports the establishment of a more interactive public administration that learns equally from its actions and from feedback it receives from the population at large (UNDP, 2011).

Underlying Principles of Community Capacity-Building

Community capacity building is underpinned by the principles of empowerment, participation, inclusion self-determination and partnership with a common defining feature of programmes and activities developed through consensus building. The approach is also reinforced by the principles of equality, collective ability and assets building. Key aspects of Community capacity-building is about taking existing strengths and giving them the opportunities and support they need to develop. It focuses on supporting community groups and organisations to improve the quality of life for their communities. Core activities at the heart of the approach include strengthening skills and structure to develop confident, active, influential, effective and inclusive community organisations through practical support (Eade, 2007).

Features of Community Capacity Building

The starting point for community capacity building is within communities themselves. Kretzmann and McKnight (1993) and Teferra (2010) identified five areas of community learning and development work that support community capacity building to include the following: working with communities to assess their needs and plan for change; supporting the development of skills and confidence of activists and organizations; promoting broad-based participation in community affairs; assisting communities to exercise power and influence; and assisting communities to provide or manage services. Effective capacity building work involves the ability to focus on the community

perspective, its needs and issues, with a particular emphasis on socially excluded groups.

Community Capacity Building for Sustainable Environmental Sanitation

Sustainable environmental sanitation management involves change in a programme's planning, implementation, and resource allocation. Four steps are vital and these are: use of existing community organisations rather than the creation of new ones; improvement of both the organizational capacity of community groups and their problem solving skills; involvement of women; and the inclusion of communities in project design, management, and financing. Success in influencing behaviour change has tended to depend on four factors namely: a clear sense of purpose; use of participatory techniques; inclusion of women as promoters and educators; and simultaneous employment of a range of techniques (Teferra, 2010).

The Setting for Community Capacity Building

The National Environmental Sanitation Policies of 2005 and 2006 highlighted the need for active community involvement in matters that affect environmental sanitation, rather than communities merely being passive recipients of professional interventions (Federal Ministry of Environment, 2005; 2006). The setting for the community capacity building in sustainable environmental sanitation projects and programmes includes neighbourhoods, villages, towns, cities, community and voluntary organisations. At the heart of the participatory approach are the empowerment of communities and the strengthening of their capacity to take collaborative action under healthy and supportive public policy environment.

Approach to Sustainable Community Capacity Building Environmental Sanitation

Two distinct approaches are community-based and community development approaches. In the former, community is a venue for sanitation practices, behaviour and lifestyle programmes. In the latter, community is a place for organising and mobilising people to address the challenges that affect their environment. Irrespective of the approach adopted, successful community interventions depend on the understanding and sharing of power between the community and external agencies.

The Importance of Community Capacity Building

Community capacity building is the way in which communities can work to improve their quality of life by taking up issues and opportunities that matter to them. It is also an important part of shifting from a passive, blaming culture to one of activity, integration and shared endeavour. Again, government policy encourages community engagement across a wide range

of policy areas. More so, people in communities, and in particular, those in excluded or disadvantaged communities, often experience challenges that they wish to overcome or may recognize as gaps in provision that they want something done about it. Finally, most of us want to live in a society that is safe, caring, inclusive, respectful, and in which we feel valued. Many people want to work towards such a society, by learning from each other, by making connections to others, through volunteering or by seeking change.

CONCLUSION

There is no single paradigm of the best ideas for a good Capacity Building Strategy for Sustainable Environmental Sanitation. However, the positive outcomes from community capacity building are: expanded citizen participation; expanded leadership base; strengthened individual skills; the creation of a widely shared understanding and vision; the development of a strategic community agenda; evidence of consistent, tangible progress toward goals; evidence of more effective community organizations and institutions; and evidence of better resource utilization by the community. Experience indicates that a combination of certain factors must be present for programmes to be considered successful. They should, for example, improve the health of beneficiary groups; achieve financial, organisational, and political sustainability; maximize the benefits of investment by reaching the greatest number of people; enhance local institutional and community capacity for organisation and management; and protect the environment. It is worthy note also that the choice of implementing institution, the division of responsibilities in service delivery, and the coordination of the implementation process are important for programme success.

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ECONOMIC ANALYSIS OF HEAVY METALS POLLUTION ON SOIL, RIVER AND RICE PRODUCTION IN NIGERIA

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ABSTRACT

Toxic metals (Cadmium, lead, copper and arsenic) study was carried out in soil, river and on rice production in Surulere Local Government of Oyo State. A group of soil and river sediment was mineralized with atomic absorption spectrophotometer analysis, the sediment samples was processed for texture analysis. The study also determined the levels of some heavy metals (Cd, Cr, As, Pb and Hg) in locally produced rice samples from the study area. Five rice samples were obtained from Agbonni, Iresadu, Oko, Iresapa and Ilajue. Results revealed that lead (Pb) ranged from 0.411 – 0.635 mg/kg in the samples. It was showed that the physico-chemical characteristics, the pH are from 7.0 – 9.0. Two kinds of textures were identified: loamy and loamy/sandy soil. Heavy metals identified from Arawo Lake rose from 0.02 to 11.0 mg/L for lead and 6.35 to 9.30 for arsenic. In soil, copper showed low concentrations in all the sites, while cadmium was below detectable limits. The levels of metal contamination and distribution were analyzed using geoaccumulation index and pollution load factor. The metal index analysis indicated high enrichment of the metals (especially Pb and Cr) which reflected anthropogenic effects of contamination attributable to several sources. This study made it clear that there is need to be more involved in environmental management to heavy metal hazard which could be turn to soil acidity and detrimental to the aquatic organism, in order to contributes to maximum food security of the country.

KEYWORDS: economic, heavy metals, pollution, soil, river, rice, spectrophotometer, production

INTRODUCTION

It has been tested and confirmed that metals can affect productivity in the soils and ecological geochemistry as it limit nutrients and toxic inhibitors. The biogeochemical cycling of metals is now a great subject of interest that calls for serious research. With the rapid Industrialization and economic development heavy metals are continuing to be introduced to soils and coastal ecology via several pathways including fertilization, irrigation, rivers, runoff, atmospheric deposition, and point sources where metals are produced as a result of metal mining, refining, and refinishing by products (Okoye 1991). Rice is one major staple grown in Nigeria. It has earned itself an important position of a commonly consumed staple by the national populace. Nigeria local rice with indigenous name (Ofada) is prone to disease and it has been examined that Ofada rice can be contaminated by heavy metals such as Cd, Cr, As, Hg and Pb (Imolehin et al., 2000). Previous studies have shown heavy metal contamination of food; such as rice containing lead, ranged from 0.00-61.17mg/kg and other food and fruit crops in Nigeria.

Cadmium and other heavy metals are discharged by factories and mines into rivers thence into irrigation channels, where they wind up in rice plants. The rice makes its way to markets and restaurants, and rice husks are fed to animals raised for consumption. (Orisakwe et

al., 2012). Soils are usually regarded as the ultimate sink for heavy metals discharge into the environment and sediments can be sensitive indicators for monitoring contaminants. (Otitoloju 2002). Prokaryotic microbes play a critical role in riveric Fe cycling. They contain most of the biogenic Fe in offshore waters and are responsible for a large portion of the Iron uptake by the plankton community. Surface populations of heterotrophic species assimilate more than 50% of the dissolved Fe and thus compete directly with phytoplankton for this limiting resource. In oligotrophic tropical and subtropical waters, photosynthetic bacteria become more important in Fe cycling as the number or unicellular cyano-bacteria increases and the nitrogen fixing *Trichodesmium*, which contains most of the biogenic Fe in the mixed layer, become abundant (Awofolu et al., 2005)

At present, our understanding of Fe biogeochemistry is incomplete because the process of control dissolved and particulate Fe concentration in the rivers will be known from laboratory studies that mimic natural conditions with varying degrees of success.

SIGNIFICANCE OF THE STUDY

This study is aimed at analyzing and investigating the effects of the heavy metals, anthropogenic activities,

biogeochemical reactions and geological structure on the soil, river and rice production in Nigeria in order to understand the nature of pollution; the health risk that arise from such parameters. Heavy metals are high pollutants because of their relative high toxicity and persistent nature in the environment, this can lead to soil and river pollution, and it can affect agricultural productivity, particularly rice production. This paper address issues on national capacity building strategy in conservation and natural resources management (NCBSNRM).

OBJECTIVE OF THE STUDY

The broad objective of this study is to examine the economic analysis of heavy metals Pollution on Soil, River, Rice Production and safety of rice consumption of public health and toxicological importance.

The specific objectives are to:

- (i) identify the socio-economic characteristics of rice farmers in the study area.
- (ii) examine dissolved and particulate Metal, Iron, Zinc etc. concentration in the Soil and river.
- (iii) identify water resource quality for irrigation agriculture and aquatic animals.
- (iv) contrast to studies of river carbon and nitrogen dynamics where organisms have been shown to play a central role.

Detailed Field Survey

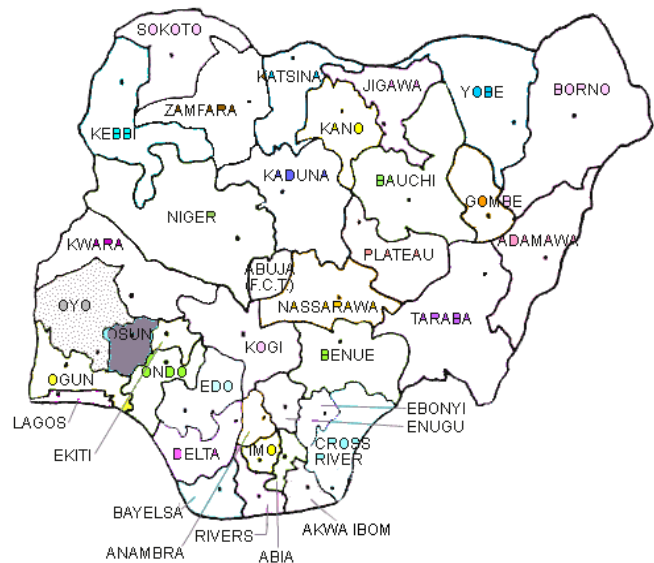
- (i) Documentation of various negative and positive effects of apparent trace metals that can affect soil, river and rice production as limiting nutrients and toxic inhibitors as a result of the biogeochemical cycling of trace metals in the soil and river; if any, is being made of them for sporting agriculture, recreation etc.
- (ii) Sample and analyze, where necessary, water and soil for heavy metals and non metals.
- (iii) In situ physical parameters measurements e.g. soil, Surface water, pH, surface and groundwater depth and water column.

MATERIALS AND METHODS

Study Area: The study was carried out in Surulere Local Government Area, Oyo State, Nigeria. This state is an inland state in South-Western Nigeria with its capital at Ibadan. It is bounded in the North by Kwara state, in the East by Osun State, in the South by Ogun state and in the West partly by the Republic of Benin. It was formed in 1976 from the former Western State, and originally included Osun State, which was split off in 1991. Oyo state is homogenous, mainly inhabited by the Yoruba ethnic (Wikipedia, 2013). The indigenes mainly comprise the Oyo State, the Ibadan and Ibarapa, all belonging to Yoruba family and speaking the same Yoruba language. The state consists of thirty three (33)

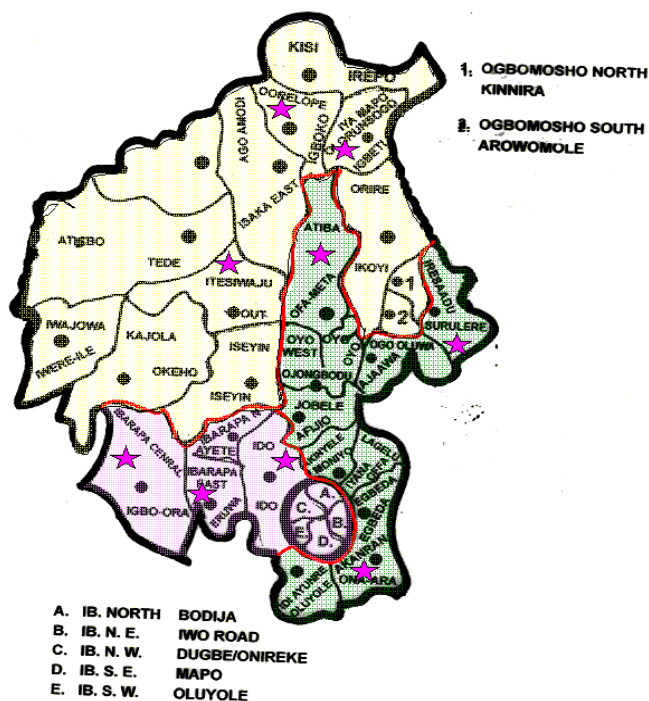
Local Governments Areas with a total population of 6,617,720 inhabitants (Census, 2006). The capital, Ibadan is reported to be the largest city in Africa, South of Sahara other notable cities and towns in Oyo State include Oyo, Ogbomoso, Iresaapa, Iresaadu, Iseyin, Kisi, Okeho, Saki, Eruwa, Lanlate, Awe and Igbo Ora. The climate in the state favours the cultivation of crops like maize, yam, cassava, millet, rice, plantain, cocoa tree, palm tree and cashew. Oyo State is located within longitude 8° and latitude 3° 28E with annual rainfall of 1247mm (Wikipedia, 2013).

The study area lies in the rainforest zone of Nigeria and this has made about 80% of the inhabitants to engage in agriculture. There are two distinct seasons, rainy and dry season. The rainy season starts in Oyo State during the first week of March and lasts till the Month of October, while the dry season lasts November – March, all things being equal. The low rainfall is marked by the period of August break in August. Mean temperature varies from daily minimum of 25° c to a daily maximum of 35°c. Humidity is quite high in Oyo State. Relative humidity in the State is around 70 percent with a minimum of about 60 percent in the evening and a maximum of around 80 percent in the morning, (Wikipedia, 2013). The people in the study area engaged in the farming enterprises that degrade the land the more. The farming practices notable among them are those that involve slash and burn, deforestation, farming on a slopping land at the expense of future production.



Source: World atlas travel

Figure 1: Map of Nigeria showing Oyo State where the study areas are located



Source: Website of Oyo state government

Figure 2: Map of Oyo State showing the selected Local Government Areas

METHOD OF DATA COLLECTION

Data for this study were obtained in year 2013, from a sample survey of Surulere Local Government areas, Oyo State, Nigeria. Primary data were collected using well-structured questionnaire and interview schedule.

Collection and Treatment of Samples: Rice samples were collected from different market locations from Iresaadu, Iresaapa, Oko, Iajue, and Agbonni into different labeled polyethylene bags. The samples were washed with deionized water and spread on clean bagco bags to allow the water to drain off. The sample were packed into labelled brown envelopes and dried in the Gallenkhamp oven at a temperature of 62°C for 3days. After drying, the samples were pulverized into fine powdery form. The rice samples were sieved using 2 mm sieve to obtain very fine particles. Drying continued until all the wet samples reached a constant weight. Ten gram (10g) of dried samples each was weighed into digestion flasks, 4ml perchloric acid and 8ml nitric acid were added to the respective flasks. The digestion flasks were then put on a hot plate set to 100°C (gradually increased) until the samples were all digested. After digestion the digested samples were diluted with distilled water appropriately in the range of standards which are prepared from stock standard solution of the metal. Heavy metal concentrations in the samples were measured using a Perkin Elmer AS 3100 flame atomic absorption spectrophotometer facility in the Laboratory.

Statistical Analysis: Descriptive statistics tools such as Percentage, Covariance, Means, standard deviations, Regression Model and Pollution Index were used to analyze the data collected.

METHOD OF DATA ANALYSIS

Pollution index is a powerful tool for ecological geochemistry analysis. The commonly used pollution indices by heavy metals in soils and waters classified as two types of single index and integrated index in an algorithm point of view. Four single indices of contamination factor (or concentration factor), ecological risk factor, and index of geo-accumulation was illustrated, and reference values for analysis of single indices were distinguished into background levels and threshold pollution values. Eight integrated indices were divided into two groups. One group was suitable for the normal distribution single indices including the sum, average, weighted average, vector modulus, and numerous pollution indices and the other for log-normal distribution including the product, root or product, and weight power product pollution indices. Using background level as reference values five contamination classes were divided and the terminologies were suggested for the single and integrated indices to unifying the analysis results. Software of EGAPI was developed in a single document interface to analyze the four single and eight integrated indices by heavy metals to analyze the quality of soils and coastal ecological geochemistry pollution indices by heavy metals of Cu, Pb, and Zn in soils and coastal ecology.

SOURCE OF INFORMATION

The major sources of information were primary and secondary data.

RESULT AND DISCUSSION

Table 1: Lead concentrations in locally produced rice samples from the study area

Identify	Study Area	Mean (mg/kg)	Mean (µg/kg)
Adui rice	Iresaadu	ND	ND
Ofada rice	Iresaapa	0.610±0.002	510±2
Oko rice	Oko	0.21H0.002	311±2
Jue (par boiled)	Ilajue	0.248± 0.002	348±2
Agbonni meal rice	Agbonni	0.602±0.002	502±2
Agbonni, raw	Agbonni	0.634±0.001	525±1
ordinary rice			
Yido rice	Oko	ND	ND
Adui rice (par boiled)	Iresaadu	0.307±0.003	408±3
Mean of all samples		0.327	

Mean ± SD

ND = Not detectable

Table 2: Lead concentrations in locally produced rice samples according to their study area

Study Area	Mean (mg/kg)	Mean (µg/kg)
IRESAADU	0.356±0.024	356±2.40
IRESAAPA	0.474±0.03	166±1.60
OKO	0.256±0.016	464±3.0
ILAJUE	0.614±0.012	613±1.2
AGBONNI	ND	ND

Figure 3: Mean lead concentration in locally produced rice according to locations

Fig. 3: shows the mean values of lead from Iresaadu, Iresaapa. Oko, Ilajue and Agbonni. Samples from Agbonni had the least value of lead (0.17 mg/kg) while samples from Iresaadu had the highest value of lead (0.612mg/kg). Lead concentration in the samples from various study area ranged from 0.17mg/kg to 0.614mg/kg. The result also shows that the concentrations of the heavy metals: chromium, arsenic, cadmium and mercury could not be detected at less than 0.002 mg/kg in any of the samples. Results of this study have revealed that lead (Pb) is the predominant contaminant of locally produced rice from the study area as it was the only heavy metal found in the samples. The other heavy metals: cadmium (Cd), chromium (Cr), mercury (Hg) and arsenic (As) were not detectable at 0.002 mg/kg. Lead (Pb) concentration of the samples followed the sequence (Adui rice) > (Ofada) > (Oko) > (Jue) > (Agbonni meal rice) > (Agbonni raw) with lead (Pb) values of 0.624, 0.511, 0.103, 0.307, 0.236 and 0.410 mg/kg respectively. These values were found to be 86.2, 86.1, 86, 85, 82, and 81 % higher than the WHO/FAO (2002) provisional tolerable intake regulations (PTWI) of 0.036 mg/kg lead. These findings should create an open end for the incoming researchers to continue further research on this study and to enable government to assist local rice producer's increase their level of production.

In conclusion lead (Pb) is the primary heavy metal contaminant of locally produced rice in the study area. Its mean concentration in all the samples was found to be higher than the FAOAVHO (2002) recommended

limit of lead in cereals. Consumers of locally produced rice in the study area are at greater risk of lead (Pb) toxicity. The result of these are dangerous health effects of lead (Pb) toxicity which include cancer, decreased nervous function, weakness in fingers, wrists, or ankles; small increases in blood pressure; and anaemia, brain and kidney damage, death, pregnancy miscarriage, and damage of reproductive organs for sperm production. Martin and Griswold (2009). Monitoring and systematic gathering of information on heavy metal levels in the environment are essential components of any pollution control system is well supported. It is essential for agricultural activities and other human activities that increase heavy metal contamination of food stuffs be controlled. Therefore, I recommend that the federal ministry of agriculture should take action on how to control heavy metal contamination of our locally produced food. Also, blood samples of individuals who consume this rice should be analysed for lead (Pb) toxicity and appropriate action taken by the federal ministry of health, I also suggest that further research be carried out to find out the exact factors that were responsible for heavy metal contamination of the samples for specific remedial actions to be taken.

CONTRIBUTION TO THE KNOWLEDGE

This study created an open end for the incoming research by making ways of determined presence of heavy metals in the soil, river and the negative effects on water organism and rice production.

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NATIONAL CAPACITY BUILDING STRATEGY FOR SUSTAINABLE DEVELOPMENT THROUGH ENVIRONMENTAL MANAGEMENT EDUCATION IN NIGERIA

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ABSTRACT

As Nigeria experiences a major thrust in economic development, there is the utmost need to ensure that the necessary social and environmental safeguards are put in place to guarantee a development that is sustainable, especially in the long run. This paper emphasizes the urgent imperative for a proper integration of environmental management education into the national capacity building strategy for a sustainable development which strives to ensure the balancing of economic, social and environmental forces in Nigeria's development process. Environmental management education basically aims at improving awareness, knowledge and skills, and actually changing the attitude of the people towards sustainable use of the environment. Serious efforts must be made to promote environmental studies if Nigeria intends to successfully combat her many environmental problems ranging from the threats of desertification and desert encroachment in the North to the menace of erosion, deforestation, oil spillage, sea level rise and coastal flooding in the South. Nigeria's environmental management education strategies are discussed while government's role in promoting environmental studies in schools is highlighted. The paper recommends the adoption of environmental management education as an important component of Nigeria's national capacity building strategy to ensure sustainable development.

KEYWORDS: capacity building, sustainable development, environmental management, strategy, environment.

INTRODCUTION

In keeping with Nigeria's development goals as enunciated in the national policy document, 'the vision 20:20:20', the present government in Nigeria strives to transform the economy into one of the top twenty in the world by the year 2020. To actualize this vision, various policies and programmes have been implemented in virtually all facets of the economy. Consequently, various achievements have been reported in key areas of the economy ranging from agriculture, health, power, aviation, transportation and communication to housing, among others. It is important to ensure that these achievements are truly sustainable when considered within the wider context of ensuring a balance between the economic, social and environmental imperatives. Cases abound in the literature where developing countries tended to place overwhelming emphasis on economic development often at the expense of social and environmental considerations (Nwafor, 2006; Mac Donald 1994; Angelson, 1994). The rich and the poor nations seemed to hold divergent views on the exact nature of the relationship between environment and development (Nwafor, 2006). This seeming dichotomy in development priorities between the 'two worlds' was aptly captured by Goodland &

Edmundson (1994) when they observed that in the poorest countries, were the ecosystem on which the people depend are threatened by population pressure, land and water degradation, deforestation and other forms of environmental stresses, economic development remained the greatest challenge; and in industrial countries where the level of consumption jeopardizes global sustainability more than population growth, the greatest challenge was moderating per capital impacts.

For instance, the current youth restiveness in the oil-rich Niger Delta region of Nigeria has been blamed majorly, on the unsustainable exploitation of oil in the area which over time, resulted in multiplicity of unresolved life threatening environmental and social problems. It is difficult to believe that the necessary environmental and social safeguards were put in place, from the beginning, to guide the operations of the oil sector in accordance with national and international standards. It is equally doubtful whether international best practices were adopted in the exploration and exploitation of the oil resource. In this particular case, it is very obvious that the primary focus of the oil enterprise was the economic gains with very little attention paid to the environmental

and social concomitants. Due to the frustrations, disillusion and failures of previous development paradigm, there is now a general understanding and consensus across the developing and developed countries that development should be made more sustainable by ensuring that there is a balance of treatment between the economic, social and environmental considerations. It is agreed that sustainable development is capable of ensuring a sustained equilibrium between the economic, social and environmental forces at work in the development process. Sustainable development provides for present needs without jeopardizing the ability to meet future needs (WCED, 1987). It is a development that endures and is long-lasting. There is therefore, the utmost need for all countries to evolve strategies to help build capacities that will guarantee the sustainability of their development efforts.

The main objective of this paper is to outline the need for the integration of environmental management education in Nigeria's national capacity building strategy to guarantee sustainable development. According to Nwafor (2006):

There should be a convergence of thinking and practices which considers and gives due weight to environmental sustainability. ..., an essential ingredient of mobilizing minds for sustainable development is capacity building. This involves developing human resources through training and development, and providing an adequate institutional framework and material support to enable acquired skills to be fully utilized.

It is important that environmental considerations be sharply focused and properly integrated into the national development process through education and sensitization. Education, democracy and access to information are essential prerequisites for sustainability (Cunningham, Cunningham & Saigo, 2005). The work shall also examine Nigeria's environmental management education strategies while highlighting government's role in promoting environmental studies in schools, colleges and universities. The significance of the contribution of this work to current national effort to build capacity in environmental management in Nigeria cannot be overemphasized.

THE CONCEPT OF CAPACITY BUILDING

According to [Wikipedia, the free encyclopedia](#), capacity building, also known as capacity development, is a conceptual approach to development that focuses on understanding the obstacles that inhibit people, governments, international organizations and non-governmental organizations from realizing their

development goals while enhancing the abilities that will allow them to achieve measurable and sustainable results. At the national level, capacity building aims at strengthening the knowledge, skills, competencies and abilities of people, organizations and communities to enable them overcome the causes of their exclusion and suffering.

The United Nations Development Programme (UNDP) (2011) conceptualizes capacity building as a long-term continual process of development that involves all stakeholders; including ministries, local authorities, non-governmental organizations, professionals, community members, academics and more. It is a process that uses a country's human, scientific, technological, organizational, institutional and resource capabilities. It may be seen as a process through which individuals, organisations, and societies obtain, strengthen, and maintain the capabilities to set and achieve their own development objectives over time. The primary goal of capacity building is to tackle problems related to policies and methods of development, while considering the potential, limits and needs of the people of the country concerned. To the United Nations Disaster Risk Reduction Office (UNISDR) (2011), capacity building is a process by which people, organizations and society systematically stimulate and develop their capability over time to achieve social and economic goals, through improvement of knowledge, skills, systems, and institutions - within a wider social and cultural enabling environment. The importance of time and space to the achievement of the goals of capacity building cannot be overemphasized.

From the foregoing discussion, it is clear that capacity building is a process of change which may through up short-term issues which must be supported by a sustained commitment to yield the desired longer term results. It is an endogenous process which is specific about who and how and where the decisions are made, management takes place, services are delivered and results are monitored and evaluated. Capacity building takes place at three different levels: the individual level, the organizational level and the societal level which are interlinked and interdependent. The United Nations Development Programme (UNDP) and the United Nations Committee of Experts on Public Administration (UNCEPA) (2006) outlined the components of each of these three levels as follows:

- **Individual Level** - Individuals, as the tissues of organisations and societies, represent the first layer of capacity. For societies and organisations to transform and grow, they need individuals with skills, knowledge and experience. At the individual level capacity development takes place through

demand-driven processes of learning and knowledge acquisition and sharing, experiencing, participation, on-the-job training, mentoring and coaching and other learning techniques that empower and place the individual in a central and active position. This new approach to capacity development moves away from the traditional technical assistance, mostly based on supply-driven technical training and workshops.

Community capacity building on an individual level requires the development of conditions that allow individual participants to build and enhance knowledge and skills. It also calls for the establishment of conditions that will allow individuals to engage in the "process of learning and adapting to change."

- **Institutional/Organisational Level** - The second layer of capacity is the organisational or institutional level. As individuals make up the tissues of organisations and institutions, the sharing of skills, knowledge, experience and values amongst individuals belonging to a group or organisation translates, over time, into the very organisation's capacity, consisting of procedures, systems, policies and culture. However, while the collective set of capacities of individuals ultimately translates into the organisational and institutional capacity, the latter, by far, exceeds the sum of the capacities of their individual members. Developing institutions' capacity means fostering change within their complex system of policies, rules, procedures, regulations and organisational culture. The process is endogenous and voluntary, fully owned and controlled by the organisations and institutions that are undertaking change. Capacity building on an institutional level should involve aiding and improving institutions in developing countries. It may not necessarily involve creating new institutions, rather, modernizing existing ones and supporting them in forming sound policies, organizational structures, and effective methods of management and revenue control.

- **Societal Level** - The third layer at which capacity building takes place is the societal level. This third level has been long neglected in development theory and considered an externality to the capacity development process, which has traditionally focused on the individual and the organisational levels. Transformation and change that happens at the societal level overhauls and, at the same time, is driven by that which takes place within individuals and organisations that make that society. In turn, the values system of a society, its customs, body of laws and policies, the system of governance are all elements that impinge on the ability of individuals and organisations to develop their capacity.

Although change in capacity at the societal level is a long process which is difficult to control and steer, it is not to be considered an externality or a variable that cannot be manipulated to achieve desired results.

ENVIRONMENTAL DIMENSION OF SUSTAINABLE DEVELOPMENT

The World Commission on Environment and Development in their 1987 report popularly known as 'our common future' or 'the Brundtland report' defined sustainable development as a development that meets the need of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). Sustainable development gives a balanced consideration to economic, social and environmental factors while making provisions for present (short term) and future (long term) needs of the society.

The primary essence of sustainable development is to ensure that present needs are not satisfied at the expense of future satisfaction (Eni, 2005). Accordingly, present production and consumption patterns must not violate economic, social and environmental principles. It is a development model that provides a framework for the integration of ecosystem health, human needs and sustainable economic growth as shown in figure 1.

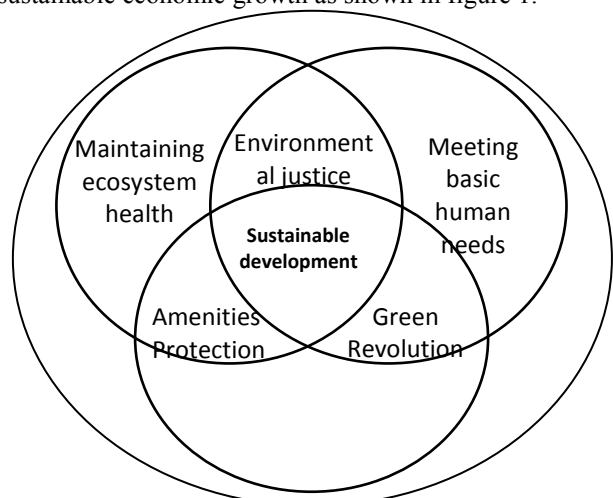


Figure 1: A sustainable development model for integrating ecosystem health, human needs and sustainable economic growth (Cunningham, Cunningham & Saigo, 2005)

According to Cunningham, Cunningham & Saigo (2005), the goals of sustainable development as enunciated by the Council on Sustainable Development include to:

- Ensure every person benefits from a healthy environment.
- Sustain a healthy economy that affords the opportunity for a high quality of life.

- Ensure equity and opportunity for economic, social and environmental well-being.
- Protect and restore natural resources for current and future generations
- Encourage stewardship
- Encourage people to work together to create healthy communities
- Create full opportunity for citizens, businesses and communities to participate in and influence economic, social and environmental decisions that affect them.
- Move toward stabilization of the population
- Lead in developing and carrying out development that are sustainable
- Ensure access to education that will prepare citizens for meaningful work and a high quality of life, and give of them an understanding of the concepts of sustainable development.

The three major dimensions of sustainable development, namely: environmental, economic and social, could be conceptualized as a tripod which may conveniently be represented in a triangular form as shown in figure 2. From the environmental perspective, sustainability must focus on the overall performance or health of the ecological system (Goodland, 1995).

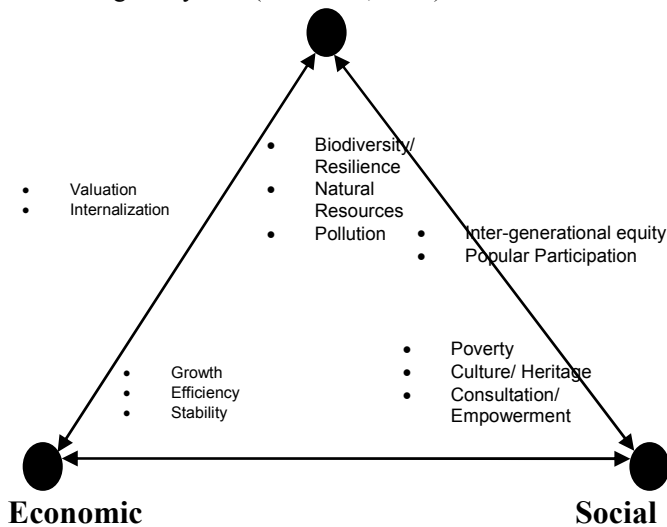


Figure 2: Elements of sustainable development (Munasinghe, 1993).

Attention is paid to ecosystem integrity, carrying capacity and conservation of natural resources including biodiversity. It is impossible to imagine a sustainable development without effective environmental management. The goals of environmental management are essentially similar to that of sustainable development. Sustainable human development is therefore, undermined by the absent of well set out environmental management strategies.

To ensure sustainable development in Nigeria, government has an action plan which sets out to achieve the following (NPE, 1999):

- Forest protection
- Erosion control
- Management of municipal wastes
- Combating desertification and mitigating effects of drought.
- Rational use of oil and gas resources
- Protecting water resources
- Sustainable human settlement
- Managing mining sites and restoring mining wastelands
- Managing toxic chemicals, hazardous and radio-active wastes.
- Emergency preparedness and management.
- Flood management
- Control of the infestation of water hyacinth and other invasive weeds.
- Strengthening, improving and co-coordinating implementation of environmental management.
- Strengthening the legal basis for sustainable development.
- Integrating environment into development plan and decision making.
- Harmonizing of federal, state and local responsibilities for environmental management.
- Creating and improving capacity for sustainable development.
- Internalizing environmental costs through the use of economic instruments in the management of natural resources.
- Alleviating poverty.
- Promoting the research and development of environmentally sound technology.
- Forging viable partnership among various stakeholders and interest group both at national and international levels.
- Managing environmental information for sustainable development.
- Financing environmental protection and natural resources conservation through national and international funding mechanism.

EDUCATION AND SUSTAINABLE DEVELOPMENT IN NIGERIA

For our purpose, it is instructive to see education as a process of raising individuals or groups along mental, physical, moral, spiritual and vocational dimensions through planned programme of instruction and other forms of relevant experiences (Noibi & Lawal, 1993). Uche, (1995) submitted that the type of society that would evolve at any period is dependent on the

prevailing educational system that has been put in place and the educational goals that guide its operation. A country therefore creates the type of society it desires through its educational system. It trains the type of people it wants since man is the product of his education. Within the African sub-region, Nigeria stands out as the only country that spans the whole range of ecological zones, from the coastal mangrove in the south to the desert in the North. The country therefore, faces a conglomeration of environmental challenges from these ecological zones. This range from the threat of desert encroachment and desertification in the North, through erosion and deforestation in the middle belt to the menace of oil spillage, sea level rise and coastal flooding in the south, including climate change which affects all part of the country. Given this state of affairs, education is seen as a veritable tool to create a society that is able to combat and contain these environmental problems. The educational system should assume a position of prominence and importance in an organized effort towards freeing man from the destruction occasioned by his ignorance of the dynamics of nature and the environment (Uche 1995). According to this author:

The destruction and devastation inflicted on the environment by man are in part due to his misconceptions about nature, his flawed attitudes to matters relating to the environment and his failure to regulate his activities on the planet. Education as an instrument of systematic change is fundamental if we are to successfully adjust or modify man's conception about nature, adjust his attitudes to the environment and make him perceive the essence of moderation in his various activities on the environment. The educational process may, therefore, be seen as a catalyst for effecting change in the conceptions of man about nature, his attitudes to and actions in the environment.

It is quite obvious that sustainable development can best be achieved through a well organized system of capacity building through education. The type of education recommended here is Environmental Management Education which can adopt both formal and informal approaches to help both local and global communities achieve sustainable development.

ENVIRONMENTAL MANAGEMENT EDUCATION STRATEGIES IN NIGERIA

Environmental management education basically aims at creating awareness and developing the right attitude and skills necessary to guarantee environmental sustainability (Harrison, Inyang & Udo, 2008; Harrison, Inyang & Ekott, 2014; Harrison, Bisong & Inyang, 2014). It is a form of education that provides a system

of educating the citizens about matters and issues that affect our environment, our homes, villages, cities, farmlands, water supplies, forest and weather in order to improve our awareness and skills and engender a change of attitude towards our environment and thereby arouse concern about the problems around us (Peters, Ekpoh, & Bisong, 1995). As an education programme, the aim is to stimulate, motivate and generate the commitment of the people towards the adoption of habits and lifestyles that are consistent with the practice of sustainable development, focusing on both the school and non-school public (Uche, 1995). According to this author, the focus should be on the cognitive, affective and psychomotor dimensions of human development. The major objectives of environmental education were well articulated in the Belgrade charter of 1989 (Anijah-Obi, 2001). They include: the creation of environmental awareness, acquisition of knowledge and understanding of the total environment, change of attitude towards the environment, development of skills required to solve environmental problems, evaluation of environmental measures and participation in finding solutions to environmental problems. These objectives should be pursued concurrently in any programme of environmental management education.

Realizing the indispensability of environmental management education in her quest for sustainable development, the Nigerian government endorsed a strategy that encouraged the incorporation of environmental education in the curriculum of schools. It similarly established environmental management education department in various universities, polytechnics and colleges of education. Other components of the strategy include: the development and use of common curricula for schools, preparation of textbooks and teachers' guide on environmental education, conducting orientation workshops and seminars for teachers, inauguration of environmental based clubs in schools, organising in-service and pre-service training for teachers and the provision of adequate funds for environmental management education programme and activities.

For very obvious reasons, different strategies are used in educating the school and non-school public about environmental management education. The non-school category comprises two major groups - those that have finished school and those that have never attended school (illiterates). Effective strategies for this category depend on the age and educational level of the target group. The strategies which may be used include: drama/popular theatre (enter-educate), targeted message on radio, television, posters/pictorials, newspapers advert and hand bills, campaign trains/puppets shows, use of town criers, use of guest speakers and use of

youth clubs. For the school children, the following strategies may be used: story-telling, singing of songs, field trip/excursion, environmental awareness/conservation clubs, lecture/discussion and projects based approaches.

GOVERNMENT ROLE IN PROMOTING ENVIRONMENTAL EDUCATION IN NIGERIA

The National Policy on Environment (NPE), as revised in 1999, recognizes education as a dynamic instrument of change that should provide the foundation for developing sound and sustainable means of resource exploitation in Nigeria. Education, according to this policy, should promote public awareness towards changing and strengthening attitudes, values and actions that are congruous with sustainable development. Governments saw the necessity to develop and support the education sector to ensure its responsiveness to changes and demands of all the other sectors, and facilitate the inculcation of environmental ethics, values and skills in the people and mobilizing them individually and collectively to accept the responsibilities of protecting the environment and ensuring rational utilization of available natural resources.

To this end, the policy states that Nigerian government shall:

- Promote comprehensive curriculum reviews that integrate environments and development concept in the educational system.
- Support the development of courses and programmes leading to the award of degrees and diplomas in environmental management and technology.
- Encourage gender sensitive education at all levels including continuing education opportunities and literacy programmes.
- Encourage practical training programmes for graduates of tertiary institutions to prepare them for labour market requirements and sustainable livelihood.
- Strengthen vocational training that facilitates the development and assimilation of environmentally sound, socially acceptable and appropriate technology.
- Establish support centers of excellence in interdisciplinary research and education in that area of environmental and sustainable development.
- Emphasize training and retraining of teachers, and school administrators in the area of environmental education and development issues.
- Assist schools to design and sustain environmental related activities including establishments of environmental awareness clubs and association.
- Support educational institutions including NGOs and the private sectors to develop and provide appropriate training programmes on environment and development

issues to decision makers, business men, journalists, community leaders etc.

- Promote research on and development of indigenous knowledge to facilitate sustainable adaptation of relevant technologies.
- Adopt community based approaches to public education and enlightenments through culturally relevant social groups, voluntary associations and occupational organizations.
- Collaborate with the media, entertainments and advertising firms to promote environmental awareness.
- Encourage the United Nations and other donor agencies to emphasize capacity building in all development programmes through adoption of the multidisciplinary approach to skills transfer.
- Encourage research linkages and staff/students exchanges between Nigerian educational institutions and institutions abroad in the area of environmental studies and sustainable development.
- Encourage public relation activities which tend to provide a forum and context for the debate on sustainable development and the articulations of the collective vision of the future.
- Promote public awareness activities through traditional; and mass media and encourage the participation of social; and political structures to keep them, informed about all aspects of the policy.
- Support public participation in activities covering formal and non-formal education and training to help carry out needed changes.
- Support environmental information at the national, regional and global levels.

CONCLUSION

As the world passes through the current phase of economic development, there is the utmost need to ensure that the necessary social and environmental safeguards are put in place through an effective programme of capacity building to guarantee a development that is sustainable, especially in the long run. The increasing trend of threats posed by diverse environmental challenges in all parts of the country has made the integration of environmental management education into the curriculum of schools at levels a national priority which should be handled with great urgency. Environmental education basically aims at achieving the following major objectives: creation of environmental awareness, acquisition of knowledge and understanding of the total environment, change of attitude towards the environment, development of skills required to solve environmental problems, evaluation of environmental measures and participation in finding solutions to environmental problems. It is doubtful to imagine a sustainable development without a well set-out programme of environmental management. The

adoption of environmental management education as an important component of Nigeria's national capacity building strategy is a sure guarantee for sustainable development in Nigeria.

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ENHANCING THE CAPABILITY OF RURAL FARMERS TOWARDS EFFECTIVE SOIL MANAGEMENT IN AMUCHA COMMUNITY, IMO STATE, NIGERIA

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ABSTRACT

With the continuous prevalence of climate change impacts, the areas suitable for agriculture, length of growing season and with potentials of high yield for staples food are all projected to decline. Some African Countries may experience decrease in agricultural yields by 50 percent by 2050 with the possibility of net revenue falling by 90 percent during the 21st century (IPCC, 2007 and Rutashobya, 2008). To guard against this projected doom, this study is initiated to examine ways rural farmers can be empowered to facilitate effective soil management for sustainable crop productivity in Amucha community of Imo State, Nigeria. A total of 480 respondents comprising farmers and stakeholders were systematically selected for study using survey instruments (checklist, questionnaire and interview). Data were analyzed descriptively using percentages and the use of multivariate tables. Results revealed generally that gender and age have strong influences on farmers' attitude towards soil management; also, low capital/poverty 113(24%), climate variability 112(23%) and local geomorphology (slope, soil) 61(13%) which rank 1st, 2nd and 3rd were identified as the three most outstanding factors militating against farmers effectiveness towards soil management. Again, agricultural loan insurance/health services and agricultural/extension services were farmers' major preference of capability enhancement variables constituting a total of 662(68.9%) in the series. This paper recommends that (1) training local farmers should be geared towards change negative attitudes and enhancement of youths to embrace farming; (2) emphasis must be laid on building the capital and technological capabilities of farmers and; (3) enabling local farmers to be adapted to the local geomorphology and climate variability of their areas. Enhancing the capabilities of these local farmers will in turn influence their soil management abilities and boost soil capabilities for sustainable agriculture.

KEYWORDS: soil management; farmer's capability; climate variability; local geomorphology

INTRODUCTION

Soil management represents the coordination of soil resource in an area through the process of planning, directing, controlling and other activities directed towards the prevention, mitigation or eradication of damages on the soil to enhance its sustainable productivity. Building capacity for effective soil management encompasses promoting legal, institutional, leadership, partnership, training and supportive framework; depending on the degree of degradation that have set in (UNEP, 2002; Majule, 2008). The degradable state of soils over space is one of the most serious environmental challenges confronting man in the 21st century, especially in developing countries. This emanates from the persistent population increase and the resultant increase in demand for land, crop production and built-up areas which together increase pressure compounded by climate change and related issues. In Africa and Nigeria in particular where the rural economies are based on agriculture, such

demands are further complicated by poverty, mismanagement, size of holdings, level of education and others. World Bank (2005), Hazzel and Wood (2008) revealed that approximately 1.2 billion people across the globe live in abject poverty while 160 billion children under the age of five years are malnourished. Similarly, about 75 percent of the African poor reside in rural areas. The scenarios for agricultural development and indeed soil management differ considerably among regions and countries across the globe. Rural farmers in most cases play central role in soil and farm management practices and food production in any area where expanse of lands abound.

According to Nyagah (2012), most African countries had directed their efforts towards soil management and conservation since 1970s and huge amount of money have been invested in an attempt to introduce efficient and sustained soil and other resources management

measures particularly in the areas where the problem of soil erosion are threatening and food deficit is widespread. In whatever perspective, most of the agronomic and engineering efforts put forward to improve farmers capability enhancement for effective soil management seem to have had limited success in achieving sustained use and widespread adoption and more or less failed to meet the anticipated objectives (Ofomata, 1985, Duru, 2012). Such limitations according to Antle (2009); Paustian et al., (2006); Sunding and Zilberman (2001) could be attributed to farmers' attitudes, perceptions, and characteristics such as education, experience and age.

The limited successes of those past efforts highlighted the need to better understand the factors that encourage or discourage the adoption, and sustainable use of introduced management measures. Indeed, enhancing the capabilities of rural farmers is very crucial in advancing capacity for crop productivity, boost food security, diversify employment opportunities and check the extreme effect of climate variability/change issues on land resources (UNEP, 2002). Yet, farmers may possess divergent views on how to improve their capabilities for both crop production and soil management.

Discounting for the efficacies of rural farmers' empowerment in general, most users of soil in the rural areas probably tend to possess little or no relevant expertise that could enhance appropriate adaptation to extreme weather and climatic events which have instigated the degradation of the soil resource in various areas within the Tropics. It is within this perspective that this work is based to explore the following

OBJECTIVES

1. To identify the major factors militating against enhancing the capabilities of farmers for effective soil management in Amucha Community of Imo State.
2. To determine if variation in age/gender have any influence on farmers' attitude towards adoption of soil management practices in Amucha community of Imo State.
3. To determine the perspective of empowering farmers for effective soil management in Amucha Community of Imo State.

THE STUDY AREA

Amucha is an agrarian community located within the Njaba Local Government Area in Imo State, Southeast Nigeria. It comprises of eight major villages (Umuoma, Umuopkoko, Umuzika, Umuokwara, Ezerie, Duruewuru, Umuzike and Umuezealibe) which together

have a total population of 22,334 people (National Population Census, 2006).

The climate of the study area is Humid Tropics (Af) based on Koppen classification scheme with the rainy season duration of more than seven months and less than five months dry season on the average. It is located within the coastal plains sands of sedimentary (tertiary) deposits with low percentage of saturation, less than 40 (Oweremadu, 2007; Ojinma, Umo and Egbe, 2014). Similarly, the soils within the study area are dominantly ferrallitic in nature and would seem to resist erosion. It contains small amount of humus due to intense leaching. This makes the soil low in fertility. Some physio-chemical and geomorpho-climatic attributes especially excess rainfall/temperature, topography, and land use often induce it to succumb to certain soil and climatic hazards. The area is drained by Njaba River, while the major land use types in the area are primarily for crops production, settlement and rearing of animals at the semi-extensive scale.

METHODOLOGY

This study is empirical in nature supported with secondary data. The investigation focuses on how farmers' capabilities are enhanced with a view to improving soil management for sustainable crop productivity. Data are generated from field survey using checklist, interview, and structured questionnaire instruments, and analyzed descriptively using tables, means and percentages. From a total population of 22,334 people that make up the study area; a sample size of 480 (comprising of 400 farmers and 80 stakeholders in the community are systematically selected for study.

Issues in Capabilities Enhancement for Sustainable Soil Management

It is often agreed that capacity building is central to the quest for sustainable soil management and use. Therefore a community, civil society, nation and/or region may adequately address the principal challenges of sustainable soil management if capacity building becomes a core and explicit priority of rural development. This is evident as UNEP (2002) posited that capacity enhancement is the hallmark for sustainable future of mankind in the fragile environment. Farmers and other rural soil users are assumed to know why they may have to take different decisions toward sustainable soil management, how it may affect them, and what they can do to prepare and protect the soil especially in areas of tree planting, conservative farming and other soil protection programs. Unfortunately, most rural communities seem to be either ignorant about the alternative strategies or

are starved of this basic support system which makes them highly susceptible to soil degradations.

Within the Amucha community of Imo State, certain variables militating against effective soil management were identified by respondents using checklist and the result is presented as Table 1. The Table reveals that low capital/poverty and climate (rainfall), each representing 113(24%) and 112(23%) are the major factors militating against effective soil management in Amucha rank (1st and 2nd) respectively. Local geomorphology 61(13%); varying type of land use 57(12%) and inadequate level of awareness 53(11%) are ranked 3rd, 4th and 5th in the series. These strengthens Okafor (1988) observation that basic education and other supports should be provided and awareness raised in rural areas on climate change and adaptation using appropriate communication tools such as radio, drama, flyers, posters, seminars, workshops, video, town criers and other traditionally based awareness strategies.

Table 1: Perceived Challenges to Effective Soil Management in Amucha Area

Militating Factor against Soil Management	Total	Percent	Rank
Land use type	57	12	4
Inadequate awareness	53	11	5
Population pressure	33	7	7
Government policies	4	1	9
Land fragmentation	36	8	6
Culture & tradition	00	0	10
Low capital/poverty	113	24	1
Illiteracy	11	2	8
Climate variability (rainfall)	112	23	2
Local geomorphology(soil, slope)	61	13	3
Total	480	100	

Source: Authors' Field Survey, 2015.

Other factors in the ranking are land fragmentation 36(8%); population pressure 33(7%); high level of illiteracy 11(2%) and government policy 4(1%) (6th, 7th, 8th and 9th) while culture/ tradition which rank 10th has no influence on the state of degradation on soil in Amucha community.

Capacity Investment and Attitude on soil for Sustainable Crop Productivity

Majule (2008) has observed that there is currently a shortage of integrated approaches for evaluating and making adaptive decisions relating to soil, water and other resources in various regions across Africa. Poor capability investment and low level of awareness to enhance effective soil management may directly associate with poverty and negative attitudes on the part of farmers toward soil management. Such poor capability is often linked with information accessibility,

health facilities, illiteracy and over dependency. Apart from these factors highlighted above, such others as attitude, gender and age of rural farmers in soil management have not been well known in most areas.

A multivariate analysis of relationships between farmer's characteristics (age and gender) and their attitude toward effective soil management in Amucha community of Imo State was done and presented as **Table 2**. The result indicates that both age and gender exerted strong influence on farmers' attitude toward soil management. Whereas 74(62%) of females, aged 35 years and below exhibited positive attitude, about 61(51%) of males in the same age group also exhibited positive attitude toward soil management in the study area.

Table 2: Farmers Composition and Attitude toward Soil Management in Amucha Area.

Attitude	Female		Male	
	35 and Less	Above	35 and Less	Above 35
Positive	74 (62%)	77 (64%)	61 (51%)	90 (75%)
Negative	46 (38%)	43 (36%)	59 (49%)	30 (25%)
Total	120 (100%)	120 (100%)	120 (100%)	120 (100)

Source: Authors Field Survey, 2015.

In the same vein, females from 35years and above have 77(64%) while their males counterpart recorded 90(75%). Hence in terms of farmers above 35 years, the males seem to exhibit more positive attitude towards soil management than the females in Amucha community. This strengthens the assumption that soil and indeed, agro-based practices in most rural communities within the southeast Nigeria are left for the adult and aged rather than the youth, and that gender varies in response to attitude toward soil management in the region.

Preference to Capability Enhancement among Farmers

Human interference within a given ecosystem often alters the balance of such space where the systems operate thereby creating new and dynamic equilibrium (Umo et al, 2014; Olofin, 1979). Such changes may manifest in form of erosion, flood and other process-induced hazards which require specialized training and other forms of empowerment programs to enhance effective coping over a period of time. Amucha community is highly vulnerable to various types of soil erosion especially in this 21st century following the impact of climate variability/change and local geomorphology. We therefore examined the various areas the populace have been or want to be empowered in other to enhance adequate adaptation to the changing scenarios of the environment for sustainable soil use.

Each respondent was asked to identify two most preferred options that will facilitate sustainable soil management. Data generated from the field was presented as **Table 3**. Analysis using percentages indicate that agricultural loan 434(45.2%), insurance/health services 126(13.1%) and agricultural extension services 102(10.6%) are the three major variables that Amucha farmers preferred for the enhancement of effective soil management. Other variables in their ranking are adult education 88(9.3%), fertilizer/manure supply 60(6.3%), awareness creation 42(4.4%), environmental education 34(3.5%) (4th, 5th, 6th, and 7th respectively) while regular workshop 4(0.4%) attracts the least attention among the variables that can enhance their capabilities.

Table 3: Farmers' Preferred Variables towards Capabilities Enhancement

Variables of Capability Enhancement	No. of Response	Percent	Ranking
Regular workshop	4	0.4	11 th
Government subsidy	28	2.9	9 th
Agricultural Loan	434	45.2	1 st
Fertilizer/manure supply	60	6.3	5 th
Insurance/health Services	126	13.1	2 nd
Environmental Education	34	3.5	7 th
Awareness creation	42	4.4	6 th
Adult Education	88	9.3	4 th
Cooperative Society	32	3.3	8 th
Agricultural Extension Services	102	10.6	3 rd
Policies on land ownership/use	10	1.0	10 th
Total	960	100	

Source: Authors Fieldwork, 2015.

CONCLUSION AND RECOMMENDATIONS

From the foregoing analyses and discussion, it is clear that Amucha soil potentials are being dissipated by mismanagement, ignorance and poverty, given the fact that most of the desirable variables for the enhancement are still absent. As a result, most farmers still present attitude and actions that often manifest through erosion, pollution, deforestation and other hazards. The basic problem of balancing the present needs against the future prospect through effective soil management strategies must involve the attraction of more youthful males into rural farming system. Again, these farmers must be empowered through the injection of capital and eradication of poverty; education about variabilities in climate and local geomorphology (rainfall, soil nature and slope types); establishment of insurance/health facilities and provision of extension services and programs. These factors, when they are incorporated into the system, better and effective strategies will be formulated for proper training of rural farmers to enhance their capacities for soil management in

Amucha. Following from these findings therefore, we recommend thus:

1. Government-public partnership in enhancing capabilities through effective financial supports (agricultural loan); manpower training and awareness creation to enhance sustainable soil management and use in the study area. Such services according to Madu (2012) will improve farmers' knowledge of agricultural practices and environment in general within the various rural communities in the region and beyond.
2. Emphasis should be placed on enabling local farmers to be adapted to the local geomorphology and climate variability of their areas. Such enablement will boost their capabilities in sustainable soil management and enhanced agricultural productivity.

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EFFECT OF URBAN INFORMAL SETTLEMENTS AND OUTDOOR ADVERTISEMENT ON THE QUALITY OF BUILT ENVIRONMENT AND URBAN UPGRADING IN NIGERIA

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ABSTRACT

The paper examines the causes and characteristics of informal settlements and outdoor advertisement in the evaluation of quality of environment. The paper identifies the problems that have aided informal settlements to: urbanization, poverty, growth of informal sector, non-affordability of land and housing shortage. The paper asserts that the informal settlements have serious adverse effects on the people's health, their built environment and quality of life. The secondary data was obtained from books, journals and seminar papers. The paper argues that, although the urban upgrading possesses great potential for improving quality of built environment in informal settlements, there is a need to repackage the upgrading exercise so that majority can benefit from it. It is necessary to incorporate community participation and outdoor advertisement into the urban upgrading in order to assist the very poor that cannot take care of their housing consumption needs. Therefore, government is encouraged to see informal settlements as a solution to new city planning rather than problem to the urban areas. This paper suggests the implementation of policies and planning, physical infrastructural development, social economic improvement, environment and health improvement. Government, private and communities interventions on informal settlements are required in order to prevent further decay for sustainable development.

KEYWORDS: quality of environment; informal settlements; urban upgrading; outdoor advertisement

INTRODUCTION

Deteriorating urban environmental conditions and their life-long implications on quality of life have become significant aspects of debates and discussions. Towns and cities in developing countries like Nigeria are growing rapidly (World Bank, 2005). As a result of the high cost of housing, lack of good financing schemes, the increasing population is forced to live in substandard housing and unhealthy conditions giving rise to informal settlements (Olotuah, 2005). Informal settlements in Nigeria are increasing and posing serious problems to their own personal life and health. Slums and squatters are experiencing a massive change in the quality of life as they retain in the settlements that are characterized by numerous problems such as overpopulation, inadequate basic amenities, non-conventional housing and so on (Majale, 2002).

The term 'Quality of life' is used to evaluate the general well-being of individuals and societies but its meaning is very complex, very comprehensive and varies with time and the person's beliefs. (Giovanni, 1998) asserted that quality of life has to do with how people live, feel and understand their daily lives. This includes aspects

such as health, education, housing, employment and participation in decisions. (Arnaldo Ribeiro, 2005) notes that quality of life is a term that has emerged as a concept of living conditions, health and physical safety, mental and social ability. However, definitions of quality of life have also been diverse. It has to do with how each one sees himself and the community (Constanza, 2008).

Nevertheless the wide range of definition can be categorized into three major philosophical approaches to determining the quality of life (Brock, 1993). The first approach describes characteristics of the quality life that are dictated by normative ideals based on philosophical, belief and other systems. This approach to quality of life depend neither on the subjective experience of people nor on the fulfillment of their wishes (Diener and Suh, 1997). The second approach to defining the quality of life is based on the satisfaction of preferences. Thus, in this tradition, the definition of the quality of life of a society is based on whether the citizens can obtain the things they desire. The third definition of quality of life is in terms of the experience of individuals. In this

approach, factors such as feelings of joy, pleasure, contentment, and life satisfaction are paramount.

Indicators of Quality of Life

Quality is a product of subjective judgment which arises from the overall perception which the individual holds towards what is seen as the significant elements at a particular point in time (Olayiwola, et al, 2006). In assessing the quality of life, social indicators such as health and levels of crime, subjective well-being measures (assessing people's evaluative reactions to their lives and societies), cultural and economic indices are very important.

According to (Truckee, 2007) Indicators of quality of life can be categorized as follows: land use and infrastructure, natural environment, health and wellness, economic wellbeing, education and lifelong learning, public wellbeing, arts and cultural vitality, civic engagement, enrichment and innovation.

(a) Land Use and Infrastructure

Housing and mobility options enable families to be self-sufficient and businesses to be profitable, development that encourages healthy lifestyles and neighborhood livability, affordable housing, land use balance and sensitivity and mobility and convenience.

(b) Natural Environment

Clean air and water support healthy communities, recreational options and diverse wildlife; invest in natural resources for future generations' enjoyment and open space access.

(c) Public Wellbeing

Safe neighborhoods, schools and workplaces, secure families and vibrant tourism, which encourages visitors to enjoy the outdoor experience and feel confident visiting the region's attractions and community responsiveness to its most vulnerable populations

(d) Economic Wellbeing

A thriving economy that provides valuable jobs, income for necessities and sufficient revenue for the public services: Economic resources allow individuals to be more self-reliant.

(e) Health and Wellness

It means that people have their basic medical needs met and access to a variety of medical facilities and services.

(f) Education and Lifelong Learning

Quality of life means everyone has access to quality educational opportunities throughout their lives. Skills to be a productive citizen that include self-sufficiency, personal enrichment and economic contribution.

These indicators assess three philosophical approaches to well-being that are based, respectively, on normative ideals, subjective experiences, and the ability to select goods and services that one desires.

Measurement of Quality of Life

Two new scientific approaches to measuring quality of life have been introduced as: "objective" or social indicators, and the measurement of subjective well-being (SWB). Findings in social indicator and subjective well-being research have direct relevance to the fundamental concerns of societies and individuals. Therefore, Social indicators and subjective well-being measures are based on different definitions of quality of life.

Social indicators are societal measures that reflect people's objective circumstances in a given cultural or geographic unit. The symbol of social indicators is that they are based on objective, quantitative statistics rather than on individuals' subjective perceptions of their social environment. Housing satisfaction is a vital indicator of quality of life.

Objectivity is one of the strength of social indicators. These indicators usually can be relatively easily defined and quantified without relying heavily on individual perceptions. Also, Strength of social indicators is that they often reflect the normative ideals of a society.

Social indicators, however, suffer from several weaknesses. Firstly, social indicators are fallible, although social indicators are thought to be "objective," they are often contaminated by measurement problems. Another limitation of social indicators is the inevitable role of subjective decisions in selecting and measuring the variables.

On the other hand, Subjective well-being consists of three interrelated components: life satisfaction, pleasant affect, and unpleasant affect. Life satisfaction refers to a cognitive sense of satisfaction with life whereas affect refers to pleasant and unpleasant moods and emotions. Based on numerous findings that uncover a relative independence between pleasant and unpleasant affect (Bradburn, 1969), SWB includes both positive and negative affective experiences of the individual.

The major advantage of subjective well-being measures is that they capture experiences that are important to the individual. Also, strength of subjective well-being measures is that when proven inadequate, they are often easier to modify in later studies than objective indicators (Davis and Fine-Davis, 1991). Third, SWB measures can be easily compared across domains by measuring the experience of wellbeing on common dimension.

Subjective well-being measures also have a number of weaknesses. First, objects that produce particular findings have not been completely eliminated. Therefore, whenever possible, SWB should be

measured by multiple methods that do not share common methodological shortcomings. Second, subjective well-being measures may not fully reflect the objective quality of community life in a place because they may be more dependent on temperament and personal relationships than on societal factors.

Informal Settlements

Severe difficulties exist in defining 'informal settlements'. The definition of informal settlements is context-specific. According to (Srinivas, 2003) informal settlements are characterized by unauthorized use of vacant public or private land, illegal subdivision and/or rental of land, unauthorized construction of structures and buildings, reliance on low cost and locally available scrap construction materials, absence of restrictive standards and regulations, reliance on family labour and artisanal techniques for construction, non-availability of mortgage or any other subsidized finance. (Sietchiping, 2000) revealed that informal land use is characterized by overcrowding, deterioration, insecurity, absence or insufficient basic facilities. These conditions endanger the health, prosperity, safety or moral of the inhabitants and the community at large is unpleasant for living.

Various definitions have thus been proposed, but that suggested by the UN Habitat Programme is probably the most widely applicable. Informal settlements, can be defined as residential areas where a group of housing units has been constructed on land to which the occupants have no legal claim, or which they occupy illegally; unplanned settlements and areas where housing is not in compliance with current planning and building regulations (UN-HABITAT, 2003).

Slums and Squatter Settlements

There is no satisfactory consensus on the definitions of slums and squatter settlements, as terms vary from culture to culture. Slums are often perceived to be informal settlements. UN-Habitat defines slums as contiguous settlements where inhabitants are characterized as having: (i) insecure residential status; (ii) inadequate access to safe water; (iii) inadequate access to sanitation and other basic infrastructure and services; (iv) poor housing quality; and (v) overcrowding (UN-HABITAT, 2003).

On the other hand, squatter settlements can be defined as a residential area which has developed without legal claims to the land or permission from the concerned authorities to build; as a result of their illegal status, infrastructure and services are usually inadequate. It becomes clear from the foregoing that squatter settlements as distinct from inner-city slums, essentially constitute what is referred to as urban informal settlements.

As pointed out in (HABITAT, 2003), it means slums are areas where people with land ownership live in poor environmental and socio-economic conditions and are different from squatters which are the settlements where people build houses without legal title to land.

Causes of Informal Settlements

The critical factors causing the formation of informal settlements are notably related to several major interrelated changes: (i) poverty; (ii) rapid urbanization and influx of people into urban areas; (iii) war, natural disasters and earthquakes leading to massive movement of people to places of opportunity and safety; (iv) Ineffective Housing Policies; (v) inefficient public administration, inappropriate planning and inadequate land administration tools. Manifestations of informality are attributed to the lack of effective planning, effective land management system and zoning regulations for urban development.

According to the United Nations Economic Commission for Europe (UNECE), poverty and social ostracism are the primary causes of informal settlements in most nations. Governments around the world grapple with fiscal deficits and therefore promote and subsidize industrial sectors that can revitalize the economy.

In addition, governments have implemented policies to provide housing for the urban poor but their efforts have proved futile. According to Housing the Urban Poor, several governments have pursued anti-urbanization policies. They have evicted people from informal settlements, razed the housing, and sent the dwellers back to the countryside. These measures fail to stem the tide of urban migration

Rapid urbanization and influx of people into urban areas is another major cause of informal settlements. Rapid industrialization and urbanization have brought an increase in the number of people living in urban areas.

Characteristics of Informal Settlements

Informal settlements are often studied in the context of informal housing, recognizing the fact that they incorporate predominantly informal housing developments. The informal settlements range from sub-standard slums to housing that does not have the proper development permit. Informal housing can be described as housing that does not conform to the laws and regulatory frameworks set up in a particular city (UN-HABITAT, 2003).

Informal settlements are mainly characterized by informal land tenure, inadequate access to basic services, both social and physical infrastructure and housing finance (Vienna, 2004). Other characteristics of

informal settlements include: (i) lack of secure tenure; (ii) housing that contradicts city by-laws; (iii) housing built on land not owned by the housing owner; (iv) lack or inadequate access to basic public services; (v) substandard housing and inadequate building structures; (vi) illegal subdivision of buildings; (vii) poverty, criminality and social exclusion; and (viii) unhealthy living conditions and hazardous locations (UN-HABITAT, 2003 and Payne and Majale, 2004).

LITERATURE ANALYSIS

Informal Settlements and Quality Of Life

Living in informal settlements often poses significant risks on health, education and well-being. Access to health and other services may be limited; overcrowding can contribute to stress, violence and increased problems of drugs and other social problems.

Social infrastructure, like water supply, sanitation, electricity, roads and drainage; schools, health centers, market places are below minimum levels. Water supply, for instance, to individual households may be absent, or community stand pipes may have been provided, using either the city networks, or a hand pump itself. Informal networks for the supply of water may also be in place. Similar arrangements may be made for electricity, drainage and toilet facilities with little dependence on public authorities (UN-HABITAT, 2003).

Effects of Informal Settlements on Quality of Life

In informal settlements, the decline in living conditions is accompanied by rapid deterioration of existing housing and homelessness (UN-HABITAT, 2007). The urban poor living in these settlements are especially vulnerable to economic shocks; they lack access to services, safety nets and political representation.

The population growth which drives the increase of informal settlements can impose pressure on the inhabitants of informal settlements. While the people are usually poorly educated, competition in the city is high, and it is hard to find jobs. Pressures can also come from environmental hazards such as floods and fire. These pressures impact upon the well-being of the poor in these informal settlements. Poverty can also create long-term pressures. People are unable to obtain adequate food, clean water and other basic services, as well as education. Their health and living standards often suffer when their settlements are situated close to sources of pollution. The environmental hazards and vulnerable locations of informal settlements mean that the effects of the hazards on informal communities are great.

These inhabitants have little ability to provide for themselves. They live in a state of uncertainty as they

have no tenure over the land they occupy are illegally. At the same time, people living in hazardous location have the continuous threat of unpredictable disaster. Both external and internal hazards affect their livelihoods. World Health Organization (WHO) notes that informal habitants are frequently ill as a result of the poor quality of their environment and exposure to disease. They are in a state of persistent poverty and frustration. Disasters may cause death and loss, while the poor housing and sanitation also threaten their health.

Housing, Environment and Quality of Life

Housing is an important component quality of life. (Agbola, 1998) notes that housing is a combination of characteristics which provide a unique home within any neighbourhood; it is an array of economic, social and psychological phenomena. In other words, housing could be seen as a multidimensional package of goods and services extending beyond shelter itself. It is also the art of creating a living area through acquisition of land at the top of which buildings are constructed with provision of basic physical, social and cultural infrastructure. (Osuide, 2004), suggests that: "Having a safe place to live in is one of the fundamental elements of human dignity and this enhances human development".

Onibokun, 1972, Wahab et al 1990 and Olotuah, 2005 sites that 75% of the dwelling units in Nigeria's urban centres are substandard and the dwellings are sited in slums. Housing in informal settlements are characterized by natural ageing of the buildings, lack of maintenance and neglect, wrong use of the buildings, poor sanitation in the disposal of sewage and solid waste and wrong development of land (UN-HABITAT, 2003).

Furthermore, So and Leung (2004) have also established a significant correlation between the quality of life and the comfort, convenience and visual acceptability of the house. Therefore the significance of adequate housing to the social well-being of the people in informal settlements cannot be overemphasized. Quality of life may also address environmental quality such as quality of dwelling air, water and adequacy of open spaces for other land uses.

Poverty and Crime Rate in Informal Settlements

The reality associated with these informal settlements is the poverty levels within which their inhabitants live, and the social exclusion to which they are subjected as a consequence of, among other factors, a lack of sufficient income to satisfy their basic needs (Paudel, 2003). Their daily challenges according to (Baharoglu and Kessides, 2004) include; limited access to employment

opportunities and income, inadequate and insecure housing and services, violent and unhealthy environments, and limited access to adequate health and education opportunities.

He went further to state that poverty in informal settlements is not just a collection of characteristics; it is also a dynamic condition of vulnerability or susceptibility to risks. The fact that they lack all these conditions and the necessity for employment to generate an income to satisfy their needs makes this informal urban environment a fertile ground for illegal informal activities including violence and crime (Lumanti, 2005).

RESEARCH METHODOLOGY

In order to reach the above mentioned objectives, the study will include a study intended to consolidate secondary data. The secondary data will include available census data, official documents, case studies of successful intervention and good practices with an emphasis on results achieved on the central city slum, and other relevant secondary literature.

In addition, this assessment will be based on existing information from reports, such as the most recent UN-HABITAT Global Reports on Human Settlements and State of the World Cities Reports.

Primary data relating to building and environmental quality were obtained by means of structured questionnaire administered on a systematic sample of 500 household heads, from a sampling frame of 5000 housing units.

RESULTS

Socio-Economic Characteristics of Respondents

The study reveals that larger proportions of the respondents are male (60%) most of whom are of adult age of 20 years and above. Majority of the respondents are educated having at least basic primary education. It can therefore, be concluded that it will be an advantage in case of any attempt at improving the environmental conditions of this settlement, since it may not be difficult to communicate with them at the same time get practical input from them.

The study further reveals that majority of the respondents are Yoruba with a figure of (80%) follow by Igbo which records (5%) and Hausa with (15%). People from other ethnic groups are not significant in the study area.

The study reveals that majority of the respondents are employed in informal sector. 55% are traders, 30% are artisan, 8% are civil servants, 2% are farmers, while the remaining 5% fall in other category. This could be

attributed to the fact that the area is dominated by poor, characterized by the informal activities that are uniquely associated with the low income groups.

Majorities of the residents earn less than N10, 000.00 a month while only few of them earn above N50, 000.00 a month. This suggests that majority of the resident live below poverty line. The implication of this is reflected in the daily standard of living as many are unable to meet their basic needs which make life more unbearable for them. Average number of household per building in the study area is between 6-7, while the average number of people per household is between 8-9. Further investigation revealed that the average room per building is eight and average number of people per room is five. This suggests that the occupancy ratio is on the high side. The implication of this is reflected on the existing infrastructural facilities and daily life of the residents which is full of unpleasant and difficult situations.

Building, Infrastructure and Environmental Conditions

Over 80% of the buildings in the area are traditional compound type while 15% of the buildings are Brazilian type and only 5% are flat. Most of the buildings (50%) are predominantly residential however, a significant proportion representing 40% of the buildings are mixed use while other land uses account for 10%. Personal observation revealed that the activities within the mixed use include residential, shops, schools, place of worship. This means that many of the residents engage in informal activities such as petty trading within their homes.

About 85% of the buildings are accessible by roads but, the main problem is that majority of the roads are not tarred and the conditions are extremely poor. The roads are characterized by poor drainage, lack of street lighting, absence of pedestrian walkway as well as on street parking. Also some of the roads are used as refuse dump site.

The study revealed that larger percentage of the buildings is extremely poor. 80% of the buildings are poor, 14% are fair while 6% of the buildings are good. Further investigation revealed that poverty (lack of money), and longtime neglect by government as claimed by the residents are major factors responsible for the present poor conditions of the buildings as well as overall physical and environmental condition of the communities.

The study revealed that 82% of the residents do not even have access to toilet facilities, 14% have access to private toilet and 4% of the residents shared toilet

facilities. Field investigation revealed that significant proportion of these toilets are located outside or away from the buildings and their conditions are generally poor. Sharing of toilet facilities by too many people has bad environmental and health implications.

Majority of the respondents (75%) shared bathroom similar situation is applicable to kitchen, as high as over 81% shared kitchen. Also, some of the kitchen, bathroom and toilet facilities are detached away from the main buildings which make them not too convenient for use at some particular time of the day especially at night. It was revealed that the conditions are very poor.

Assessment of Community Infrastructural Facilities

Assessment of the infrastructural facilities by the residents revealed that the daily life pattern of the residents is characterized by unpleasant and difficult situation as majority adjudged that the conditions of the available infrastructural facilities are poor while some basic ones such as playground, open space, recreational area, and fire station, outdoor advertisements among others are not even available.

Electricity is provided by Power Holding Company of Nigeria (PHCN but, the supply is erratic. The area lacks effective refuse collection service and has no central sewage system therefore; the main mode of solid waste disposal is through drainage and cart pushers who eventually dispose them to unknown destination or at times on the existing streets. The need for children to play coupled with the absence of playgrounds has made them to convert streets to playgrounds. The existing road conditions are extremely poor while most of the buildings do not have access to potable public water supply, however, larger proportion get their water supply from well and borehole own by private individual.

RECOMMENDATIONS

Recommendations in this study are structured into broad areas on: how to alleviate the poverty of the residents, improve the level of infrastructural facilities, housing conditions and general environmental conditions of the study area so as to achieve a Healthy, livable, prosperous and sustainable human settlement. It is evident that decent housing is a major problem of informal settlement dwellers. This is largely due to their low level of financial capacity coupled with inefficient land administration system which have further exclude them from urban life and increased their vulnerability to eviction, disaster and environmental health problem. Therefore, any attempt to achieve livable, healthy and prosper cities must as a matter of urgency address housing issue. This means that there must be a conscious effort focusing on provision of decent

housing for the poor at an affordable rate. This can be achieved through different means such as site and services and compressive housing.

Also, the issue of land tenure must be looked into because land is a major factor of housing provision. It becomes very difficult to provide decent housing and basic services to the poor where the title or the interest on the land is uncertain. Furthermore, urban informal settlements dwellers can be encouraged to improve housing and general environmental conditions of their settlement through land regularization that guaranties security of tenure and provision of array of basic facilities. Improvement in the living environment of the poor will help them to be more productive and increase their income over time while security of housing and land tenure is expected to help the poor overcome the problem of social exclusion from urban life.

The amount of infrastructural facilities available in the informal settlements is grossly inadequate while some are not even available. Availability and adequacy of infrastructural facilities is a major factor that determines the environmental condition and livability of any settlement. Therefore, efforts should be directed towards upgrading the existing ones while those that are not available should be provided. This could be achieved through preparation of detailed infrastructure network plan for the community with population density being the major yardstick in determining the adequacy. The design should allow for individual self-funded incremental service connections and affordable capital, maintenance and user costs for services.

Therefore, deliberate effort should be made to improve the livelihood of this category of people. Their means of livelihood which is centered on informal sector should be recognized and be supported.

CONCLUSION

The major issues found in informal settlements studied included judicial and administrative failures, physical infrastructures and service problems, increasing socio-economic problems posing threats to their long term livelihood, and poor environmental conditions. If a formal urban planning system designed to improve the general amenity of informal settlements, the policy and implementation capability of government and the housing sector, and the range, availability and affordability of urban housing were to be developed, then this study has suggested the implementation of policies and planning, physical infrastructural development, socio-economic improvement, environment and health improvement, enhancing government build up of all organizations involved and responsible to improve informal settlements.

Therefore, informal settlement should not be considered as an anomaly but rather as the necessary response they actually represent in terms of the desires and needs of the poor to access the urban environment. Attempts to eradicate them will thus fail until these underlying issues of poverty and inequality are addressed.

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INFLUENCE OF TEMPERATURE INCREASE ON POISSON'S RATIO OF LATERIZED CONCRETE

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ABSTRACT

This paper reports the result of investigations carried out on the effect of temperature increase on the Poisson's Ratio of laterized concrete. Values of Poisson's Ratio are needed for the structural analysis and design of many types of concrete structures. The test specimens were made with sieved samples of selected grain sizes range of lateritic soil used as fine aggregate to replace sand in normal conventional concrete. Batching was by weight. Three mix ratios of (1:1.5:3), (1:2:4) and (1:3:6) were used. Water/cement ratio of 0.6 was used throughout the experiment. The cylindrical shape specimens of size 150mm x 50mm were tested at 28days curing age after heated to various high temperatures 40⁰ C, 60⁰C, 80⁰ C and 100⁰C, for 24 hours and allowed to cool for another 24 hours. The results showed that Poisson's Ratio of laterized concrete decreases as the temperature increases. The results can be used to estimate the influence of high temperature on the structural behaviour and integrity of laterized concrete component which follow the pattern of conventional concrete at increased temperature.

KEYWORDS: poisson's ratio, laterized concrete, lateritic soil, compressive strength, conventional concrete

INTRODUCTION

Concrete is one of the most important building materials manufactured in the building industry. Generally, concrete is made up of water, cement, fine and coarse aggregates. The mechanical and physical properties of concrete are more complex than most materials as they impacted by the environmental conditions when it is poured and cured (Naus and Graves, 2006). The need to provide for different uses at relatively cheap and reasonable costs has led to the use of different materials as substitutes for the constituents of concrete. One of the suggestions in the forefront has been the sourcing, development and use of readily available local materials suitable for the production of any component of a building. Lateritic soils belong to a category of such materials.

There are varieties of definitions of lateritic soil stemmed from the fact that each investigation approaches the study of the material from its own professional view point. The term 'laterite' according to Hamilton (1995) was first used by Buchanan in 1807 to describe a ferruginous vesicular, unstratified and porous materials with yellow ochres due to high iron content occurring in Malabar, India. The freshly dug material was soft enough to be rapidly hardened on exposure to air and was remarkably resistant to the weathering effect of climate. Lateritic soil are recognized as tropical and sub-tropical weathering products of various crystalline igneous rocks, sediments, detrital deposits and volcanic ash, and it was morphologically identified as surface or near surface occurrence in various tropical and sub-

tropical regions of the world. Concrete in which sand component is partially or wholly replaced by Laterite is called laterized concrete. Terracrete is the product formed by replacing sand as fine aggregate in concrete wholly with laterite. In other words, it is a product formed by bathing cement, coarse aggregate, laterite and water in standard mix to form a construction material of similar characteristics to concrete.

The elastic characteristics of a material are measures of its stiffness. Stiffness influences the deformation and load distribution. Determination of elastic properties of laterized concrete is necessary for stress analysis associated with environmental effects and for computation of the design stresses deformations and deflections under load in concrete and concrete structures (Abadjieva, 1998). Poisson's Ratio and young modulus are the two fundamental constants characterizing the general mechanical behaviour of linear, elastic, homogenous and isotropic materials. Isotropic materials have the same properties in all directions while homogenous materials are those composed of the same material throughout. Poisson Ratio is the ratio of the lateral strain accompanying an axial strain to the applied longitudinal strain and may be expressed as

$$E_{\text{Lateral}} = \nu E_{\text{Longitudinal}} \quad (1)$$

Where the constant of proportionality ν is the Poisson's Ratio and E is the Strain. Another way of finding Poisson's Ratio is from the modulus of Elasticity E , as

determined in Longitudinal or transverse mode of vibration and the modulus of rigidity thus:
Where G = Modulus of rigidity.

G is normally determined from the resonant frequency of torsional vibration and this is intermediate between those values obtained directly and those from dynamic test. The physical significance of N is revealed by various interrelations between theoretical elastic properties (Love,1944). Values for Poisson's Ratio are needed for the structural analysis and design of many types of concrete structures. Also it is necessary to know the value of Poisson's Ratio when interpreting strain data obtained in test structures. For the small strain analysis of concrete structures, knowledge of the strength and the elastic modulus is sufficient. However, when large strains are involved as in a structural integrity analysis, knowledge of the stress-strain relationship of the concrete at elevated temperatures is also required.

This study quantifies the influence of a rise in temperature on Poisson's Ratio of terracrete. The results can be used to estimate the influence of high temperature on the structural behaviour and integrity of laterized concrete components.

SIGNIFICANCE OF THE STUDY

The present state of economic condition has accentuated the necessity of implementing local capacity to curtail dependence on foreign capacity. This is the time to raise our economy by making use of indigenous construction capacity and also to develop it to meet the foreign capacity standard. Terracrete is cheaper than concrete because laterite which is used as the fine aggregate constituent is much more readily available than sand used as fine aggregate in normal concrete. It can even be collected from the construction site therefore eliminating necessary transportation cost. Presently, there is a great need to further research on the topic so as to get more information on its performance at elevated temperature when compared with normal concrete. In summary, the study provides more information on the performance of laterized concrete under high temperature conditions. This would enable the designers to check the factor of safety and the adequacy of the structure to sustain the applied loads safely.

PREVIOUS STUDY

The abundance of the laterite in tropical region has generated research interest in the material. The possibility of replacing sand in concrete with laterite have been investigated into by many researchers, but to date, the information available on the performance under high and low temperature condition is limited

(Kodur,2008). Various structures are being exposed to continuous variations in temperature especially this era of global warming, this necessitate more concern on how laterized concrete behaves after curing under varying temperature.

Ata et al (2005) established that Poisson's Ratio of laterized concrete ranges between 0.25 and 0.35 and increases with age. In addition, it was noted that methods of curing, compaction and water / cement ratio have little influence on Poisson's Ratio. Investigation by Udoeyo et al (2006) shows that concrete with up to 40% replacement level of sand by laterite attained compressive strength of 20N/mm². This indicates that it is possible to use laterite as partial replacement for sand up to this level. In another study, Balogun and Adepegba (1982) found out that the most suitable mix of lateritized concrete for structural purposes is 1: 1.5:3, using batching by weight with water / cement ratio of 0.65 provided that the laterite content is kept below 50% of the fine aggregate content. It was found that shear and tensile strength of laterized concrete increased with curing duration.

Previous studies on conventional concrete indicated that it exhibits change in its compressive strength and its modulus of elasticity as environmental conditions change (Gardner et al 2005, Lec, 2008 and Yuan, 2002). Lec et al (1988) showed that compressive strength and Poisson's Ratio increases as temperature decreases. The young modulus of concrete was also found to increase at low temperature but in a smaller rate than the compressive strength. In the study carried out by Phan and Carino (2003) concrete would permanently lose strength if exposed to repeated extreme temperature. This result conformed to the study carried out by Lawson et. al (2000) which indicated that the concrete loses 50% of its compressive strength for every 100°c rise in temperature up to about 200°c, after which the strength starts to drop significantly.

MATERIALS AND EXPERIMENTAL PROCEDURES

Materials

The laterite used to replace sand in this study was from a pit at the back of civil engineering block Obafemi Awolowo University, Ile – ife. The maximum size of laterite used passed through 2.36mm BS sieve. The gravel used throughout the tests was obtained from the capital project division of the University and varied in sizes from 12mm – 20mm. The cement used was from west African Portland Cement Company Ewekoro, Ogun State and conformed with BS 12 [4] for Ordinary Portland Cement. Clean tap water available in the concrete laboratory was used in manufacturing the specimens.

Characterization of Laterite and Sand

The physical and chemical characteristic of laterite according to Adepegba (1975) are furnished in table 1 and table 2 respectively. Table 3 present the basic properties of Sand and Laterite

Table 1 physical characteristic of laterite

Component	Percentage composition(%)
Gravel	5
Sand	48
Silt	12
Clay	35

Source: Adepegba (1975)

Table 2 Chemical composition of laterite

Component	Percentage composition(%)
SiO ₂	67
Al ₂ O ₃	17.1
TiO ₂	1.0
Fe ₂ O ₃	5.6
MgO	0.1
K ₂ O	0.1
SO ₃	0.3

Source: Adepegba (1975)

Table 3 Basic properties of laterite and sand

Physical properties		Sand	Laterite
Specific density		2.6	-
Bulk Density (Kg/m ³)	Loose condition	1405	1162
	Dense condition	1547	1294
Fineness Modulus		2.27	5.46

EXPERIMENTAL PROCEDURES

The specimens used in the experiment were 150 x 150mm cylindrical shape. The cylindrical moulds were coated with mould oil to ensure easy de-moulding and smooth surface finish. The procedures adopted for casting the test specimens are in accordance with British Standard Institution (1983). The batching of the terracrete was done by weighing the different constituent materials based on the adopted mix ratio of 1:1.5:3, 1:2:4 and 1:3:6. The different mixtures of cement content lateritic soils and coarse aggregates were worked manually. The water cement ratio for all the mix was 0.6 by weight. The freshly mixed terracrete was then filled in moulds with the use of hand trowel. Capping was provided for each mould and the identification marks showing the date of casting and mix ratio were made on each specimen. The specimens were de-moulded 24 hours later and cured in water for 28 days.

Exposure of Specimen to High Temperatures

At the end of the specimens curing age, they were removed from the curing tank and allowed to dry after which they were heated in the oven at elevated temperature 40^oC, 60^oC, 80^oC and 100^oC for 24 hours

before being subjected to compressive load from compression machine armed with dial gauges after cooling. One guage was fixed on the vertical plane and one on the Circumference of the centre section on the lateral plane to determine the longitudinal and lateral extensions respectively (plate 1 and 2). The lateral strain was determined from the attached lateral dial guage. Similarly, the longitudinal strain was obtained from the longitudinal dial guage. The value of Poisson's Ratio is obtained by dividing the lateral strain by the corresponding longitudinal strain.

ΔH = change in length (Lateral)

ΔV = change in length (longitudinal)

L = Original Length (150mm)

$$\text{Lateral strain (EH)} = \frac{\Delta H}{L}$$

$$\text{Longitudinal strain (EV)} = \frac{\Delta V}{L}$$

$$\text{Therefore } N \text{ (Poisson's Ratio)} = \frac{EH}{EV}$$



Plate 1: Sample of specimen inside the oven



Plate 2: Compression machine armed with dial gauges

RESULTS AND DISCUSSION

Table 4 to 6 and figure 1, show the effect of temperature increase on Poisson's Ratio of laterite concrete. The results show that the value of Poisson's Ratio decreases as the temperature increases in all the mix ratios. The result follows the pattern of conventional concrete at increase temperature (Lee et al, 1988). When conventional concrete is exposed to elevated temperature, it begins to experience dehydration reactions in the hydrated cement paste, possible thermal incompatibilities between paste and aggregate and eventual physiochemical deterioration of aggregate. This typical degradation is accompanied by a decrease in the stiffness (modulus of elasticity) of the concrete. Repeated thermal cycling as a result of temperature increase reduces the peak strength and could loosen the bond between the concrete and the reinforcing bars.

Table 4 Effect of temperature increase on Poisson's Ratio of laterized concrete for mix (1:1.5:3)

Temperature °C	ΔH (mm)	ΔV (mm)	EH	EV	N
40	4.21	6.45	0.0281	0.043	0.6535
60	3.82	6.07	0.0255	0.0405	0.6296
80	3.53	5.67	0.0235	0.0378	0.6217
100	2.84	4.99	0.0189	0.0333	0.5676

Table 5: Effect of Temperature increase on Poisson's Ratio of laterized concrete for mix (1:2:4)

Temperature °C	ΔH (mm)	ΔV (mm)	EH	EV	N
40	4.05	6.29	0.027	0.0419	0.6444
60	3.61	5.83	0.0241	0.0389	0.6195
80	3.31	5.24	0.0221	0.0349	0.6332
100	2.42	4.06	0.0161	0.0271	0.5941

Table 6: Effect of Temperature increase on Poisson's Ratio of laterized concrete for mix (1:3:6)

Temperature °C	ΔH (mm)	ΔV (mm)	EH	EV	N
40	3.97	5.89	0.0265	0.0389	0.6812
60	3.59	5.74	0.0239	0.0383	0.624
80	3.27	5.09	0.0218	0.0339	0.6431
100	2.22	4.01	0.0148	0.0267	0.5543

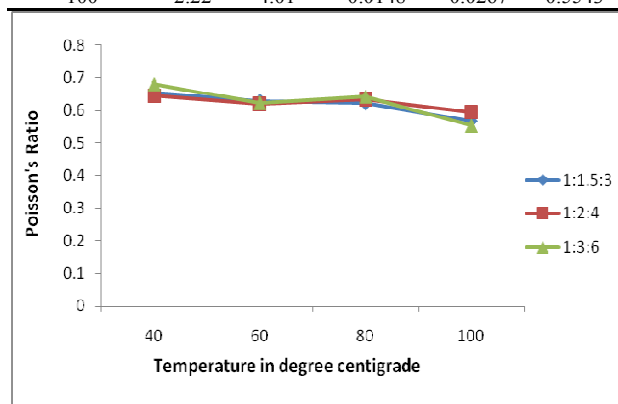


Fig 1 Effect of Temperature increase on Poisson's Ratio of samples

CONCLUSIONS

From the research work carried out on the effect of temperature on laterized concrete it is concluded that the Poisson's Ratio of laterized concrete (Terracrete) decreases with increase in temperature. This result is in line with that of conventional concrete. Temperature changes caused the horizontal strain and vertical strain to change. In general high temperature cause both horizontal and vertical strain to increase. Colder temperature causes both strains to decrease. The net effect on Poisson's Ratio was found to be small since both horizontal and vertical strain change by a similar amount.

RECOMMENDATION

Based on the conclusions above it is recommended that the design of laterized concrete structures take into account the variability of the properties with temperature levels as they could influence the structural behaviour, strength and stiffness.

BRIEF BIOGRAPHY OF AUTHOR

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BUILDING CAPACITY FOR SNAIL AND MUSHROOM FARMING IN RURAL COMMUNITIES OF IMO STATE, NIGERIA

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ABSTRACT

Obviously, food insecurity, diminishing quality of health and increasing environmental degradation are the three key underlying problems affecting the future well being of Mankind. Nigeria, despite having a majority of her population engaged in Agriculture still imports over 90% of her food products. Huge amount of money is invested in the health sector with a lot of people importing herbal drugs. There is also an urgent need to diversify the economy as Oil which is a limited resource is their major source of the country's revenue. Farmers in the rural areas lack the knowledge and capacity to engage in non Timber Forest Products (NTFP) that can serve both as money spinner and health builder. The involvement of farmers in rural communities of the three senatorial zone were evaluated, personal observations and interview of government agencies and stakeholders were also conducted. A structured questionnaire were sampled to 120 respondents in Eziudo, Ezinhitte Mbaise Local government area (Owerri zone), Umuagwo, Ohaji/Egbema Local government area (Orlu zone) and Isuochi, Okigwe Local government area (Okigwe zone) in Imo State respectively. Data obtained were analyzed using using descriptive statistics. Tables, percentages and graphs were also employed for the analysis. Findings revealed low level of involvement in snail and mushroom farming. Their involvement is hampered by information flow, ignorance of the importance of snail and mushroom farming, lack of funds/empowerment and skill in the management of such venture. Suggestions were made to address the fundamental strategies that can improve the introduction, practice and management of snail and mushroom farming in the study area.

KEYWORDS: snail and mushroom farming, rural communities, food insecurity, building capacity, non timber forest products

INTRODUCTION

Snails belong to the animal family known as *Mollusca*. They respire through the lung hence belongs to the group called *pulmonata gastropod*. In West Africa, snails dwell mostly in humid forest areas from where they are gathered by villagers for consumption and other uses (Ademosu and Omidigi, 1999). Obviously, there is no reliable documentation on when and where man started consuming snails as a food supplement but the practice of picking snail for food and selling the surplus as a source of income has been for a long time. Snails are sluggish in movement and very active at night.

Snail meat has a high medicinal value and has been a major ingredient in the diet of people living in high forest zone of Nigeria. The Snail meat can control hypertension and its blue liquid is used in stopping excessive bleeding from open wounds.

In Nigeria, there is the need to diversify the economy as agriculture potentials remains greatly underutilized. Snail farming can definitely be a veritable means of

generating income, reducing health problems and to achieve self sufficiency during difficult times as experienced in both rural and urban areas of Nigeria.

The need to enhance the mass production of Snails cannot be overemphasized because Snails can be reared both on a small scale and large-scale production systems (Elimsile, 1982). In recent times however, there is renewed interest in snail farming because of its vital role to good health, food security and sustainable rural livelihood.

Mushroom on the other hand, can be used to describe the fruiting body of a fungus (Ilori, et al., 1997). It is vital to reiterate that fruit bodies of fungi had been utilized as food for more than two thousand years now. Mushrooms are widespread in nature often cultivated traditionally by using palm wastes and *Sclerobolus* for household consumption. The practice of picking mushroom for food and medicine is common among the different tribes in Nigeria.

This practice although reported all-over the country is more pronounced amongst the Yoruba speaking people (Alabi, 1991).

Mushroom lack chlorophyll presents in plants and represents one of the world greatest untapped resources of food that is highly nutritious and medicinal. They are classified under subdivision *Basidiomycotina* and grow on dead and decaying material. Though, mushrooms are harvested by majority of tribes in Nigeria. However, due to past unpalatable experiences with poisonous species of mushrooms, many people are conscious about their safety in venturing into it. Thus, for the few species of *Pleurotus* and *Auricularia* that are common and easily identified, consumption or picking of wild mushroom is becoming unpopular.

It is saddening to see that people from all works of life associate mushrooms with negative events in Nigeria and most Africa countries (Yongabi et al; 2004; Akpaja et al; 2005). In recent time however, many Nigerians yearn for the commercial production of edible mushroom for food and medicinal needs. Mushroom cultivation is environmental friendly. Mushroom plays a pivotal role in sustaining eco-energy balance in nature (Jupponen et al., 2004). Be as it may, enhancing farmers capacity in a non-timber forest activities like Snail and mushroom production will not only boost the food and medicinal supplement of the people in the study area but also help in sustaining the over burdened environment. The issue of environmental degradation is quite critical in Imo State, where more than 80 % of the population depends on forest products for survival (NCF, 2000).

Nevertheless, Nigerian farmers are still ignorant of the high demand for snail and mushroom due to its food and medicinal benefits. They also lack the adequate skill, technology and even the capital in going into Snail and Mushroom farming.

This paper examine the essence and capacity building of Snail and Mushroom farming as regards to health, food, environmental sustainability and even means of livelihood in the study area.

IMPORTANCE, USES AND PROSPECTS OF SNAIL AND MUSHROOM FARMING IN NIGERIA.

A recent study shows that the *glandular substaitles* in edible snail meat cause agglutination of certain bacteria, which could be used in combating a variety of ailments including whooping cough. The giant African snail a common variety is said to have voracious appetite. They are known to eat at least 500 different types of plants including peanuts, beans, peas, cucumbers and melon. If fruits or vegetable are not available, the snails will eat a wide variety of ornamental plants, tree bark, and even paint and stucco on houses (Akinnusi, 1998; Akintomide, 2004).

Table 1. A Proximate composition of fresh snail meat

Nutrient	Value
Crude protein	18.20%
Carbohydrate	2.88%
Ether extract	1.36%
Fat	1.01%
Crude fibre	0.07%
Ash	0.37%
Nitrogen free extract	4.95%
Iron	12.2MG/100G
Water	74.06%
Other mineral constituents	60.5m/100g

Adapted from Ogbeide (1968), Wosu 2003.

The recent increase in the demand for animal protein consumption in Nigeria with continuous rise in inflation has made it unaffordable to an average Nigerian. There is therefore a general shift from animal protein to plant protein.

Table 2. The Nutritional Values of snail compared with other food animals (%)

S/N	Food Items	Carbohydrate	Protein	Fat	Ash	Water
1.	Snail meat	2.93	20.70	1.21	1.49	73.67
2 a)	Beef	—	17.5	22.0	0.9	60.0
b)	Pork	—	11.9	45.0	0.6	42.0
c)	Lamb	—	15.9	27.7	0.8	56.0
3.	Poultry	—	—	—	—	—
a)	Chicken	—	20.2	12.6	1.0	81.8
b)	Duck	—	16.2	30.0	1.0	68.6
c)	Turkey	—	20.2	20.2	1.0	79.3
d)	Dried fish	—	60.0	21.0	15.0	4.0
4	Milk	—	—	—	—	—
a)	Cow (whole milk)	5.0	3.5	3.8	0.7	87.3
b)	Goat	4.5	3.8	4.8	0.8	86.4
5.	Eggs	—	—	—	—	—
a)	White of egg small amount	10.5	Small amount	1.0	88.0	—
b)	Yolk of egg small amount	15.5	33.5	1.0	45.5	—

Adapted from Wosu 2003.

Note: Ash contains mineral

METHODOLOGY

Politically, the study area Imo state Nigeria is divided into 3 zones for administration. One rural community each were selected for this study. They are Umuagwo in Ohaji/Egbema Local Government Area (Orlu Zone), Eziudo Community in Ezinihitte Mbaise Local Government Area, (Owerri zone) and Isuochi in Okigwe LGA (Okigwe zone). A total of 120 structured questionnaires were randomly sampled and distributed in the study area. 40 questionnaires for each of the 3 rural agrarian communities. However, 8 of the questionnaire were unable to be retrieved. A total of 112 questionnaires completed by respondents were retrieved thus; Umuagwo 39, Eziudo 37 and Isuochi 36. Also, the researcher made use of personal observations, interview of stakeholder and leaders in the community to enhance the quality of this research.

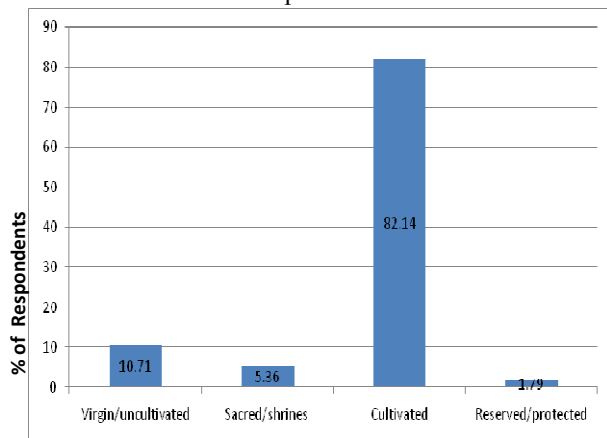
Table 5: Predominantly produced Agricultural products
The table below shows list of predominantly agricultural products in the three sampled rural communities of Imo State

S/N	Community	Agric Products	Availability
1	Umuagwo	Cassava, pineapples, snails, vegetable, Palm oil, mushroom, yam, plantain, bush meat etc	Seasonal
2	Eziudo	Cassava, vegetable, garden egg, snail, mushroom, palm oil etc	✓
3	Isuochi	Yam, cassava, snail, mushroom, plantain, Palm oil, bush meat etc	✓

Authors field work, 2014.

THE NATURE OF FOREST IN THE STUDY AREA

The nature of forest according to the respondents from the below chart shows that 82.14% is cultivated, 10.71% is virgin/uncultivated, 5.36% are sacred/shrines and 1.79% are reserved/protected areas.

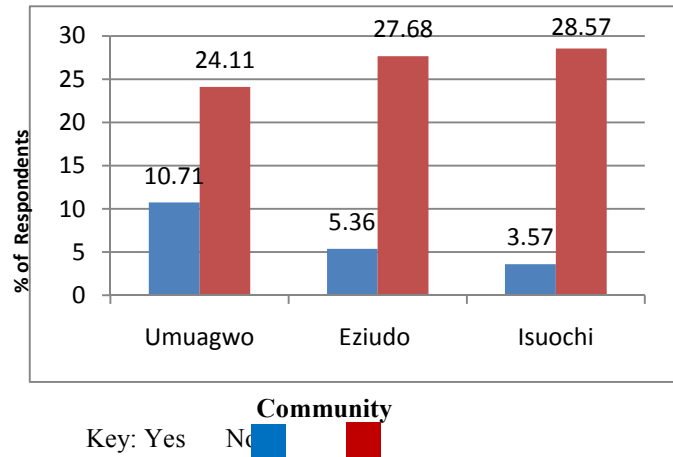


Source: Author's fieldwork, 2014.

Figure 2: Bar chart showing the nature of forest

PARTICIPATION IN SNAIL AND MUSHROOM FARMING

Figure 3 below shows respondent's participation in snail and mushroom farming in the study areas; only 19.64% respondents said they participate in snail and mushroom farming while a staggering 80.37% said they do not participate in snail and mushroom farming.

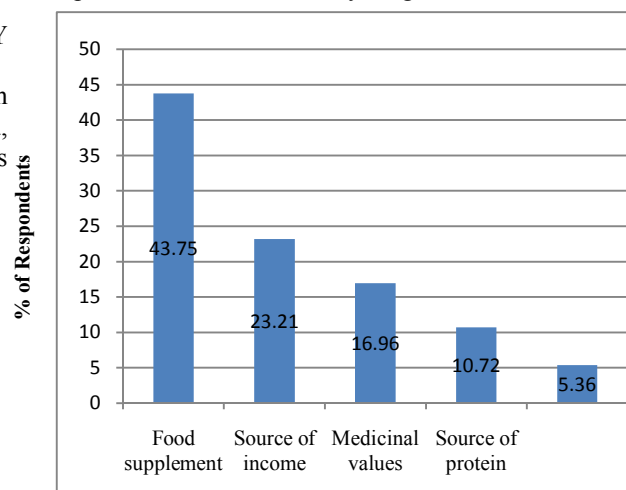


Author's fieldwork, 2014.

Figure 3: Multiple bar chart showing participation in Snail and Mushroom farming

Benefits of Snail and Mushroom farming

Findings from the field shows respondents perception of the benefits of Snail and Mushroom farming; 43.75% says it's for food supplement, 23.21% as source of income, 16.96% for medicinal values, 10.72% as source of protein and 5.36% for recycling of waste matter.



Author's fieldwork, 2014.

Figure 4: Graph Showing Benefit of Snail and Mushroom Farming in the study area

DISCUSSION AND CONCLUSION

From the findings of this research work, the following were reached; Snail and Mushroom farming is poorly practiced in the area of study. People engage more in exploitation of forest products while little attention is paid to Non-Timber Forest Products (NTFP) like snail and mushroom that are cheaper and environmental friendly. This is the reason for the high environmental degradation in the study area and in line with the assertion by NCF, 2000 (see page 2). There is a lot of ignorance as most farmers do not know the nutritional, medicinal and money spinning impact of this all important Non-Timber Forest Products (NTFP). There also abound potentials for farming of Snail and Mushroom in the study area. Capacity building strategies such as the ones recommended here will boost food security, source of revenue and good health for the study area in particular and the country at large.

There should be organization of talk shows on Television and Radios on the positive potentials of Snail and Mushroom farming. The government through her organs like the ministry of Agriculture should produce monthly newsletter, seminars and workshops. This will help to increase the awareness of the nutritional and medicinal benefits and reducing every cultural bias associated with Snail and Mushroom farming. Government on her own part should train more Snail and Mushroom scientist, set up a Regional or National centre for research in Non Forest Timber products (NTFP) like Snail and Mushroom where rural farmers can be trained. Attention of the farmers can then be shifted from the too much dependence on forest timber products which had degraded the environment to non forest timber products that helps to conserve and sustains the only one Environment.

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USE OF EXTERNAL SUN SHADING DEVICES IN NON-RESIDENTIAL BUILDING IN AKURE

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ABSTRACT

The amount of sun and heat entering the interior space of the building has a great effect on the persons dwelling within the very space. To achieve a balance between the amount of natural illumination entering the interior space and the amount needed, some measures were put in place in the write up, which was introduced in the design or made as part of the building structure. The paper also outlines the various methods used in sun control and external shading with Ondo State as a case study and Akure its state capital as the point of reference, giving the need for the application of the shading devices in the buildings selected as typologies. Results obtained showed that several methods could be used to achieve thermal comfort and excellent shading in buildings after several considerations had been put to test. It could be concluded that, although each methods of external sun control have its benefits, a combination of strategies works best and sustainability is achieved at a very low cost.

KEYWORDS: illumination, building structure, external shading, thermal comfort, sun control.

INTRODUCTION

The thermal performance of a building depends on several factors, such as site, orientation, materials and constructive components. Depending on the geographic orientation and the optical characteristics of glazing, these facades can cause an expressive accumulation of thermal energy density inside the buildings. This is translated into discomfort for the users, and/or energy consumption (Lechner, 1991). The use of new materials and constructive technologies by modern architecture, transformed the aesthetic and functional aspects. There was a new building design concept: skin skeleton buildings, envelope and structure had become dissociated. This characteristic allowed larger windows till the completely glazing facade, offer transparency and visual integration (Maragno, 2000). From the point of view of visual comfort, these larger windows are desirable. However, in hot climates, like in Brazil and some areas of Nigeria, it is very important to avoid as much of infrared radiation as possible, to minimize the greenhouse effect.

This paper investigates the thermal performance of different fixed external shading devices, considering the elements largely used in modern architecture buildings of Nigeria. The use of these architectural elements has a great importance in hot climates reducing the amount of direct solar radiation. Various conditions are considered and the best form of shading that will suite several forms of non-residential building in Akure considering the poverty level and taking a peek at the sustainability is discussed and determined.

METHODOLOGY

The study was carried out in Ondo state, located in Southern Western Nigeria with the National population estimated the state as 3,441,024. The state lies between longitudes 4°E and 6°E and latitude 5.45°N and 8.15°N. Akure was chosen specifically in Ondo state as it is a town in which most of the major development in the state is focused. Detailed description of the characteristics of the study areas was outlined. In order to ensure efficiency in the level of work done, data collected was analyzed based on the goal and objectives of study. Both primary and secondary methods of data collection were employed in order to find out the types and forms of external sun shading devices in use in the selected case studies and search out their effectiveness and effect on the individual in occupants. For the purpose of this study, the researcher chose Akure, Ondo state, because of its peculiar characteristics and features associated with the area, and cases of inadequate ventilation and heat control and shading, thus making the area a good case study.

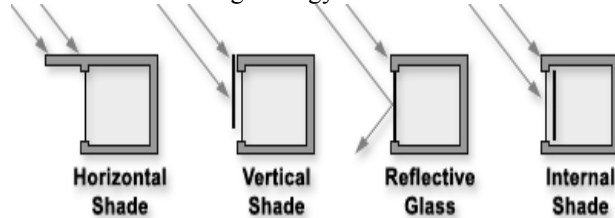
Sun shading, or the process of controlling the sunlight entering a building, can be accomplished through a number of different methods. The techniques employed generally depend on the climate and the use of the space. For instance, in climates with a high cooling load, sun entering the space can increase cooling energy use, whereas in heating climates, the excess sun may be desirable, but glare and high contrast ratios may make it difficult for occupants to work.

There are well established companies that can fabricate almost anything you want, but they cannot tell you the best solution for your building. You have to design the installation. As you do, consider the following factors: Shading Effectiveness, Effect on View, Daylighting Potential, Passive Heating Potential, Appearance, Longevity, Attachment to the Building, Removable Shading, Method of Control, Envelope Penetrations, Fire Egress, Property Lines and Setbacks, Determine the Azimuth Accurately.

Types of Sun Shading Devices

Shading devices are divided into two major types namely: Internal Shading devices and External Shading Device and it may be fixed or movable. Apart from these two major types the division can be further divided into smaller part forms but we will be dwelling majorly on external sun shading devices.

Fundamental Shading strategy



Source: Ecotest community wiki, 2011

Examples of External Sun Shading Devices

a) Projecting Horizontal Shelves.



b) Balconies.



Sources: Google image, 2011 and Researchers field work, 2011 and Google images, 2011

c) Eaves and Overhangs



Sources: Google images, 2011

d) Inset Windows.



Source: Google images, 2011

e) Vertical Fins



Source: Researchers Fieldwork, 2011

f) Fixed Louvers



Source: Google images, 2011

g) Awnings



Source: Google images, 2011

h) Mesh Materials



i) Roll-Up External Blinds



Source: Google images, 2011

j) Tree Shading



Relevance and Application of Sun Shading Devices

Among the primary types of buildings that can benefit from the application of shading devices are:

- Barracks and other multi-family housing projects, especially in temperate or warm climates;
- Offices, administration buildings, and other structures employing daylighting; and,
- Nearly any structure in warm, sunny climates requires sun shading to achieve a better and more livable dwelling.

The relevance of ventilation, sun shading and thermal control in the design process cannot be neglected nor overemphasized. However, for concerned professionals

to achieve the desired results of natural ventilation and heat control in residential buildings, it is necessary to conduct an adequate study of existing problems in residential buildings as pertaining to natural ventilation and solar control. This will enable the productive and effective solving of ventilation and heat control problems in buildings.

Geographical Features

The general landscape feature of the area is generally plain and vegetated with trees dotted with some outcrops of rock and natural features on the succinct of the area, as the whole structure of the area follows the road structure making use of linear settlement pattern.

Climatic Features

There are climatic elements in various zones which vary from location to location. These climatic elements and their distribution are in one way or another being affected by some climatic factors such as altitude, continentality, prevailing winds, slope, insolation, natural vegetation and soil. The inhabitants are mostly concerned with the general outdoor temperature and precipitation (rainfall). They are probably the two familiar things about the atmosphere that are objectively noticed most readily and which have the greatest impact on our everyday life. Of a truth, they are important in describing the climatic condition of a region and have a far reaching impact but other climatic elements that contribute to the weather cannot be over-emphasized.

However, the prevailing climatic elements in Akure that would be made mention of in this paper include: Solar radiation, Temperature, Wind, Humidity, Rainfall

1. **Solar Radiation:** The sun reaches the earth through a process known as *insolation*. Some parts of the earth receive more energy than they emit or radiate (Adeleke, 1976); In this part of the world, that is what we refer to as *net gain* while the other parts that receive less energy than they radiate can be said to have *net loss*. Moreover, the net gain and the net loss areas could have been too hot and cold respectively for human comfort but this has been heated through the balance made by the wind and river currents which blow the excess energy in the areas with net gain to the areas where we have net loss. The area of study happen to be a net gain area, has a high intensity of solar radiation and the state in which the town is located is referred to as the sunshine state probably because of the nature of its Solar Radiation.
2. **Temperature:** Temperature in Akure follows a constant pattern throughout the year and it is often high. The annual mean temperature is about 27°C and the range for the average monthly temperature is small, about 3°C (Meteorology department, Lagos 2004). The diurnal range is about 8°C daily. When the intensity of sun is very high, the maximum temperature is about 34°C with extremes about 38°C. Monthly range of temperature is very small in the mountainous part of S.W Nigeria. The average temperature is lower, decreasing by about 3.5°C per 100m ascent. Diurnal amplitude may be more than 15°C.
3. **Winds:** Wind can simply be defined as the air in motion and has both direction and speed. Wind is made up of a series of gusts and eddies

that can only be felt but not seen. Akure is affected by three types of wind.

- **Tropical Continental Air Mass**
 - **Tropical Maritime Air Mass**
 - **Equatorial Easterlies**
4. **Humidity:** The vapour content of the atmosphere in Akure is high, hence a high humidity of 25mmHg and could rise to 30mmHg and a frequent relative humidity of 90% or above. Cloud conditions determine the intensity of direct or diffused solar radiation. Reflected radiation from the ground is usually low as vegetation is dense and the soil is damp, which encourages insect breeding and fungal growth.
 5. **Rainfall:** Rainfall is usually high during most part of the year with daily incidence being very regular. Normal temperature drops slightly with rainfall. Akure is characterized with convective precipitation caused by the convergence of trade winds from the north and south hemisphere on the equatorial zone, causing it to rise at the inter-tropical front (ITF) while expanding and cooling at the same time. Rainfall is usually accompanied by violent electric storms. In Akure, the long wet season starts in mid-March and last till July while the short wet season, follows the August break and lasts from September to October.

Use of Sun Shading Device in Akure

For the purpose of carrying out a good and solid appraisal of use of external sun shading devices in non-residential building design in the chosen study area; two different typology were selected, analyzed and comparison were made among them. The effectiveness of their shading methods on the building fabrics and the comfort to be derived in the building were considered in line with their use. A critical study of the buildings was done and an oral interview of some of the personnel was carried out.

The criteria used for assessing the building include: the building orientation in relation to north-direction, the accessibility of the building, material used for construction of components most especially the means of sun shading such as: glazing, horizontal or vertical fins, etc. Presence of landscape elements, positioning of the external openings, presence of shading devices and so on were also considered.

In the general view, there are a lot of commercial and administrative building in the area of study making use of diverse shading techniques and types, below is an analysis of the manner and type of external sun shading devices being utilized in the area.

RESULTS AND DISCUSSION

From the study of the two different typologies the following could be deduced from each:

TYOLOGY ONE (TISCO BUILDING)



Tisco Building, Alagbaka Akure
Source: Researchers Field work, 2011

The building was as observed or deduced to be planned as a commercial residential building as the topmost floor was designed to be a residential apartment, leaving all other floors as the commercial area with the mega supermarket on the ground floor of the building.

The building is a six floor building, having one major stair-hall and no lift system, it house about 36 different occupants involved in majorly commercial and administrative activities. The building does not make use of artificial lighting system, but diverse of the occupant are left with the responsibility of getting their own supply especially when the Power Holding Company of Nigeria are not forth-coming, but they still have one mains. The building was majorly a frame structure that had been partitioned by wooden platforms to be able to achieve maximum utilization of the spaces and for proper allocation of space.

The building is located with its longer side tilted towards east a little from the north at about 15^o, shielding the rising and the setting sun with its massing concrete structure at both ends. It is located precisely on Latitude 7^o15'13.32"N and Longitude 5^o12'57.17"E. It easily accessed as it is located just by the dual carriage road and en-route Fiwasaye Girls School Round-about and First Bank Round-about.

The shading strategy utilized is majorly external, although some internal shading was not neglected like window blinds and venetian blind, majorly for interior beautification. The building incorporated its shading device in its structural element as it made use of horizontal shelves made of concrete projecting out from

the vertical wall of the building and also forming an L shape with its downward projection.

The Effectiveness of this particular shading strategy is well shown as the coolness achieved in the interior of the building but this also took its toll on the lighting of the interior space since the building shading strategy was planned not putting in mind the partitions that were later introduced in the building, which shaded effectively some parts of the building making them develop into dark lobbies as shown in the diagram below:

The view of the building is not affected by this type of shading device rather is it complemented it in aesthetically with its appearance adding some colour contrast to the main colour of the building. In terms of the longevity of the usage of the shading device which has been from the start of the building about 25 years ago shows how fixed the shading device is. Although to its detriment, it cannot be detached from the building during hot season when interior of the building is hot, which also is of a little advantage since it is a concrete structure it tend to absorb some of the heat being casted on it by the sun.

TYOLOGY TWO (IYE-OMA PLAZA)



Iye Oma Plaza, Alagbaka Akure
Source: Researchers Field work, 2011

The building is located with its Front tilted towards east a little from the north at about 21^o, shielding the rising and the setting sun with its full glazing skeletal structure at both ends and in front. It is located precisely on Latitude 7^o15'18.63"N Longitude 5^o13'11.24"E. It easily accessed as it is located just by the dual carriage road, en-route Fiwasaye Girls School Round-about.

The shading strategy utilized is majorly external, although some internal shading was not neglected like window blinds and venetian blind, majorly for interior beautification in this building too. A full glazing in the

front view was employed and casement windows of about 900mm in height running through the length of the side of the building at the ground floor forming an extension from the glazed façade and also on the other floors, the height of the one on the other floors was about 1200mm showcasing a stylish block building that has intermittent breakage with glazing.

The glass utilized is a reflective tinted glass about 200mm thick, this help reflect the sun rays that are incidenting on the building face to be reflected back into the atmosphere leaving the interior of the building cool and workable. The tint in the glazing material also gave the interior of the building some shade that are also encouraging. As the major activity being carried out in the building is commercial, the shading device worked out ok, but to further compliment the glazing material, venetian blind was utilized in the space. Also since the building is a whole complex for just one company it was easier to partition the building interior with dwarf aluminium partitions making use of wooden panel at the base and glass at the top; leaving the lighting penetration sharp and ok also since the building is not too big it also gave room for proper illumination needed, although the company make use of artificial lighting and ventilation majorly.

The effectiveness of the shading was properly treated in this particular choice of their shading strategy. The choice of shading was actually the best as it gave the building the catching and a contemporary view and tends to be long lasting as it was hinged and fixed to the metallic frame created on the external face of the grid system building. This particular type of shading is of the removable type, which gives room for changing the form, style, shade or tint and so on. Even in a situation in which there is power outage, the glazing materials are such that can be opened to allow for ventilation.

Factors to Consider in Choosing External Sun Shading Device in Akure

As deduced, the major factor that is really required to be considered when choosing external sun shading devices is the **orientation of the building** on the site which determines the way and manner in which the sun will be hitting the face of the building. Considering the case study one in which the longer face is shielded away mostly from the rising and setting sun in the East and West respectively by tilting the building slightly afforded the opportunity for a very cool interior and at the same time good illumination. The best for the area is the orientation of the longer side of the building to face the North or South to reduce the ray of penetration of sun and heat. Apart from orientation, the **size and shape of fenestration** used in the building most times necessitate the use of external sun shading device,

which is especially for large windows mostly used in non-residential buildings. Another factor of importance is the **nature of activity** to be performed in the interior space which dictates the amount of illumination and ventilation, also the thermal comfort that should be achieved in the interior space.

Choose light-colored window coverings for best **energy savings and comfort**. Affording users the opportunity to choose interior window treatments, which invariably make room for occupants to make adjustments for individual comfort needs. The mechanical engineer should perform **calculations** that include shaded windows, but acknowledge that not all shading systems will be deployed when needed.

Shading devices modify the **intensity and distribution of daylight** entering the space. Lighting design scheme and placement of control zones may be affected. Proper shading devices can be partially or fully paid for by reduced cooling equipment and cooling energy costs. However the likelihood of proper use by occupants must be accounted for. **Construction costs** for the shades and Cost of the Material for construction needs to be borne in mind so as not to run in debt and considering the fact that poverty is on the high side, an effective but also cost efficient method is encouraged. The last factor to be mentioned is the **Client**, who is the major determinant of whatever would be done on his site should be carried along when designing and costing the building. Good shading means occupants will have minimal complaints. Shading reduces glare. Exterior elements partially shield occupants' view of the bright sky. Screens, glazing treatments, and shades reduce the brightness of the window. Exterior elements and venetian blinds reduce contrast by sending some light deeper into the space (improving distribution). (*Tips for daylighting with windows, 2011*)

CONCLUSION AND RECOMMENDATIONS

Considering the nature of the atmosphere and the weather condition of the area of study, it is would be noted that the temperature is relatively high during the day and cool at night, but the major time of activity is during the day between 8:00am and 4:00pm of which temperature will be high especially at mid-day. The poverty stricken nature of the area is also worthy of note as it is a great influence to what and how buildings are and what is done to them. Putting all these factors into play, it was considered that the major type of external sun shading device that would best fit in the area of study (Akure) would be:

- Projecting Horizontal Shelves
- Eaves and Overhangs for complex shaped commercial buildings

- Fixed Louvers major Horizontal louver shading and egg crate louvers
- Vertical and horizontal fins being combined and;
- Tree shading for buildings that are not of high rise nature and for keeping the parking space of the building cool at all times.

All these are dependent on the type of design that was carried out and anyone of the above would be very effective in Akure metropolises. Although each methods of external sun control have benefits, a combination of strategies usually works best, because different strategies may be appropriate for each orientation of the building. It is hereby recommended that shading should be considered from the onset of the project, which will result in a more integrated, sustainable and attractive design, without necessarily posing a threat to the purse of the average citizen.

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SEDIMENT HEAVY METALS DISTRIBUTION IN RELATION TO GRAIN SIZE AT JOHOR PORT: EAST COAST PENINSULAR MALAYSIA

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ABSTRACT

A total of twenty (20) surficial sediment samples were collected from Johor Port, East Coast of Peninsular Malaysia on May 2014 by using Smith McIntyre grab. These sediments were analyzed for its grain size using particle size analyzer (PSA) to find out the relationship between grain size and heavy metal concentrations. The concentration of heavy metals were measured from the 63 μm fraction of the dried sediments and analyzed using ICPMS. The heavy metals studied were: Fe, Mn, Zn, Cr, Cu, Ni, Pb, As, Co, Cd and Hg. Results showed that the study area was dominated with silt loam (90%) and same percentages of loamy sand (5%) and sandy loam (5%). Based on the results, generally the sediments in the study area were fine. For heavy metals concentration, Fe concentration ranged from 3.52–4.70%, 75.28–411.96 $\mu\text{g/g}$ for Cr, 18.86–1886.05 $\mu\text{g/g}$ for Mn, 4.56–10.66 $\mu\text{g/g}$ for Co, 15.47–314.85 $\mu\text{g/g}$ for Ni, 25.15–212.72 $\mu\text{g/g}$ for Cu, 86.22–721.36 $\mu\text{g/g}$ for Zn, 10.18–19.68 $\mu\text{g/g}$ for As, 0.38–1.26 $\mu\text{g/g}$ for Cd, 38.91–138.61 $\mu\text{g/g}$ for Pb and 0.10–0.49 $\mu\text{g/g}$ for Hg on dry weight basis. The trend of mean concentrations of these heavy metals in a decreasing manner was: Fe > Mn > Zn > Cr > Cu > Ni > Pb > As > Co > Cd > Hg. Enrichment factor (EF) is used to evaluate the dominant source of the elements and as indication of pollution. The mean EF for Cr, Mn, Co and Ni shows a deficient or minimal enrichment which indicated that these heavy metals were of natural origin. Moderate enrichment for Cu, Cd and Hg was observed which is an indication of minor enrichment while As, Zn, and Pb, shows a significant enrichment which is an indication of anthropogenic sources.

KEYWORDS: sediments, heavy metals, grain size, Johor Port, Malaysia, pollution

INTRODUCTION

Heavy metals are one of the most serious pollutants in our natural environment due to their toxicity, persistence and bioaccumulation problems (Tam and Wong, 2000). Heavy metals are non-degradable and are detoxified by binding to certain proteins or metallothionein or depositing them as granules. All heavy metals exists in surface water in colloidal form, particulate and dissolved phases, although dissolved concentration are generally low (Kennish, 1996). Pollution or contamination may come from atmospheric inputs, natural disasters and also anthropogenic activities. The anthropogenic activities are one of the major contributors towards pollution such as mining and industrial processing of ores and metals also one of the factors that may contribute to the contamination of the river.

Sediments are considered as an important indicator for environmental pollution; they act as permanent or temporary traps for materials spread into the environment (De Gregori *et al.*, 1996). Another important factor that influences heavy metal concentration in sediments is the geochemical properties

of the sediment. It has shown that the amount of heavy metal retention in sediment is affected by sediment characteristics such as; grain size, cation-exchange capacity (CEC), organic matter and mineral constituents (Vertacnik *et al.*, 1995). Average contents of most elements increase with the decrease of grain size due to high surface area to grain size ratio. Few studies (Kamaruzzaman *et al.*, 2002) found that metal concentrations in sea water within South China Sea off Kemaman coast region are generally comparable except in certain areas that may be polluted by certain metals due to agricultural, industrial run-off and effluent discharges. This study was conducted to assessed pollution status in the study area.

MATERIALS AND METHODS

Description of the Study Area

Johor Port is located at the southern-most tip of Peninsular Malaysia. It is near the town of Pasir Gudang and close to Singapore-Johor Strait known as the Tebrau Strait, a narrow sea that separates Johor, Malaysia with Singapore which is approximately about 60km between the mouth of Sungai Pulai and mouth of Sungai Johor.

Johor Port is most strategically positioned in the heart of the sprawling 8,000-acre Pasir Gudang Industrial Estate. Pasir Gudang Port is linked to the important commercial and also industrial centers in Malaysia as well as other ports and neighboring countries. Nowadays, Pasir Gudang Port is the largest palm oil terminal in the world, ranked 6 out of 35 worldwide LME accredited ports, and the main gateway for Southern Malaysia's import/export requirements. Johor Port is also near Johor Bahru city central area, industrial area and a wide range of development area. This made the sources of

water pollution problems that occurs in Johor Strait. Johor Port also is a strategic route for trading ships.

Collection of Samples

Surface sediment samples were collected from 20 stations using a Smith McIntyre grab. The sediments were taken from the middle of the grab with plastic scope to avoid contamination then was put in an acid-washed plastic bag and kept frozen until ready for analysis. Figure 1 shows the location of sampling stations in the study area.

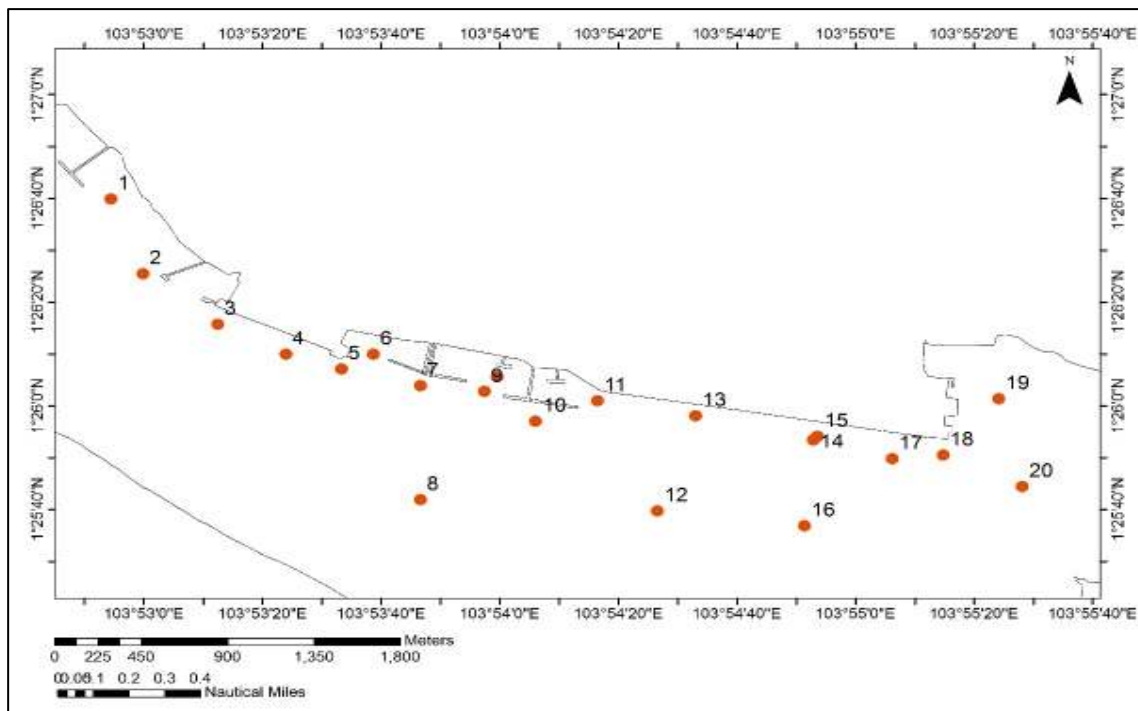


Figure 1: Location of stations in the study area

SAMPLE PREPARATION

The sediment samples were dried at 150°C for 7 hours then lightly ground to break up the particles and sieved through a 63µm mesh. The samples were then kept in a cleaned polyethylene bottles.

DETERMINATION OF HEAVY METALS

Microwave Digestion

Sediment samples were digested for metal contents following standard methodologies with some modifications (Kamaruzzaman, 1999). The digestion procedure involved heating of 0.05g sediment sample in a sealed Teflon vessel with a 1.5ml mixed acid solution of concentrated HNO₃, HCl and HF with 3:3:1 ratio. The vessel was heated at 150°C for 7 hours. After cooling to room temperature, the digested sample was transferred into 15ml centrifuge tube and diluted to 10ml with ultra-pure water. For the validation method, a

certified reference material NBS 1646a estuarine sediment was analyzed and digested to determine the recovery levels and accuracy of heavy metal analysis. The recoveries for all metals ranged between 91.08 – 137.5% with slightly higher recoveries obtained for Pb and Hg. Heavy metals were analyzed using an inductively-coupled plasma mass spectrometer (ICP-MS). A certified reference material, estuarine sediment (NST1646a) was used as a precision check. The percentage of recoveries for certified and measured concentration was satisfactory, with recoveries of 81.66 – 118.48%.

RESULTS AND DISCUSSION

Table 1 shows the concentrations of heavy metals in the study area.

Results showed that Fe ranged from 3.52 – 4.70%; 75.28 – 411.96µg/g for Cr; 18.86 – 1886.05µg/g for Mn; 4.56–10.66µg/g for Co; 15.47 – 314.85µg/g for Ni; 25.15 – 212.72µg/g for Cu; 86.22 – 721.36µg/g for Zn; 10.18 – 19.68µg/g for As; 0.38 – 1.26µg/g for Cd; 38.91 – 138.61µg/g for Pb and 0.10 – 0.49µg/g for Hg. Highest concentration of Fe, Zn, Cd and Pb were recorded at station JB19 with values of 4.70%, 721.36µg/g, 1.26µg/g and 138.61µg/g, respectively. Furthermore, the highest concentration of Cr, Co, Ni was found at station JB7 with values of 411.96µg/g, 10.66µg/g and 314.85µg/g, respectively. Highest concentration of Cu and Hg can be found at station JB6 with values of 212.72µg/g and 0.49µg/g. Mn and As however, were found to have highest concentration at stations JB17 and JB12 with values of 1886.05µg/g and 19.68µg/g, respectively. Taking into account that Johor Port is one of busiest port in the region, significant increase in the concentration of heavy metals cannot be hide. The used of antifouling paints that protect vessels from microorganisms which can be washout and being leached from the paints could elevate the heavy metals in the study area. The highest concentration of As in JB10 reflects from agricultural activities such as palm oil plantation. It is known that many agricultural products needed such as; fertilizers, pesticides, insecticides and others contain As in various forms in high concentrations. In addition as Johor Port is a main hub for bulk operation, such as grain, iron ore and coal, this could elevate higher concentration of As. As is a

natural component of Pb, Zn, Cu and gold-bearing ores and consequently can contaminate the sediment during mining and smelting operation. For Pb however, the atmospheric deposition of Pb mainly focuses in station JB19 through emission from automobiles. In addition, the traffic intensity in and around the Johor Port carrying bulk goods can significantly contributed to the significant enrichment of Pb in the area. Furthermore, leaded fuel, lubricating oil and grease from anchored boats transporting the goods are possible sources of Pb.

Lowest concentrations of Fe and Cr can be found at station JB10 with values of 3.52% and 75.28µg/g, respectively. The lowest concentration of Mn, Co, Ni, Cu, Zn and Pb were found at station JB12 with values of 18.86µg/g, 4.56µg/g, 15.47µg/g, 25.15µg/g, 86.22µg/g and 38.91µg/g, respectively. As for As, lowest concentration can be found at station JB9 (10.18µg/g). The lowest concentration of Cd can be found at station JB8 (0.38µg/g), while for Hg, lowest concentration was found at station JB7 (0.10µg/g). The lowest and highest concentrations of heavy metals might be due to the texture and mineralogy of the sediments in the study area (Table 2).

The trend of mean concentrations of heavy metals was Fe > Mn > Zn > Cr > Cu > Ni > Pb > As > Co > Cd > Hg. Figures 8 to 10 show the spatial distribution patterns of %sand, %silt and %clay in the study area.

Table 1. Heavy metals concentration in surface sediment of Johor Port (µg/g dry weight) and % for Fe

	Fe	Cr	Mn	Co	Ni	Cu	Zn	As	Cd	Pb	Hg
JB1	3.98	77.88	1053.05	8.79	41.06	123.38	261.09	12.69	0.61	63.44	0.19
JB2	4.09	80.52	1227.54	8.91	41.72	99.40	273.24	12.10	0.65	58.07	0.19
JB3	3.66	75.67	942.91	9.18	46.26	90.94	255.70	10.55	0.68	61.01	0.12
JB4	3.94	71.79	1864.54	8.03	38.05	85.06	252.78	14.06	0.63	57.16	0.19
JB5	4.37	90.18	1594.06	8.18	49.70	99.60	310.68	14.38	0.61	54.44	0.30
JB6	4.31	189.74	189.46	7.92	234.59	212.72	689.65	11.65	1.01	80.10	0.49
JB7	3.72	411.96	934.65	10.66	314.85	101.19	259.20	10.42	0.53	46.72	0.10
JB8	3.77	81.79	1151.09	8.37	37.97	60.24	182.10	11.65	0.38	47.90	0.13
JB9	3.81	86.64	788.54	7.55	51.38	100.00	327.85	10.18	0.68	53.74	0.16
JB10	3.52	75.28	276.00	7.88	45.20	61.00	207.79	15.52	0.50	55.58	0.15
JB11	3.63	90.16	958.33	7.64	38.69	79.76	275.58	11.23	0.51	56.33	0.17
JB12	3.85	81.72	18.86	4.56	15.47	25.15	86.22	19.68	0.48	38.91	0.15
JB13	4.00	90.81	781.07	10.56	49.90	80.28	277.90	13.53	0.60	74.74	0.26
JB14	4.06	88.73	1422.31	8.95	36.65	77.29	302.58	13.67	0.64	78.07	0.16
JB15	3.89	92.52	884.69	10.66	45.73	85.09	284.08	13.24	0.76	68.37	0.15
JB16	4.05	83.98	729.62	10.34	38.77	54.47	165.00	14.63	0.41	61.81	0.14
JB17	3.83	88.68	1886.05	8.18	35.56	71.51	298.42	12.10	0.60	65.41	0.15
JB18	4.04	82.22	1736.11	9.15	33.73	73.21	293.44	13.41	0.60	65.66	0.14
JB19	4.70	124.78	598.04	10.30	54.31	152.55	721.36	13.45	1.26	138.61	0.27
JB20	4.08	97.95	1025.15	9.89	41.01	67.70	249.31	14.04	0.41	61.11	0.14

Spatial Distribution Patterns of Heavy Metals in the Study Area

Figures 2 to 7 show the distribution patterns of heavy metals in the study area

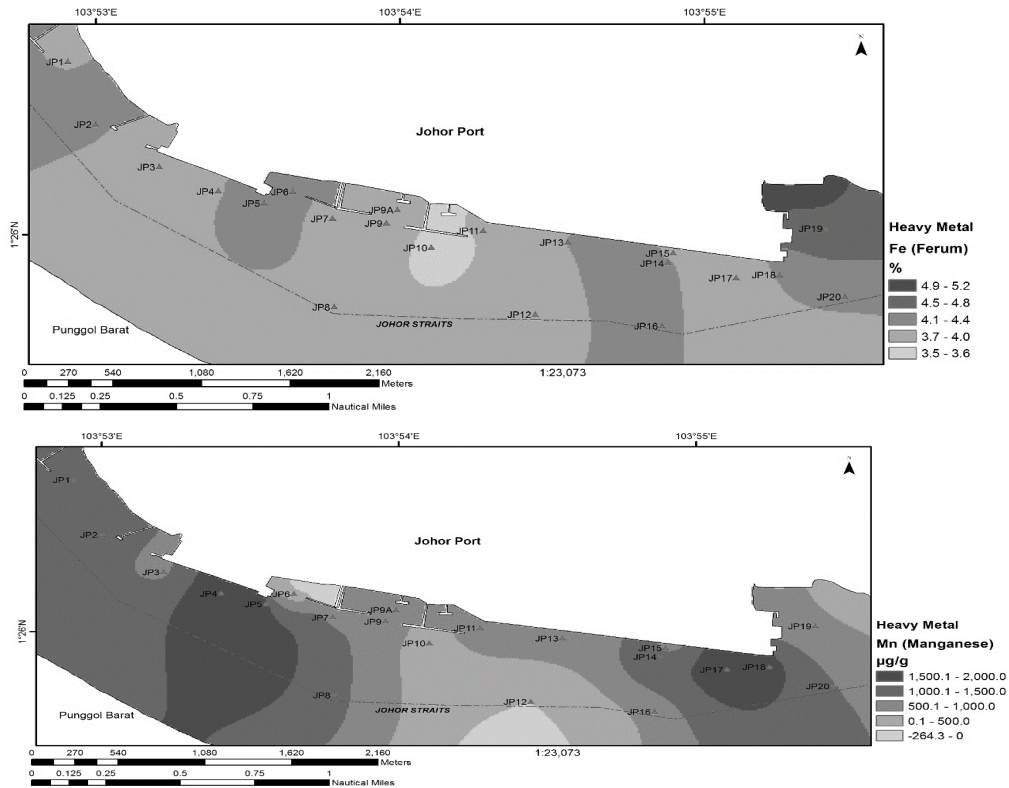


Figure 2: Distribution patterns of (a) Fe and (b) Mn at Johor Port

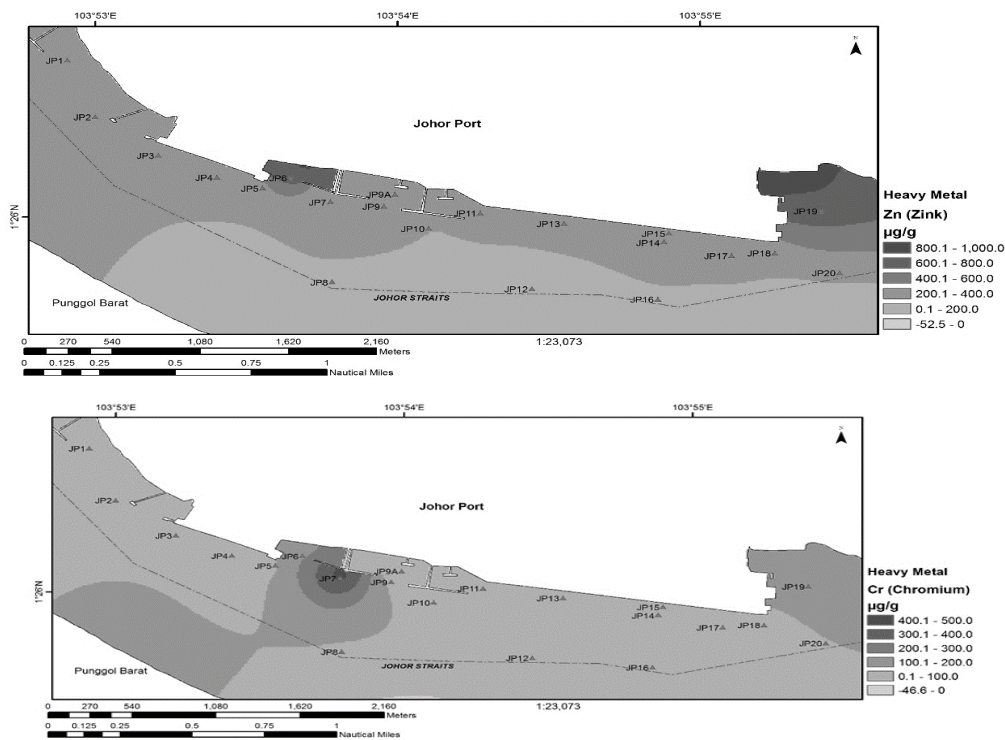


Figure 3: Distribution patterns of (a) Zn and (b) Cr at Johor Port

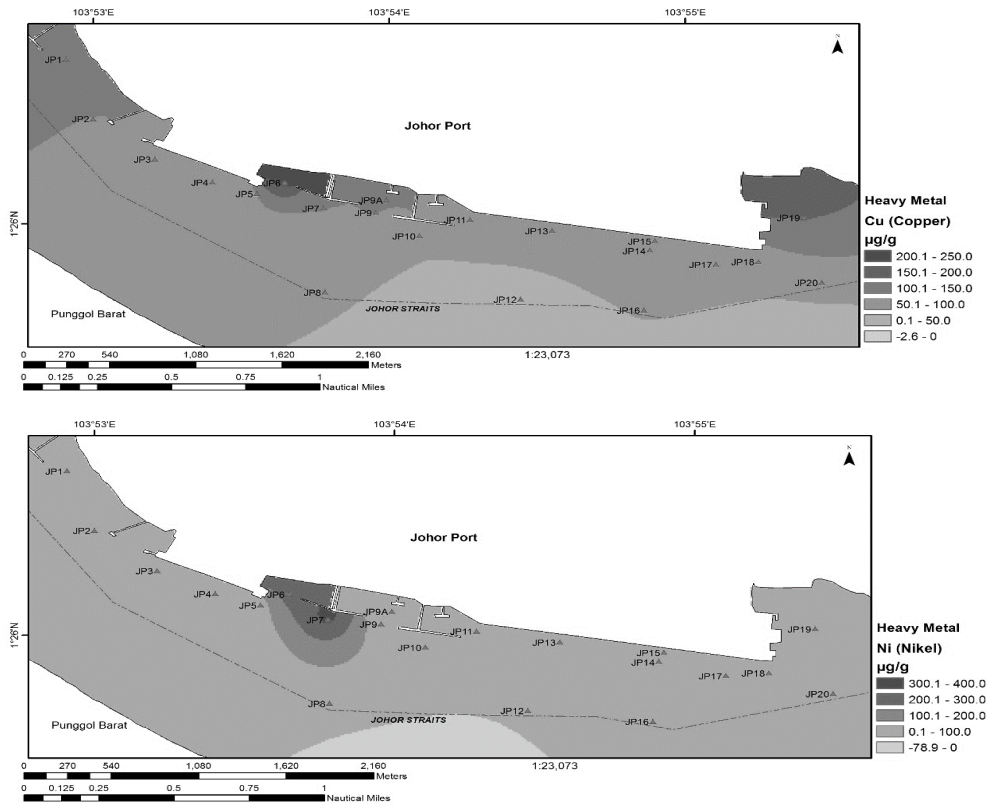


Figure 4: Distribution patterns of (a) Cu and (b) Ni at Johor Port

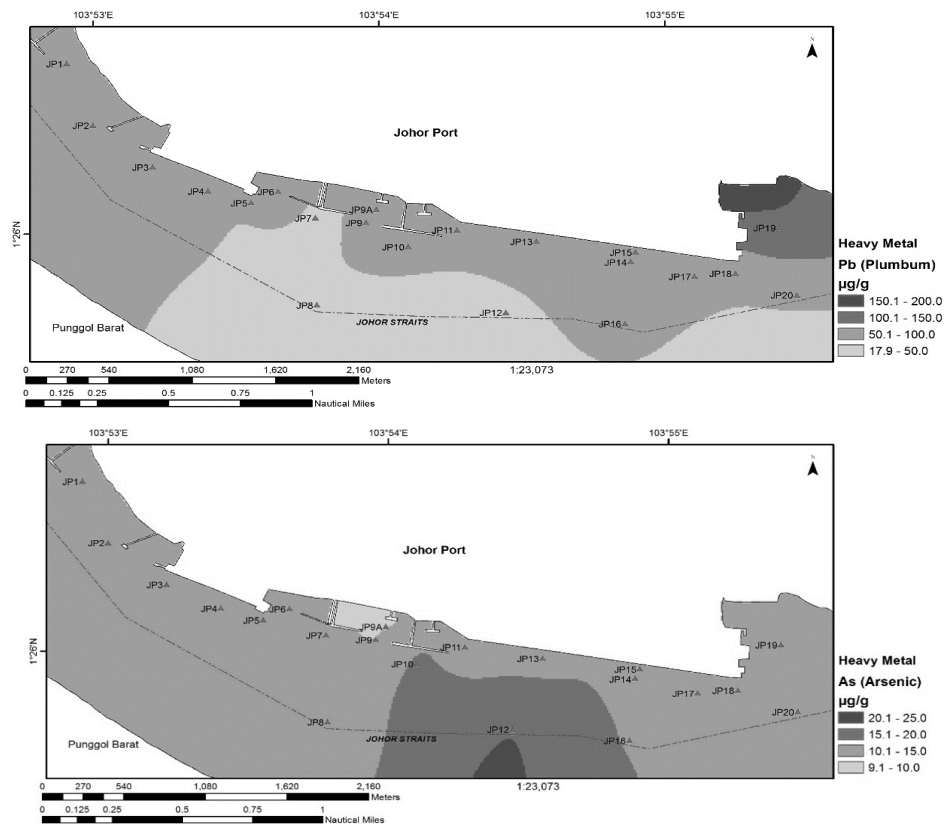


Figure 5: Distribution patterns of (a) Pb and (b) As at Johor Port

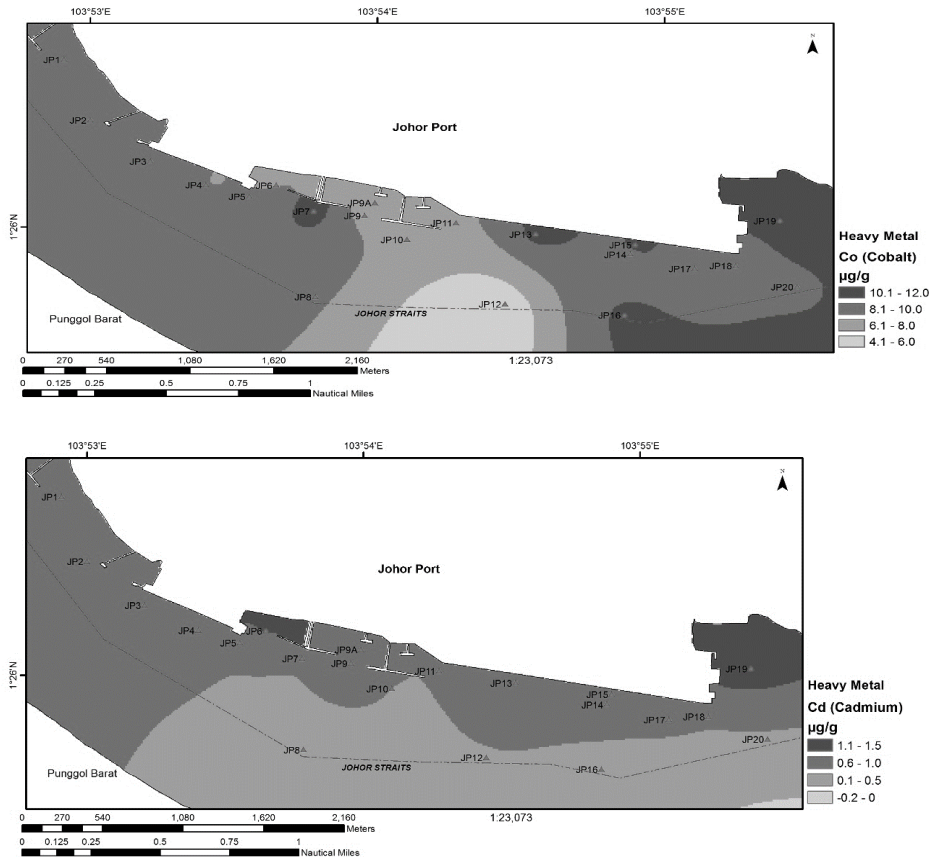


Figure 7: Distribution patterns of Hg at Johor Port

Table 2. %sand, %silt and %clay and textural classes of the sediments in the study area

Station	% Sand	% Silt	% Clay	Sediment Texture
JB1	16.76	64.9	18.34	Silt Loam
JB2	7.14	75.05	17.81	Silt Loam
JB3	12.69	72.76	14.55	Silt Loam
JB4	18.38	65.05	16.57	Silt Loam
JB5	5.23	75.52	19.25	Silt Loam
JB6	19.05	70.42	10.53	Silt Loam
JB7	14.06	71.49	14.45	Silt Loam
JB8	6.69	73.99	19.32	Silt Loam
JB9	21.03	61.81	17.16	Silt Loam
JB10	84.24	13.36	2.4	Loamy Sand
JB11	27.47	59.07	13.46	Silt Loam
JB12	33.08	54.07	12.85	Silt Loam
JB13	9.13	67.09	23.78	Silt Loam
JB14	26.73	59.07	14.2	Silt Loam
JB15	6.65	75.25	18.1	Silt Loam
JB16	30.06	56.06	12.88	Silt Loam
JB17	7.44	71.87	20.69	Silt Loam
JB18	8.99	70.14	20.87	Silt Loam
JB19	14.65	65.8	19.55	Silt Loam
JB20	61.61	32.67	5.72	Sandy Loam

Spatial Distribution Patterns of %sand, %silt and %clay in the Study Area

Figures 8 to 10 shows the distribution patterns of %sand, %silt and %clay in the study area

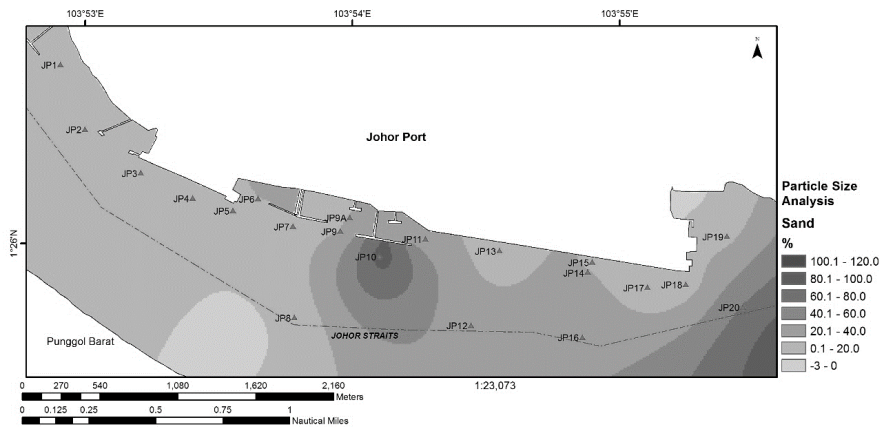


Figure 8: Distribution patterns of %sand in the study area

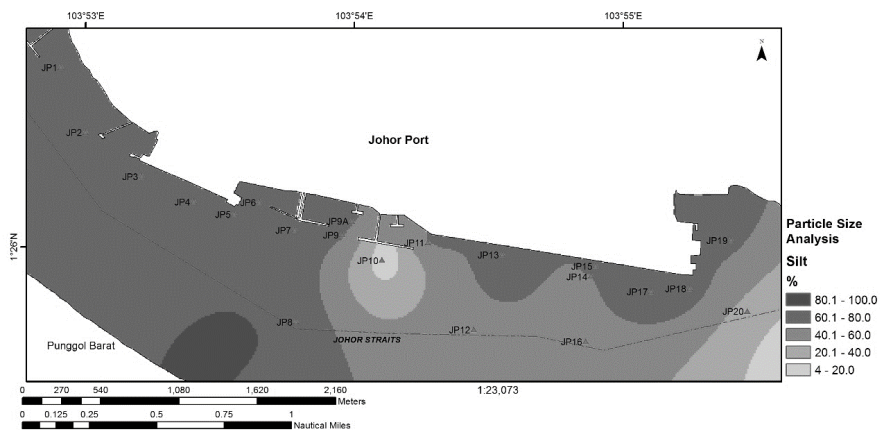


Figure 9: Distribution patterns of %silt in the study area

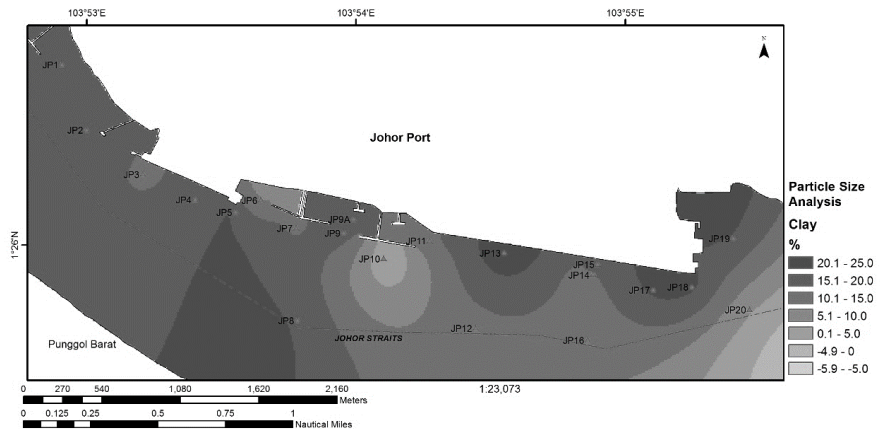


Figure 10: Distribution patterns of %clay in the study area

CONCLUSION

In general, higher levels of heavy metals studied were found at stations with fine texture. Fine sediments absorbed most heavy metals due to its binding agents like clay and organic matter. Lower concentrations of

most heavy metals are found in areas which have coarser sediments. In general, coarse sediments holds less heavy metals compared to fine sediments. Enrichment of heavy metals like Pb and As might be

due to anthropogenic sources like emissions from vehicles and agriculture activities

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PUBLIC-PRIVATE PARTNERSHIP IN SUSTAINABLE TOURISM DEVELOPMENT: A PANACEA TO POVERTY ALLEVIATION IN CROSS RIVER STATE, NIGERIA

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ABSTRACT

One of the cardinal economic interests of the Federal Government of Nigeria is to diversify the economy in relation to areas of competitive advantage, and one of such areas is tourism. Tourism has become a major source of economic diversification for many countries, allowing for new employment and income earning opportunities. Although, the developed countries account for a higher proportion of global tourism, many developing countries are beginning to take advantage of the huge opportunities offered by this sector. However, only developing countries with effective natural and man-made tourism supporting and enhancing infrastructure have been able to develop their tourism sector and seize the attendant advantages. Nigeria is one of such countries, with huge tourism potentials, especially given its natural and diversified landscapes. Consequently, Nigeria is currently seeking to diversify her economy away from crude oil production to maximize the employment and income generating opportunities Tourism offers. This paper therefore critically analyses Nigeria's tourism potentials, focusing on the impacts on the wider economy. Appealing to the qualitative method of research, the paper concludes that the tourism sector has huge potentials yet unexplored, which if properly supported, through the Public-Private Partnership Policy, can contribute significantly to the economic diversification and poverty alleviation efforts of Cross River State government, one of the leading states in this sector.

KEYWORDS: tourism, economic diversification, development, sustainability, poverty alleviation

INTRODUCTION

Heavy metals are one of the most serious pollutants The travel and tourism industry has in the late 20th century emerged as the world's largest industry, serving as an alternative income earner to most non-industrialized nations (Duke, 2012). Since the beginning of time humans have traveled. Food, water, safety or acquisition of resources (trade) was the early travel motivations. But the idea of travel for pleasure or exploration soon emerged following advancement in technology which provides the means or mode of travel. For instance, the invention of the wheel and the rail provided new modes of transportation. And each improvement in technology increased individuals' opportunities to travel. As roads were improved and governments stabilized, interest in travel increased for education, sightseeing, and religious purposes.

On the other hand, Tourism is identified as an effective way to revitalize the economy of any Nation and widely acknowledged as one of the fastest growing industry globally (Raymond, 2001; Ozgen, 2003; Chockalingam and Ganesh, 2010; Jennie, 2012). The continuous and rapid growth of tourism is not in isolation of the stable economic growth experienced in the global economy, which lasted from the mid-1990 to 2007. This growth has facilitated increased global disposable income,

demand for leisure, combined with the global economic restructures in response to globalization. Thus, tourism has become a major source of economic growth, employment, earnings, and foreign exchange for many countries (Basu, 2003) and considered by developing countries as a main source of development, growth and poverty alleviation (Haller, 2012).

Tourism is also a collection of activities, services and industries that delivers a travel experience, including transportation, accommodations, eating and drinking establishments, retail shops, entertainment businesses, activity facilities and other hospitality services provided for individuals or groups traveling away from home. The World Tourism Organization (WTO) informs that tourism is currently the world's largest industry with annual revenues of over \$3 trillion dollars; and that Tourism provides over six million jobs in the United States, making it the country's largest employer.

Given the definition of tourism by the World Tourism Organization (WTO) as an activity involving the travels of persons to places outside their usual environment for not more than once for leisure, it is indicative of how such activities may benefit host and local economies and communities. This is particularly the case as the

notion of tourism has grown from the pursuit of the privileged few to the indulgence of the masses (Murphy, 1985). Indeed, tourism has a range of benefits both to the individual tourist, tourism organizations, and the local economies and communities in terms of employment, income, and enhancement to the quality of life (Besculides et al, 2002; Oh, 2005). That is why Ajao (2012) argues that if Nigeria gets its tourism sector right, tourism will serve as an employer of labour besides agriculture.

For some major tourist destinations, tourism has become a major alternative form of commodity export and a significant source of foreign exchange that allows internal and external trade balances to be reconciled. Thus, there is no doubt that tourism can make an effective contribution to economic development; provided it is developed sustainably so as to minimize the ecological footprints, and lighten the burden of government in the sector. The rest of the paper is structured to highlight the impact of Tourism on poverty alleviation through the Public-Private Partnership, and summarizes with some projections as to how Nigeria could benefit maximally from this sector.

THEORETICAL FRAMEWORK

The potentials of sustainable tourism development and the huge scope for diversifying mono-cultural economies through tourism has drawn the attention of policy makers, unilateral and multilateral organizations contending with the underdevelopment and the attendant poverty in developing countries to the sector (UNWTO, 2007). One of the unique characteristics of the tourism industry that makes it a prime sector from which employment can be engineered, especially in the case of the developing countries, are its labour intensive characteristics. This is particularly significant given the huge unemployment rate, especially among the youths (O'Higgins, 1998) and the labour surplus characteristic of most developing economies (Ranis, 2004). Given the low-level skills and the relatively short-lead period for training and skills acquisition, the tourism industry lends itself as a sector capable of generating huge employment and income earning opportunities.

Nigeria has no doubt had its share in this regard because over the last 50 years, the tourism industry has grown significantly. During this period, the country has offered a wide variety of tourist attractions such as extended and roomy river and river beaches ideal for swimming and other water sports, unique wildlife, vast tracts of unspoiled nature ranging from tropical forest, magnificent waterfalls, some new rapidly growing cities and climatic conditions in some parts particularly conducive to holidaying. Other attractions include traditional ways of life preserved in local customs; rich

and varied handicrafts and other colourful products depicting or illustrative of native arts and lifestyle, and the authentic unsophisticated but friendly attitude of many in the Nigerian population.

Similarly, the tourism sector is a magnet for foreign direct investments and affords developing countries the opportunities to attract inward direct investments both for soft and hard tourism infrastructures. The significance of this trend can only be imagined if the low foreign exchange earning capacity of most developing countries is considered. This combined with low-level divisible capital nature of the downstream end of the tourism industry; it affords huge opportunities for creating small and medium sized enterprises, a panacea for poverty alleviation.

In the experience of developed economies, the role of small and medium sized businesses in employment creation and technological as well as managerial innovation is widely acknowledged (Schreyer, 1996). Available data shows that between 1950 and 2004, tourist arrivals at destinations have grown from 25 million to 760 million (Zhehna, 2003). This figure has further grown to 842 million by 2006 (UNWTO, 2007, Cooper et al (2008) and this is expected to rise by an annual average rate of 4.3 per cent until 2010 to record a total of 1.6 billion by 2020. The expected associated income is forecast at US\$ 2 trillion (Pearson, et. al., 2008, Mowforth and Munt, 2009, OECD, 2008, and Olorunfemi and Raheem, 2008). In Nigeria International Tourist arrivals was 4,037,808 in 2013 attracting an income of \$649,468,486.

TOURISM AS A TOOL FOR POVERTY ALLEVIATION

Although it is difficult to accurately quantify the benefits of tourism (Mbaiwa, 2003) there is no doubt that the tourism market will expand rapidly to provide alternative income and employment opportunities for countries to seize upon (Chibuikem, 2009; Rogers 2009). For a country like Nigeria longing for effective economic diversification, tourism presents such an opportunity. Tourism is widely acknowledged as an effective tool for socio-economic development, because of the possible backward and forward linkages with other sectors of the economy, which allows it to facilitate employment opportunities, income, local economic development, and enhance the quality of life (Hall, 2007). However, Hall (2007) further argues that the extent to which these benefits can accrue to a nation crucially depends on local conditions. Manwa (2012) also adds that for tourism to be sustainable the community has to benefit directly from it, this will enable them to protect and conserve the resources upon which it is based. This is further emphasized by Smith

(2007) that apart from the type of tourism, the extent to which tourism confers economic benefits on any country also depends on the expectations of the tourists and the host country's ability to provide appropriate and adequate facilities. And unless economic policies to promote tourism remain a focus in developing countries, tourism will not be a potential source of economic growth (Ekanayake and Long, 2012).

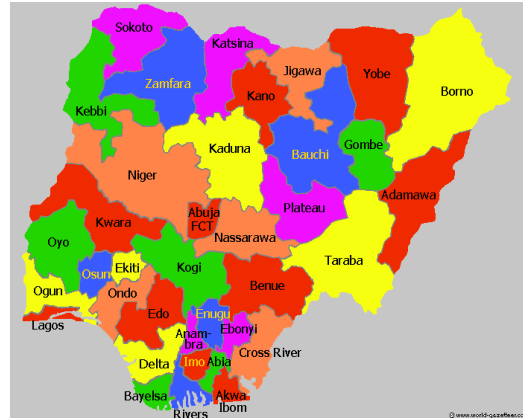
So while tourism presents developing countries like Nigeria with huge opportunity and scope for economic diversification, efforts need to be made to manage possible adverse social and environmental impacts. Although the quality of the environment, both natural and man-made, is essential to tourism, this cannot be taken for granted given the complex relationships that exist between tourism and the environment (Mbaiwa, 2003). Many of these impacts are linked with the construction of general tourism enhancing infrastructure such as roads and airports, and of tourism facilities, including resorts, hotels, restaurants, shops, golf courses and marinas to name but a few. As a sector of the economic growth, tourism is very important and has several advantages thus:

- the consumer travels to the destination, providing opportunities for the sale of additional goods and services.
- tourism creates important opportunities to diversify the local economy. It can often be developed in poor and marginal areas with few other export and diversification options. Tourists are often attracted to remote areas because of their high cultural, wildlife and landscape values. One of the assets of the poor is their cultural and wildlife heritage; and tourism presents opportunities to capitalize on those assets.
- tourism offers better labour-intensive opportunities than other sectors except agriculture.
- tourism helps promote gender equality, employing higher proportion of women than other sectors. (Dimoska, 2008)

STUDY AREA AND METHODOLOGY

A case study of Cross River State has been used to provide an insight into the state of tourism in Nigeria because it is an ideal method of capturing a snap shot of a wider issue, since it is not possible to analyze the whole of Nigeria (Figure 1) in a presentation such as this. In this study, three tourist destinations in the State (one each from the three Senatorial districts) have been used. Cross River State is one of the thirty-six states of the Federal Republic of Nigeria, located in the south eastern part of the country and has Calabar as its capital created in September 1987, (Figure 2). The state lies between latitudes 5 degree 32 and 4 degree 27 North and longitude 7 degree 50 and 9 degree 28 East.

The state is situated within the tropics and shares common boundary with the Republic of Cameroon in the East, Benue State in the North, Abia and Anambra State in the West, Eboyi State in the North West and Akwa Ibom State in the South.



Nigeria – Showing 36 States



Cross River State – Showing the 18 Local Government Areas

The State is well endowed with several varieties of tourist's attractions which can be categorized into: historical monuments, cultural attractions, festivals, carnivals and natural attractions. Thus from these numerous attractions, the Calabar Carnival, Yakurr Leboku New Yam Festival and the Obudu Ranch Resort have been chosen and briefly discussed.

Calabar Carnival

The Calabar Carnival is a mega-event and the climax of Christmas Festival in Calabar consisting of several activities from 30th November to 1st January the following year. The children carnival comes up on the 26th December while the adult one is on the 27th December. There are five competing bands namely Bay Side, Masta Blaster, Passion 4, Sea Gull and Freedom Band. There are other non-competing bands. The carnival has been dubbed Africa's biggest street party, with dance groups covering a distance of 12km.

The bands comprise five major components: A decorated truck on the move, Members of the band on

organized move, The creativity of the band, its music, choreography, costumes and artistic representations, The band's ability to interpret the year's theme, and The

presentation of its king and Queen in terms of carriage costume and general appeal.

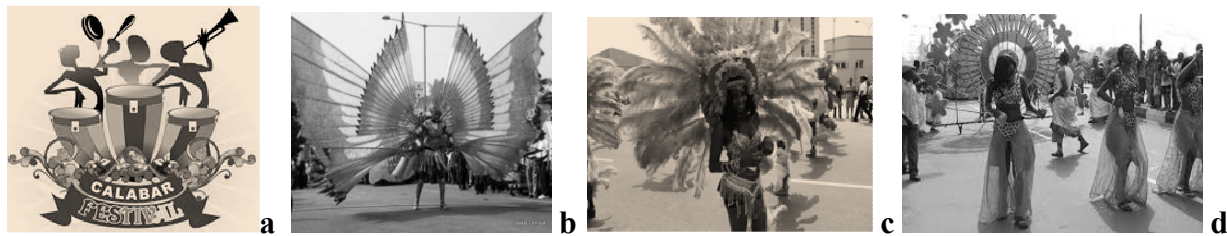


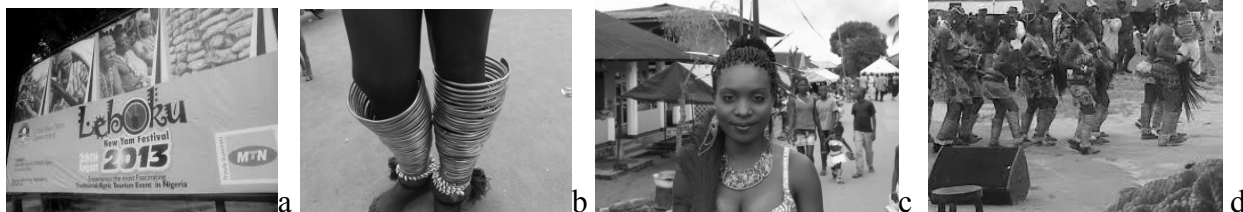
Figure 3(a – d): Scenes from 2013 Calabar Festival

The Visual Art Department of Cross River University of Technology Calabar and the Theatre Arts Department of the University Of Calabar are the main arteries sustaining the carnival's visual displays. While the Visual Arts Department provides artists who fabricate things, design floats, decorate, model objects, construct installations, design fabrics etc, the theatre artists handle performance, choreography, dance interpretations among others (see figure 3: a – d). The carnival showcases the antenna role of arts, heritage, theatre, culture hospitality and entertainment in tourism development. The carnival annually attracts over 20,000 tourists to the State and has popularized the city of Calabar in national and international news media. It has made valuable contributions in advertising Cross River State tourism potentials as tourists who visit the state spend a lot of money on accommodation, food, shopping and sightseeing which multiply retail income and businesses within the December period.

Leboku Festival

Leboku is the annual New Yam Festival celebrated in Ugep, Cross River State to honour the earth goddess and

the ancestral spirits of the land in Ugep, one of the five settlements of Yakurr. The three-week festival is the culmination of many events: the beginning of the yam harvest, a time to appease the gods and ancestors, a public parade of engaged maidens, a commemoration of events that led to the migration from the Yakurr ancestral home to the present site, and a period of holiday in the Yakurr traditional calendar (mid-August through mid-September). The Yakurr calendar runs from August to July. During the Leboku, people keep away from intense farming activities and exchange visits with their families. The Leboku is also meant to usher in peace, good health and prosperity". In Yakurr, before the festival proper is held, several traditional rites are performed. The Obol Lupon of Ugep and Paramount Ruler of Yakurr assisted by other chiefs perform the traditional rites to usher in the new yam. Though most of these traditional rites are not open to the public, communities in Yakurr local government are always in festive mode throughout the one month the festival will last. The 30-day activity heralding the new yam festival starts with the 'Etikekomi', visitation to farm roads to accept palm wine and sundry gifts. On that day, tapers give out their palm wine free.



a) 2013 (New Yam) Leboku Festival; b) Legs and the bangles worn by the maidens; c) A well-dressed maiden
 d) Some Leboku dancers

Figure 4: Scenes from 2013 Leboku New Yam Festival

After that is Leboku Kepile, the traditional wrestling festival. The Ikoabase Leboku-wa (church thanks giving service) as well as 'Ebokupom' (traditional offering of supplication and appeasement to the gods of the land) are also held as part of the festivities. As part of the ceremonies to usher in the new yam, Okondel, a rite meant only for initiates is also held. Normally the

Okondel ceremony, which is held only at night, is performed by the Obol Lupon of Ugep. Other activities held before the new yam festival is unveiled, including 'Eboku Pom (performed by traditional priests), Mblemi as well as Ledomboku (the actual traditional new yam celebration.) It is after all these traditional activities have been performed that the government Leboku is

celebrated. But the ‘government’ Leboku is given more prominence than the traditional Leboku by the state government. In its bid to promote tourism, the state is said to have added some innovations into the event (see figures 4: a – d).

No wonder the state governor, Senator Lyell Imoke in his 2014 budget speech stated, “...that we have become a destination for tourists within the sub-region is not in doubt. This leadership position in tourism development has come with great responsibility; that of improving facilities to cope with this rising profile and to meet visitor expectations. Accordingly, our tourism policy and regulatory framework will be overhauled not only to reflect this trend but also to create the right environment which will encourage private sector participation in our tourism industry. Consequently, to consolidate gains made in this sub-sector of our service industry, the sum of N1,137,658,500.12 (One Billion, One Hundred and Thirty Seven Million, Six Hundred and Fifty-Eight Thousand, Five Hundred naira, Twelve only) is made available in the 2014 fiscal year”.

Obudu Ranch Resort

The Obudu Ranch is a popular holiday destination for adventurous tourists wishing to explore the remote corners of Nigeria. Situated in the northeast corner of Cross River State, only 72.42 kilometers from the Cameroon border, a tourist can enjoy the countryside of both Nigeria and Cameroon at the same time. The Obudu Plateau is spread over an area of 103.6 square kilometers. It is over 1,524m, 1,612 meters above sea level and has temperate weather condition to ensure green vegetation and grazing of cattle round the year. The climate is cool and pleasant with no mosquitoes. The landscape is spectacular, with rolling grasslands, deep-wooded valleys and waterfalls. The Ranch is a tourist delight as a result of its divergent attractions. There are a natural swimming pool, horse riding, beautiful waterfall to behold, gorilla camp, bird watching, sporting facilities and accommodation. It is best to visit Obudu in the dry season since during the rainy season much of the ranch may be covered in mist and low clouds and there are thunderstorms. Between December and February the harmattan is heavy; therefore, the best times for a visit are the end of October to December and March to May before the rainy season.

Attractions

Gorilla Camp, 13 km from the hotel, is accessible either by vehicle or on foot, where one can take a long, picturesque walk to the camp, and observe gorillas in their natural habitat. Guests may also ride horses or embark on hiking trips into the wild (comfortable shoes and a guide are recommended). Bird watching here is

unparalleled and there is a pleasantly shaded natural and man-made swimming pools (see figure 6) near the Ranch House. If visitors accept the challenge of a three-hour hike, they’ll be rewarded with a stop at the waterfall, nestled amid captivating scenery. In spite of the altitude, it can get quite hot in the day, with five sunshine hours in the dry season (October - April) and roughly two during rainy season (July to August). Other activities include: golf, badminton, lawn tennis, squash, horseback riding and international mountain race.



Figure 5: Swimming pools at the resort



Figure 6: Road to Obudu Ranch Resort

Accommodations

The Ranch Hotel maintains 33 chalets and boasts of a friendly staff, superb restaurant and bar, and laundry/dry cleaning services. Chalets provide exquisite comfort with a large sitting room, color TV, VCR, cocktail bar, kitchen & spacious bedroom with double bed. The Ranch Hotel operates 24-hours during peak periods, September-December.

Route

The sights are spectacular on the drive east (see figure 6); through rolling mountains and the dense forest with trees so high their branches form a canopy, shading out the sun entirely. This phenomenon has led to the area being called “Nigeria’s Amazon,” and is not to be missed. However, should one prefer to fly, they can do so from any major city to Calabar then proceed by car over the five hour route via Ikom.

ANALYSIS AND FINDINGS

After very careful analysis, the following observations were made: That the friendly nature of Cross River State environment enhances sustainable tourism development. This is because the state's environment is generally friendly. The state is acclaimed as the cleanest in Nigeria. Studies also show that there is a good security network in the state. This is in line with the general perception of people about the state of security in Cross River State. Many people who have had course to relocate to the state from other neighbouring States of the Niger Delta or the other parts of the country attest to this. It is a fact that events of kidnapping, assassinations, arm robbery, ethnic fighting, pipelines vandalization, religious fighting occurring daily in other Niger Delta States as well as other parts of Nigeria are hardly experienced in Cross River State. Interestingly, therefore there is very low occurrence of intertribal wars in the state. Cross Riverians are not given to violence hence there are little skirmishes happening in rural communities that could be perceived as capable of threatening the peaceful nature of the state. Clean and portable water is also available. This claim has been attested to by the Cross River State Water Board Bulletin (2005) which reported that the State through the World Bank assisted water programme enjoys a good supply of water.

This study has also shown that the private sector has done much in the area of development of road maps to guide tourists, building and running of hotels, generating employment for citizens, provision of tourism workers and information among others. These findings are in conformity with previous works of Nwakana (1980), Smith (1979), WTO report (1967) and others. These studies show that the private sector has over time invested in hotels and tour agency business, and financial support to the public sector for the development of tourism.

In Cross River State, a framework for private sector participation is also being put in place through the "Cross River Tourism" initiative. This partnership is aimed at achieving effective destination marketing, proper regulation of the tourism industry practitioners, the development of private enterprise in the tourism sector and the promotion of private sector investment.

Generally, Tourism strives better in states with friendly tax laws. In Cross River State both the public and private sectors have contributed immensely in the development of tourism (Udumo, 2013). While the private sector contributed in the area of road map development to guide tourists, building and running hotels, generating employment for citizens, the public sector on its part has contributed in all areas such as

expansion of airports, establishment of Airlines, building of good roads, provision of good public transport system, training of tour guards, establishment of traveling agencies, promotion of cultural activities, provision of employment opportunities, and provision of infrastructures. For tourism industry to be fully developed, both sectors must as a necessity collaborate to harness the enormous natural resources embedded in the state. The areas requiring collaboration mostly include transport system, training and re-training of hospitality workers, provision of infrastructures of facilities, creating of employment opportunities. Both sectors must play a complementary role if tourism is to become one of the key factors of the economic growth of state and indeed the nation.

RECOMMENDATIONS/CONCLUSION

There is no doubt that tourism is one sector where the Cross River State position has remained unchallenged in Nigeria, and is steadily becoming a credible destination within the West African sub-region. Tourism offer opportunity to meet people while enjoying a range of social, cultural or physical activities. Tourism promotes good quality of life; increases self-esteem and confidence; gives people the opportunity to make their own choices; gives satisfaction, enjoyment and pleasure; enables people to become involved in and feel part of the community; tourism increases the opportunity to gain and develop new friendships; allows partakers to be challenged, take risks and experience new things; bridges the gap between attending and participating in the community; allows people to contribute their skills and feel a sense of belonging and accomplishment, and promotes friendships through shared experiences.

In the light of the foregoing, the following recommendations are made; that:

- i. the public sector should resuscitate most of the tourist sites such as zoo, parks and other entertainment sites in the state so as to keep the tourism tempo high and attractive.
- ii. the public sector should collaborate more with the private sector by undertaking the funding and management of the state tourism industry.
- iii. the public sector should provide accessibility to the tourism site by building good roads and/or rails.
- iv. the public sector should partner with the private sector to hold conferences, talk shows on tourism either monthly, quarterly or yearly, to educate people about tourism development potentials in the state.

Furthermore, the following strategies that focus specifically on unlocking opportunities and generating net benefits through tourism should not be underscored:

- governments have crucial role in creating and accomplishing strategies, policies, regulations, as well as ensuring coordination between stakeholders.
- the private sector is an essential player, as partner, facilitator, customer, marketing channel and advisor.
- the Poor have roles as producers, suppliers, workers, participants and decision makers.
- civil Society (educational institutions at all levels, trade associations, journalists, community-based organizations) has an important part to play to facilitate inclusion by the poor.
- donors must provide technical assistance, source funding to enable the further development of tourism projects and expertise.

Additionally, having identified tourism as an economic venture, requiring the involvement of both public/private sectors of the economy, the need to further encourage tourism in Cross River State, Nigeria can no longer be overemphasized. Therefore, one fact should be noticed: that sustainable tourism cannot automatically eliminate poverty on its own. For that reason, there should be rightly created tourism policy as well as developing plans in which eliminating poverty is a primary goal. This can be done through:

- * strengthening existing legislation.
- * establishing a presidential Council on Tourism and a Tourism Steering Committee.
- * creating awareness on Tourism as a unique key to driving the economy.
- * strengthening the professional/personnel staff of the Federal Ministry of Culture and Tourism.
- * having a unified voice in the commercial tourism sector.
- * encouraging Public/Private relationships.
- * creating an enabling environment for the private sector involvement and investment in the tourism sector.
- * addressing the current marketing of Nigeria tourism potentials.

It is therefore necessary to have good cooperation between all stakeholders. Only in that way can it be accomplished for tourism to be an efficient means for eliminating poverty. Hence, the principal conclusions from this study of the impact of Tourism on the economy are that:

- Spending by international tourists has a direct impact on the national economy (estimated at US\$280m/N36b between 2006 – 2010).
- Downstream economic impacts from the “export” revenues of international tourist spending are

estimated to generate additional gross revenue of US\$224m/N29b.

- While the incidence of domestic leisure travel may be low, the sheer size of Nigeria’s population means that there is a significant contribution to the demand for tourism services from domestic travel activity. The revenue value of this impact is yet unknown.
- The revenue generated from travel within the country by employees and staff of Federal Government departments and agencies generates a demand for an estimated US\$68m/N8.8b of transport and hospitality sectors.
- State governments also make a considerable contribution to the transport and hospitality sector in the undertaking of official travel activities. The revenue value of this impact is unquantifiable.
- The contribution to government revenue from VAT levies on the Hospitality sector, recorded at N1.149 million in 2004, is considered to grossly understate the actual level of revenue received.
- Company Income tax generated by the Hospitality sector was recorded at N313 million in the 2005 year, the first year such a breakdown was available.
- Implementation of the Tourism Development Master Plan in Tourism Cluster development will disperse the economic benefits from tourism activity. The economic benefits from tourism activity will be spread much wider and to a greater proportion of the population than is currently the case. (Nigeria Tourism Development Master Plan, 2006)
- Demand for labour will receive a very significant stimulus from implementing a Tourism Development Master Plan in Nigeria.

The future for tourism in Nigeria thus depends on these opportunities and challenges. The diversity of cultural attractions, the friendly disposition of the people, a revamped National Tourism Organization and Human Resources Development will enhance these key opportunities. Implementation of the Nigerian Tourism Development Master Plan should therefore be given major priority by Nigerian government.

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PRODUCTION ECONOMY OF BITTER LEAF (*VERNONIA AMYGDALINA*) AS DIETARY ADDITIVE FED TO *CLARIAS GARIEPINUS*

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ABSTRACT

Antibiotic has been used to enhance physiological well-being in animal husbandry cum aquaculture; however resistance of pathogenic microorganisms resulting from its use poses serious challenges to both animal and human being. Man has used nature's resources to his benefit since creation; one of such resources is herbal additives that are readily available and effective with no residual effects, but there is little information on their utilization in fish farming in Nigeria. This study evaluated the utilization of powdered Bitter leaf (*Vernonia amygdalina*) on growth performance and production economy of *Clarias gariepinus*. Six isonitrogenous herbal diets (40% Crude protein), with the following inclusion levels (VAM1/Control; 0.00% - VAM6; 0.10%) were fed twice daily at 5% body weight to twenty *Clarias gariepinus* per treatment, in triplicates for 12 weeks. Mean Weight Gain (MWG), Specific Growth Rate (SGR), Protein Efficiency Ratio (PER), Mean Feed Intake (MFI), Feed Conversion Ratio (FCR) and Profit indices (PI), Cost Benefit Ratio (Ber) and water parameters were determined using standard methods. Results obtained showed that VAM4 diet gave the highest MWG (65.02±1.70g); SGR (0.87±0.01%/day); PER (0.96±0.01); and lowest FCR (2.57±0.04) but highest PI (6.4) and Ber (1.63) respectively as compared with others diets. However the highest MFI (138.25±1.57) was recorded from fish fed VAM5 diet and least from VAM1 (106.32±1.73). Values for DO, P^H and Temperature ranged from 6.67 mg/l (VAM1) - 6.82mg/l(VAM6), 5.56(VAM1-6.87(VAM2) and 26.67°C (VAM2) - 26.81°C(VAM1) respectively. These parameters of the culture water values were within the range recommended for catfish. The use of bitter leaf improves the rearing indices and profitability of catfish production; therefore, its adoption along integrated farming in sustainable agriculture and ethnomedicine development is advocated to reduce poverty and enhance human building capacity.

KEYWORDS: dietary supplement, drug discovery, performance indices, phytotherapy, fish nutrition.

INTRODUCTION

Vernonia amygdalina popularly known as bitter leaf a member of compositae family is widely distributed throughout Africa. It is locally abundant in sloughs, home gardens and even all over places in the Southern part of Nigeria (Bonsi *et al.*, 1995 and Burkill, 1985). The plant leaves can be used as flavouring, seasoning accomplishment and garnishing of foods (Fayemi, 1999). Bitter leaf, is a well-known remedy for stomachaches, skin infections, diabetes, loss of memory prostate cancer, general weakness and other diseases (Adodo,2004). The bitter leaf plant contains *vernoinine*, *vernodalin*, *venomygdin*. It is known to be endowed with valuable biochemical properties, fixed oil, alkaloids, saponins, tannins and other glycosides (Bonsi *et al.*, 1995). Medicinal plants have continued to attract attention in the global search for the effective methods of using plants parts (e.g. seeds, stems, leaves, roots and bark etc.) for the treatment of many diseases affecting humans (Sofowora,1993) and his animals (Babayemi *et al.*, 2014).

Fish are considered one of the important food sources for human beings because their flesh contains a high

percentage of protein, calcium, phosphorus and iodine that are vital to our health. Fish account for almost 17 percent of the global population intake of animal protein (FAO, 2014). The fisheries and aquaculture play a vital role in achieving the FAO's strategic objective of eliminating hunger, food insecurity and malnutrition. People have never consumed fish so much fish or depend so greatly on the sector for their well-being as today. As the demand for fish increases, the sector is also striving to be more productive and sustainable and to enable more inclusive and efficient system while reducing rural poverty and enhancing the resilience of livelihood to disaster, crises and climate change (FAO,2014).

The fisheries and aquaculture sector is also a source of employment and income, supporting the livelihoods of 10–12 percent of the world's population. In 2012, employment in the sector grew faster than the world's population, with almost 60 million people engaged in the primary sector, 90 percent small-scale fishers and 15 percent of them women. At global level, the contributions of small scale fisheries to poverty

alleviation and food and nutrition security are being increasingly recognized, most notably in the Rio+20 outcome document (The Future We Want), in the Voluntary Guidelines for the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security, and in the development of the Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication (FAO,2014).

Feed safety is an essential factor to assure the productivity of those aquatic husbandries. Safety may be affected by many hazards of biological, physical and chemical origins (FAO, 2005). The greatest limitation of fish farming in Nigeria is lack of suitable fish feed both in quality and quantity. It accounts for about 60-80 percent of operational costs in intensive aquaculture (commercial) and semi-intensive (artisanal) production systems. Both systems involve inputs of supplementary and complete feed, which account for up to 40% and 60% of production costs, respectively (Fagbenro, 1987). Furthermore, feed and fertilizers represent about 40-60 percent of the total cost of aquaculture production in semi-intensive aquaculture systems (Adewumi and Fagbenro, 2009). Fertilizer and feed resources will therefore, continue to dominate aquaculture needs. While some countries in the world produce adequate quality commercial fish feeds for aquaculture, many depend on imports from countries within or outside the region. The evolution and development of fish feed manufacturing in aquaculture has made good progress in all regions, perhaps, except Africa (FAO, 2006). These feeds many/most are substandard in specific species feed formulation requirements. This situation led many farmers to use all kind of materials to formulate feeds or even feed their fish. (Areola, 2008; Kanu, 2008).

Synthetic antibiotics have been widely used in fish culture systems as performance enhancer and for stress control. These antibiotics are expensive and induce microbial resistance with consequent environmental effects. These products are now considered as human health factors for their possible role in the emergence of microbial resistance (Nollet, 2005; Michard, 2008). Now restriction on the use of antibiotics growth promoters has stimulated the search for alternative additives (Nasir and Gashorn, 2006). Natural medicinal products originating from fungi and herbs have been used as feed additives for farm animals in China, and show many bioactivities such as antimicrobial, immune enhancement and stress reduction (Wang *et al.*, 1998). Several herbs have been tested for their growth promoting activities in aquatic animals (JayaPrakas and Euphrosia, 1996; Citarasu *et al.*, 2002 and Sivaram *et al.*, 2004) and pharmacological screening of some

medicinal plants as antimicrobial and feed additives in poultry (Thakare, 2004).

Catfish has been credited for being hardy, resistance to handling stress. It has better growth and feed conversion abilities, the high quality and better taste of its flesh makes it a highly demanded fish, hence there is need to increase local production of this species at cheaper production cost (Sogbesan, 2014). Some phytogetic plants however, have been identified to have potential as antibiotics/ phytobiotics, but there is little information on their utilization in fish nutrition. Owen and Amakiri (2011) suggested that any significant reduction in the cost of feeds will significantly reduce the overall cost of production and increase the profit margin of the farm. One way to achieve this is by the use of natural feed additive. Therefore the evaluation of *Vernonia amygdalina* a commonly available phytogetic plant as feed additive; its effect on growth performance and production economy of *Clarias gariepinus* (CG) were investigated.

MATERIALS AND METHODS

Experimental Site: The study was carried out at the Department of Aquaculture and Fisheries Management's Teaching and Research Laboratory, University of Ibadan, Ibadan, Nigeria.

Identification, Preparation and Processing of *Vernonia amygdalina*

Identification of the plant/botanicals was made by the Forest Taxonomist Dr. A.A. Adebisi from the Department of Forestry and Renewable Resources, Faculty of Agriculture and Forestry Resources, University of Ibadan, Ibadan Nigeria. The collection, preparation, processing and preservation of the plant were done practically as reported by (Fayemi, 1999 and Ogbuewu *et al.*, 2010).

Calculated dosage values for bitter leaf (*Vernonia amygdalina*)

The dosage values for bitter leaf were based on the extrapolated dosage (Nwaoguikpe 2010) at 2% body weight of the dry powdered leaves of *Vernonia amygdalina* in rats. The final dosage/doses ranged from 0.00625% – 0.1%/100g.

Formulation and preparation of experimental diets:

The experimental diets were formulated using algebraic method along with least cost formulae of Falayi (2003) and prepared following the methods of (Adewole, 2014) as shown in (Table 1). The six different diets were isonitrogenous at 40% Crude Protein (CP): *Vernonia amygdalina* meal (VAM1) (control) diet at 0%, VAM2 (0.00625%), VAM3 (0.0125%) VAM4 (0.025%) VAM5 (0.05) and VAM6 (0.10%) respectively.

Table 1: Percentage composition of ingredients (g/100g diets) in *Vernonia amygdalina* (Bitter leaf) meal diets for feeding trials

Ingredients	VAM1 (Control)	VAM2	VAM3	VAM4	VAM5	VAM6
Fishmeal	28.55	28.55	28.55	28.55	28.55	28.55
Soybean meal	20.93	20.93	20.93	20.93	20.93	20.93
Groundnut cake	20.71	20.71	20.71	20.71	20.71	20.71
Yellow maize	20.76	20.754	20.7475	20.735	02.71	20.66
Vegetable oil	2.50	2.50	2.50	2.50	2.50	2.50
Vitamin/mineral premix	1.50	1.50	1.50	1.50	1.50	1.50
Cassava starch (Binder)	1.50	1.50	1.50	1.50	1.50	1.50
Common salt	0.50	0.50	0.50	0.50	0.50	0.50
Bone meal	1.00	1.00	1.00	1.00	1.00	1.00
Carboxyl/methylcellulose	2.00	2.00	2.00	2.00	2.00	2.00
Chromic oxide	0.05	0.05	0.05	0.05	0.05	0.05
Inclusion levels of <i>Vernonia amygdalina</i> (%)	0.00	0.00625	0.0125	0.025	0.05	0.10
Total	100	100	100	100	100	100
Calculated Crude Protein	40.00	40.00	40.00	40.00	40.00	40.00

VAM= *Vernonia amygdalina* meal

Experimental Procedures: Experimental design, Fish feeding, weighing and data collection

CG juveniles (n=20, weight: 10.94±0.02g) were fed twice (administered two equal portions at 8 – 9.00hr and 18.00 – 19.00hr) daily at 5% body weight in triplicates for 12 weeks in a completely randomized design (CRD), using the holding plastic tanks (49x33.5x33.5) cm³. Fish were acclimatized for 21 days and fed commercial diets before the feeding trial and were starved for 24 hours before the commencement of the feeding trial. Fish were not fed on the weighing day as recommended (Sogbesan, 2007). The quantity of feed was adjusted based on the weight attained by the fish for previous fortnight throughout the feeding trial. The water quality standard was strictly adhered to by removing particulate wastes in the tanks through siphoning daily before feeding while the water in each tank was completely changed every other day and tanks were washed twice a week, to ensure optimum quality of the culture medium and healthy condition of the fish according to (Adewole and Owolabi, 2007). Dead fish were monitored for mortality daily and removed, counted and recorded for determination of mortality/survival rate (Sogbesan, 2007). The growth parameters, condition factor, survival rate and nutrient utilization were computed and analysed according to the standard methods (Aderolu *et al.*, 2009 and Adewole, 2014). Water quality of the rearing environment such as temperature was taken with graduated mercury-in-glass thermometer at 0800 and 1600hr daily, while the pH (Hydrogen ion concentration) was determined with pH meter (daily) before feeding. Dissolved oxygen (DO) was determined using Do meter (EDT Diect-ion) as recommended by Boyd, (1986).

Production cost of the experimental diets and economic evaluation of feeding trails: The production costs in Naira of the experimental diets were calculated

following the method of Faturoti and Lawal (1986) based on the current market prices of the ingredients used for formulating the diets. Economic evaluation in terms of Investment Cost Analysis (ICA), Net Profit Value (NPV), Gross Profit (GP), Profit Index (PI), Incidence of Cost and Benefit Cost Ratio (BCR) of comparative growth performance of the fingerlings of *Clarias gariepinus* to the natural products in sustainable fish production, was determined according to New (1989) and Mazid *et al.*, (1997).

Statistical Analysis: Data collected were subjected to Analysis of Variance (ANOVA) at $\alpha_{0.05}$. Comparisons among treatment means were carried out by one-way analysis of variance and Duncan's Multiple Range Test was used to determine the level of significance among treatments, using Statistical Analysis System (SAS, 2008).

RESULTS AND DISCUSSION

The experimental fish did utilize the feed at the varying levels, and which brought about significant variations in some of the growth performances recorded. Total final weight attained ranged from 601.57 ± 21.23g to 1170.29 ± 30.57g. The highest total final weight value was from VAM4 diet, followed closely by 1127.92 ± 4.24g from VAM5 diet, while the lowest was from the control diet. The fish fed the VAM4, VAM5, VAM6, VAM3, VAM2 diets had significantly higher (p<0.05) total final weight than fish fed VAM1 the control diet (Table 2). The mean final weight, total weight gained, mean weight gain, specific growth rate, relative growth rate followed the same similar trend as in the total final weight (Table 2) in CG fed VAM's diets. Final condition factor (K₂) ranged from 0.69 ± 0.03 to 0.83 ± 0.09. The highest final condition factor value was from VAM4 diet, followed closely by 0.80 ± 0.03 from VAM2 diet, while the lowest value was from VAM5 diets respectively. There were no significant differences

($p < 0.05$) within the treatments in the K2 of the fish fed the VAM' diets (Table 2). The number of fish cropped ranged from 16.00 ± 0.00 to 19.00 ± 0.03 . The highest value was from VAM2, followed closely and jointly by 18.00 ± 0.00 from VAM4, VAM5, VAM6 diets, and the lowest value was from the control diet respectively. The fish fed VAM2 diets had significantly higher ($p < 0.05$) number of fish cropped than, VAM4, VAM5, VAM6 diets, which were significantly different from VAM3, VAM1 diets respectively. The percentage survival ranged from 80.00% to 90.00% and followed similar trend as the number of fish cropped for all the experimental VAM's diets (Table 2).

Total Feed Intake (TFI) ranged from 1701.18 ± 27.69 to 2488.45 ± 28.30 g within the treatments, the highest value was from VAM5 diet, followed closely by 2438.45 ± 30.76 g from VAM4 diet and the lowest value was from the control diet. The fish fed the VAM5, VAM4, VAM6, VAM3 diets had significantly higher ($p < 0.05$) TFI than the VAM2 diet, which was significantly different from control diet (Table 2), while Total Protein Intake (TPI) ranged from 707.35 ± 11.51 to 999.11 ± 11.36 within the treatments, the highest value was from VAM5 diet, followed closely by 990.75 ± 30.76 from VAM4 diet and the lowest value was from the control diet. The fish fed the control diet had significantly lower ($p < 0.05$) TPI than the other diets (Table 2).

Protein Efficiency Ratio (PER) values ranged from 0.54 ± 0.01 to 0.96 ± 0.01 across the treatments. The highest value was from the fish fed VAM4 diet followed closely jointly by 0.90 ± 0.02 from VAM5, VAM6 diets and the lowest was from control diet respectively. The fish fed the VAM4, VAM5, VAM6, VAM2 diets had significantly higher ($p < 0.05$) PER than VAM3 diet which was significantly different from the control diet (Table 2).

The Feed Conversion Ratio (FCR) values ranged from 2.57 ± 0.04 to 4.44 ± 0.07 across the treatments. The highest value was from the fish fed the control diet, followed closely by 2.80 ± 0.15 from VAM2 diet and the lowest was from VAM4 diet respectively. The fish fed the control diet had significantly higher ($p < 0.05$) FCR ratio than the other diets (Table 2).

The result of the production cost of the experimental diet *Vernonia amygdalina* meals (Table 4) showed that the highest profit index (PI) 6.84 was from VAM4 diet, followed closely by VAM3 diet and the lowest value was the control VAM1 diet respectively. The highest net profit and best benefit cost ratio were from VAM4 diet, followed closely by VAM5 diet and the least was from the control VAM1 diet. Mean values for pH

ranged from 6.67- 6.82. The highest was from VAM6 diet, followed closely by VAM5 diet and the least was from VAM1 diet. Mean values for dissolved oxygen ranged from and 5.56-6.74mg/l. The highest was from VAM6 diet, followed closely by VAM2 diet and the least was from VAM1 diet. Mean values for temperature ranged from $26.67^{\circ}\text{C} - 26.81^{\circ}\text{C}$. The highest was from VAM1 diet, followed closely by VAM4 diet and the least was from VAM2 diets respectively.

The fact that weight gain was reported in all the treatments is an indication that the fish responded positively to all the diets. Although there were significant differences ($p < 0.05$) in the total final weight of the fish fed the tested diets compared to the control, but not significantly different within the tested diets. This result is in line with the findings of Oleiforuh-Okoleh *et al.*, 2015 and Tangka (2003) that inclusion of bitter leaf powder in broiler chicks and animals had improved growth performance respectively. The highest weight gain was from *C. gariepinus* fed VAM4 diet. There were no significant difference in the weight gain but there were reduction in the weight with increasing concentration of *Vernonia amygdalina*. The results from the present study were similar to Ibrahim *et al.*, (2000) who reported that rats fed group A (25% w/w) had added weight, those in group B (50% w/w) had a fairly constant body weight, whereas those in the group C (75% w/w) had lost weight when compared with the control group D ($p < 0.05$, $p < 0.01$) student's t-test). The authors also reported that throughout the period of their study, the water intake and feed intake were increasing. While Eleyinmi *et al.*, (2006) observed that the feed consumption rates of the rats on the experimental diets were low compared to the control diet and suggested that this may be due to variation in the taste of the test diets from which the test animals are familiar with. This may, in turn, impact on the growth characteristics of the test animals. Furthermore, the authors observed low mean daily feed intake and reduced weight in rats fed *Vernonia amygdalina* and *Gongronema latifolium* respectively and attributed this to the presence of anti-nutritional factors (especially Phytic and Tannin) or both.

The astringent taste associated with the consumption of *V. amygdalina* affects its intake as food/feed (Bonsi *et al.*, 1995; Coop and Kyriazakis, 2001). The feed intake in this study dropped at the highest concentration VAM6 within the tested groups for *C. gariepinus* fed *V. amygdalina*, although significantly higher than the control while the feed acceptability index did not vary significantly within the tested groups indicating that the presence of astringent tastes of *V. amygdalina* did not deterred the fish from consuming the various diets. It

may be suggested that the concentrations used here did not affect the palatability of the feeds given to the fish. The results obtained here are in agreement with (Ibrahim *et al.*, 2000) that consumption of *V. amygdalina* Del leaves, especially at very high concentration requires caution, since there were reduction in the total and mean weight gain from \geq VAM5, although better than the control. Also the results obtained here are similar to (Yilmaz *et al.*, 2009) who reported that the increase in Genesis (contains naturally occurring mixture of plant substances (Soy concentrate, wild yam, vitex, dong quia, black cohosh, licorice root gentian root) that are recognized to have varying degrees of estrogenic activity) concentration enhanced weight gain up to a definite level (420mgG30l^{-1}) for female *C. gariepinus*, but after this level specific growth rates decreased significantly. Similarly, (Ekeocha, 2011) reported that the average final body weight decreased as the levels of VALMs increased in the diet with the highest value of (784.21g) from the control diet and those on the 10%VALMs diet had the least value of 561.83g in birds.

The Feed Conversion Ratio (FCR) and Protein Efficiency Ratio (PER) showed that the fish utilized the tested diets better than the control. The feed conversion ratio decreased from (4.44 ± 0.07 to 2.57 ± 0.04), while the PER increased from (0.54 ± 0.01 to 0.96 ± 0.01). The feed efficiency ratio and PER are used as quality indicator for fish diet and amino acid balance. So these parameters are used to assess protein utilization and turnover. The feed conversion ratios of (2.57- 4.44) reported from the study are better than those reported by El-Block (1975) that food conversion ratio for *Clarias* ranged from (3.2-6.7) according to the quality of the food/feed given. Since De silva and Anderson (1995) and Adikwu, (2003) documented that lower the feed conversion ratio, the better the feed utilization. The results from this study are also similar to those obtained by (Khatab *et al.*, 2001; Adewole, 2014; Adewole and Awosusi, 2015; Shalaby *et al.*, 2006; Oleiforuh-Okoleh *et al.*, 2015; Olobatoke and Oloniruha, 2009) who reported the increased feed intake, FCR and PER in *O. niloticus*, *Clarias gariepinus*, broiler birds and cockerels fed black seed cake (*Nigella sativa* L.), rosselle (*Hibiscus sabdariffa*), honeybee propolis and ag-zyme (organic enzyme), garlic (*Allium sativum*) and Chloramphenicol, bitter leaf (*Vernoina amygdalina*) extract and powdered meal as dietary additives/supplements respectively. However, the result obtained here were not in agreement with (Teguia *et al.*, 1993 and Ekeocha, 2011), who reported that *V. amygdalina* leaf meal supplement did not improve performance characteristics over basal diets but significantly ($p < 0.05$) decreased feed intake, feed conversion ratio and growth rate in birds. However,

boiling prior to use has been shown to decrease the contents of secondary plant compounds, making it more palatable (Teguia *et al.*, 1993; Bonsi *et al.*, 1995).

The PER of a diet is its “growth promoting value” and is a good indication of the quality of the feed and the response of the animals to it (Adejumo, 2004). The relationship between rate of growth and productive life is also well established (Maynard and Loosli, 1956). Higher growth rates promote better feed efficiency and carcass quality. The PER also increased significantly within the tested groups when compared with the control. De Silva and Anderson (1995) reported that the protein efficiency ratio is a measurement of protein effectiveness to provide the essential amino acids needed by the fish muscle. It means that higher protein efficiency ratio is an indication of diet that produces fatty fish. The authors also reported that this index has been associated with fat deposition in the fish muscle, although fat deposit index was significantly lower than the control in these studies.

Economic evaluation of feeding *C. gariepinus* fingerlings on graded levels of *Vernonia amygdalina* (VAM's) diets showed that higher net gain, better cost benefit ratio reported for all the inclusion levels of VAM's diet when compared to the control, indicated that the *C. gariepinus* was able to maximize the utilization of the feed for muscle development as reflected by the superior mean weight gains of the fish. Production and benefits positively favoured the utilization of VAM2-VAM5 diets, since the values are more than 1.0 indicating an increase in the fish value above the amount invested (Sogbesan *et al.*, 2006). Considering the profit index (PI), the fish fed VAM4 had the highest profit index coupled with the highest mean weight gain of the fish compared to others and lowest feed conversion ratio. There is no doubt that this assertion is in support of the findings of (Sotolu, 2008 and Omitoyin, 1995) and similar to the observations of Kyvsgard (2002) and Oleiforuh- Okoleh *et al.*, (2015) that broiler fed bitter leaf performed better in term of cost of feed per kg than those on the control. Also the result in this study is in accordance to the revelation of Oleiforuh- Okoleh *et al.*, (2015) that the cost /kg feed consumed /bird as well as cost of production increased with increase in the quantity of bitter leaf in the drinking water, thus, the highest cost of feeding was from the fish fed the highest inclusion level: VAM6 diet.

The development of new diet formulation supports the aquaculture industry to increase demand for affordable, safe, and high quality fish and sea food products. Food is a major requirement for all living organisms including fish for reproduction, growth and maintenance of the body as a whole (Soloman, 2012). Given the

engagement of a considerable high proportion of the Nigerian population in agriculture and widespread poverty among rural populace in agriculture, positive intervention in agriculture through varieties developed by conventional breeding and biotechnological (Adetimirin,2010) and nutritional techniques (Adewole, 2014) remain a veritable tool for addressing poverty and socio-economic problems in Nigeria. Without an increase in the productivity of more nutritionally adequate food and a reduction in poverty, the increase in population is bound to be accompanied with high level of food insecurity (Adetimirin, 2010).

Thus the recent increases in feed ingredients cost have motivated the fisheries industry to identify technologies that will improve feed utilization and reduce the cost per pound gain. Furthermore, inclusion of bitter leaf in the diet of *C. gariepinus* had no detrimental effects on

growth performance and production economy of the fish. This paper has contributed to knowledge through the establishment of the best supplementation level with respect to the sustainable production, economy and the potential utilisation of *Vernonia amygdalina* as alternative to synthetic antibiotic as growth promoter in the production of *Clarias gariepinus* was 0.025g/100g (VAM4) diet. Since the aim of this conference is to promote National Capacity Building Strategy for Sustainable Development and Poverty Alleviation: the adoption of aqua feed with the incorporation of herbal additive will contribute immensely to the manpower development/empowerment in aquaculture/agriculture and economy in general, thus, improving sustainable livelihood, alleviating poverty and enhance the fish farmers' capacity building strategy and productivity.

Table 1b. Proximate and energy composition (%dry matter) of the *Vernonia amygdalina* meal diets

Parameter	VAM 1	VAM 2	VAM 3	VAM 4	VAM 5	VAM 6
Crude protein (%)	41.58	40.66	40.85	40.63	40.15	40.17
Crude fat (%)	3.47	3.81	3.69	3.65	3.91	3.92
Crude fiber (%)	2.76	2.93	2.97	2.87	2.81	3.03
Ash (%)	13.38	13.79	14.18	13.55	13.56	14.29
Dry matter (%)	92.04	91.67	91.37	93.02	91.41	90.97
Moisture (%)	7.96	8.33	8.63	6.98	8.59	9.03
Nitrogen free extract (%)	30.85	30.48	29.68	32.32	30.98	29.56
Gross energy	3115	3110	3132	3125	3115	3171
Digestible energy	1648.97	1634.33	1620.31	1658.95	1634.85	1611.28

Table 2: Growth performance of *Clarias gariepinus* fed *Vernonia amygdalina* additive meal for 84 days

PARAMETERS	VAM1	VAM2	VAM3	VAM4	VAM5	VAM6
Initial total weight (g)	218.67 ± 0.44	219.33 ± 0.17	218.67±0.44	218.67±0.44	218.67±0.44	218.83±0.17
Mean initial weight(g/fish)	10.94 ± 0.02	10.97±0.01	10.94 ± 0.02	10.94 ± 0.02	10.94 ± 0.02	10.94 ± 0.01
Total final weight (g)	601.57± 21.23 ^b	1021.42±106.10 ^a	1028.33±77.24 ^a	1170.29±30.57 ^a	1127.92±4.24 ^a	1093.92±108.70 ^a
Mean final weight (g/fish)	37.60 ± 1.33 ^b	53.76±5.58 ^a	60.49±4.54 ^a	65.02±1.70 ^a	62.66±0.24 ^a	60.77±6.04 ^a
Total weight gain(g)	382.90±20.80 ^b	802.08±106.10 ^a	809.67±77.53 ^a	951.63±30.15 ^a	909.25±4.13 ^a	875.08±108.55 ^a
Mean weight gain(g/fish)	23.93±1.30 ^b	42.22±5.58 ^a	47.63±4.56 ^a	52.87±1.67 ^a	50.51±0.23 ^a	48.61±6.03 ^a
Specific growth rate (%)	0.52±0.02 ^b	0.79±0.06 ^a	0.80±0.04 ^a	0.87±0.01 ^a	0.85±0.00 ^a	0.82±0.05 ^a
Relative growth rate(%/fish)	175.07± 9.18 ^b	365.69±48.34 ^a	370.37±35.91 ^a	435.14±12.94 ^a	415.82±1.90 ^a	399.82±49.36 ^a
Total feed intake	1701.18±27.69 ^c	2245.02±118.15 ^b	2305.63±84.95 ^{ab}	2438.45±30.76 ^{ab}	2488.45±28.30 ^a	2417.22±33.76 ^{ab}
Mean feed intake	106.32±1.73 ^a	118.16±6.22 ^a	131.70±1.72 ^a	135.47±1.71 ^a	138.25±1.57 ^a	134.29±1.88 ^a
Total protein intake	707.35±11.51 ^b	912.83±48.04 ^a	941.85±34.71 ^a	990.75±12.50 ^a	999.11±11.36 ^a	971.00±13.56 ^a
Feed conversion ratio	4.44±0.07 ^a	2.80±0.15 ^b	2.85±0.10 ^b	2.57±0.04 ^b	2.73±0.03 ^b	2.76±0.04 ^b
Protein efficiency ratio	0.54±0.01 ^c	0.88±0.05 ^{ab}	0.86±0.03 ^b	0.96±0.01 ^a	0.90±0.02 ^a	0.90±0.01 ^{ab}
Feed acceptability index	0.31±0.08	0.76±0.11	0.44±0.14	0.48±0.15	0.18±1.10	0.88±0.11
Initial condition factor	0.48 ± 0.01 ^b	0.59± 0.01 ^a	0.55±0.03 ^{ab}	0.62±0.03 ^a	0.50±0.04 ^b	0.56±0.01 ^{ab}
Final condition factor	0.69±0.03	0.80±0.03	0.77±0.06	0.83±0.03	0.71±0.08	0.73±0.03
Number cropped	16.00±0.00 ^d	19.00±0.00 ^a	17.00±0.00 ^c	18.00±0.00 ^b	18.00±0.00 ^b	18.00±0.00 ^b
Survival (%)	80.00±0.00 ^d	95.00±0.00 ^a	85.00±0.00 ^c	90.00±0.00 ^b	90.00±0.00 ^b	90.00±0.00 ^b

Data mean values with different superscripts in each row are significantly different P>0.05, while without data are insignificantly different P>0.05.

Table3: *Production Economics of Vernonia amygdalina fed Clarias gariepinus*

PARAMETERS	VAM1	VAM2	VAM3	VAM4	VAM5	VAM6
Cost of feeding	65.67	86.64	86.98	94.14	93.34	96.08
Cost of fingerling	300.00	300	300	300	300	300
Expenditure	365.67	386.64	388.98	394.14	396.08	393.34
Value of fish	330.80	561.78	565.58	643.66	620.36	601.66
Incidence of cost	2.35	2.02	1.80	1.74	1.86	1.87
Profit index	5.04	6.48	6.50	6.84	6.46	6.45
Net profit	-34.81	175.14	176.60	249.52	224.28	208.32
Cost benefit ratio (Ber)	0.91	1.453	1.45	1.63	1.57	1.53

Values given are mean of three replicates.

Table 4: Physico-chemical parameters of water used for culturing *Clarias gariepinus* fed different levels of propolis and ag-zyme for 84 days²

Parameters	VAM1	VAM2	VAM3	VAM4	VAM5	VAM6
pH	5.56	6.87	6.67	6.51	6.72	6.74
DO(mg/L)	6.67	6.79	6.77	6.76	6.79	6.82
Temp(^o C)	26.81	26.67	26.71	26.75	26.68	26.72

Value given is mean of three replicates

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ASSESSMENT OF INCOME POVERTY AMONG FARMERS IN AKWA IBOM STATE, NIGERIA

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ABSTRACT

The study assessed income poverty among farmers using six Agricultural Zones in Akwa Ibom State. Data on the number of registered farmers in the six (6) Agricultural Zones and data on the level of income across the six agricultural zones in the area used for the study were obtained from the Akwa Ibom State Agriculture Development Project (AKADEP). Questionnaire was administered to the sampled farmers across the Agricultural zones in the area in order to obtain data. Descriptively, tables, charts, percentages, averages, frequencies, mean and maps was used to explain income poverty in the area, while Analysis of Variance (ANOVA) statistical tool was used to determine the spatial variation of income poverty among farmers across the six (6) agricultural zones in the area. From the results, the annual income across the six agricultural zones in Akwa Ibom State indicates that in Uyo Zone, the farmers annual income was between ₦121,000 – ₦140,000,810. In Eket Agric zone, the respondents' income level was less than ₦100,000.00 annually. In the same vein, the farmers' in Abak zone were within ₦141,000.00 – ₦160,000.00 annual income range. In Oron and Etinan Agric zones, the respondents earned between ₦100, 000.00 - ₦120,000.00 annually respectively. Furthermore, the results showed that annual income of the respondents in the area was relatively low as the people earned less than ₦100, 000.00 and ₦120,000.00. Also, the calculated F- value of 53.426 is greater than the table value of 2.64 at 0.010 significant level, the “H₁” indicating a significant variation in income poverty among farmers across the six agricultural zones in Akwa Ibom State.

KEYWORDS: Assessment, Income poverty, Farmers, Agricultural zones, Akwa Ibom State.

INTRODUCTION

Rural poverty the world over, has been observed to be a major problem in the socio-economic development of rural inhabitants. Poverty has been conceived to be the lack of command over commodities and resources that provide people with income and consumption (Lipton and Ravallion, 1995). Also, Sen (1984) viewed poverty as the extent to which the consumption of certain goods and services affords certain capabilities. Therefore, poverty occurs where there is poor production, income inequality, low income, rising vulnerability, destitution resulting from misdistribution of resources, low calorific intake, absence of resources, low life expectancy, stagnation of local economic growth and limitations of access to health, sanitation and education. In spite of the economic policies and institutional structures aimed at reducing income inequality, most rural economies are still characterized by low incomes and rising vulnerability (World Bank, 2008).

These manifestations confirm the prevalence of poverty in Akwa Ibom State, especially among the rural and peri-urban dwellers. Inequality is high in Akwa Ibom State as the total expenditure per month of the highest

10 percent of the population (N8, 235) is seven times higher than that of the lowest 10 percent of the same population (N1,120). Also, using the Gini Index, inequality is 44 percent for food items and 55 percent for non-food items. Additionally, while the overall urban poverty index was 53 percent, rural poverty index was 76 percent. Also, 81 percent of the rural poor use uncovered traditional pit latrines with HIV prevalence rate of 8 percent, second only to Benue State with 10 percent prevalence rate. Rural Akwa Ibom is inhabited by landless, uneducated poor and its crop yield is low because of degraded and polluted land. Its agriculture is mostly subsistent and rain-fed and its man-land ratio is approximately 1. Furthermore, 89.2 percent of the population in Akwa Ibom State resides in the rural areas and 74 percent live below the poverty line of ₦4,954 per adult per month. Therefore, the incidence of poverty has been described as “high, extensive and deep” (AK-BASES, 2005). Based on these, there is high (36.1 percent) unemployment among the rural residents who are characterized by low incomes, high level of poverty, poor quality of life, poor shelter, lack of access to potable water, poor sanitary conditions, poor

transportation, poor energy supply and even poor storage facilities for harvested agricultural produce. Consequently, these have led to increased rural-urban migration, high crime rate, kidnapping, advance fee fraud, social unrest and juvenile delinquency thus, making the rural socio-economic growth and development stagnant and redundant and the urban areas vulnerable to insecurity.

According to Bardhan, (1973) and Ahluwalia (1976), Poverty can be measured using the head count ratio which is based on the ratio or percentage of the number of individuals or households whose income are not equal to the poverty line to the total number of individuals or households (Ginneken 1980). Another method of measuring intensity of poverty is the “income-gap” ratio. Here the deviation of the poor’s incomes from the poverty line is averaged and divided by the poverty line or expressed as its percentage (World Bank, 1980; Ogwumike; 1987; Echebiri, 1997; Van de Walle, 1990). However, with the prevalent rate of poverty in the area, the possibility of increase in social vices and juvenile delinquencies among siblings of the rural poor farmers could bring about social unrest and civil strife in the relatively calm and peaceful rural and peri-urban areas of Akwa Ibom State. This study is therefore aimed at assessing income poverty among rural farmers in Akwa Ibom State. However, this paper is significant numerous ways especially as it highlights the level of income poverty in the study area. Thus, the paper helps to show the spatial and temporal poverty level in different agricultural zones in Akwa Ibom State. Hence, it has provided a baseline information on the poverty level among peasant farmers.

8,412km² and a shoreline of 12km (FIG. 1). The map of Akwa Ibom State roughly represents a triangle; it is bounded to the West by Rivers and Abia States, Cross River State to the East and the Atlantic River on the South-southern Nigerian coastal plain. It has a population of 3.9 million and 31 Local Government Areas of which Uyo, the State Capital has 305,000 (Federal Government of Nigeria, 2009).

Ninety percent of its population live in the rural areas (AK-BASES, 2005) and are engaged mainly in agriculture, trading and the gathering of Non-Timber Forest Products (NTFP). The near absence of industrialization makes Akwa Ibom State a “Civil Service State”. The State is characterized by two seasons, the wet and rainy seasons that last for about 7-8 months, and the short dry season during which the State is covered by dry, dusty, harmattan winds which last for about 4-5months. Rainfall ranges between 2000mm and 3000mm with annual mean temperature between 27^oc and 28^oc (Ekanem, 2010). Agricultural and related works engage about 70 percent of the people of Akwa Ibom State (Okoji and Ekanem, 2010). But agriculture has remained the mainstay and is at subsistent level. Oil palm (*Elaeis Guinensis*) seems to be the only industrial crop and this necessitated the setting up of Akwa Palm Industries in 1981 to harness the full potentials of the crop. Rubber (*Hevea Brasilensis*) and Cocoa (*Theobroama Cacao*) are the other tree crops seeking attention for commercial cultivation. Livestock reared include small-scale poultry, piggery and goats. The coastline of 129 kilometres is characterized with mangrove swamps, rivers, creeks and flood plains. However, fishing practices are still rudimentary and aquaculture negligible.

MATERIALS AND METHOD

Study Area

Akwa Ibom State which was proclaimed on September 23, 1987, is situated between longitudes 7^o30’ and 8^o20’E and latitude 4^o30’ 5^o30’N with a total area of

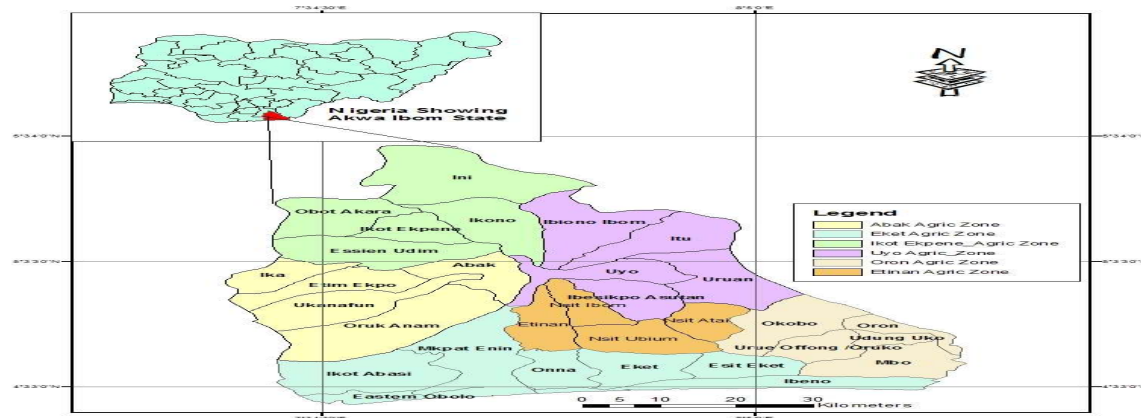


FIG.1: Akwa Ibom State Showing the Different Agricultural Zones

TYPES DATA AND SOURCES

The major type of data required for this study were data on the number of registered farmers in the six (6) Agricultural Zones of Akwa Ibom State and data on the level of income across the six agricultural zones in the area. These data were required to ascertain the level of poverty among rural farmers in the state. These data were sourced from primary and secondary sources. Primary sources of data included copies of the questionnaire administered to the farmers. While secondary sources of data included number of registered farmers in the State obtained from the Akwa Ibom State Agriculture Development Project (AKADEP).

PROCEDURE AND TECHNIQUES OF DATA COLLECTION

For data from primary sources, the respondents will be allowed to record their responses in spaces provided in the questionnaire according to instructions. In the case of illiterate farmers/respondents, their responses will be recorded for them through the aid of the trained field assistants. This will form the core of this work as much of the data will be collected via questionnaires. The population of study was made up of registered farmers in the six agricultural zones in Akwa Ibom State which sums up to 70,535 in number. Furthermore, the Taro Yamane (1967) formula was used to determine the sample size. Hence, a total of 778 registered farmers were sampled across the State as shown in Table 2.1.

Table 1: Registered Farmers in the Agricultural Zones and proportionate sample size form the study

S/N	Agricultural zone	Population of study (Registered Farmers in the Agricultural Zones)	Proportionate sample size (No. of Respondents)
1	Uyo	48241	492
2	Eket	476	15
3	Oron	1297	66
4	Ikot Ekpene	19621	159
5	Etinan	331	17
6	Abak	569	29
	Total	70535	778

Source: Author's Computation, (2015).

TABLE 2: Annual income of respondents across the six agricultural zones

S/N	OPTION	UYO FREQ	%	EKET FREQ	%	ABAK FREQ	%	IKOT EKPENE FREQ	%	ORON FREQ	%	ETINAN FREQ	%
a	Less than N100,000	94	19.4	7	33.3	13	20	32	25.4	6	8.82	3	9.1
b	N100,000- N120,000	101	22.5	6	28.6	12	18.5	48	38.1	19	27.9	17	51.5
c	N121,000- N140,000	113	23.3	0	0	6	9.23	14	11.1	14	20.6	7	21.2
d	N141,000- N160,000	103	21.2	3	14.3	21	32.3	14	11.1	11	16.2	2	6.1
e	Above N180,000	66	13.6	5	23.8	13	20	18	14.3	18	26.5	4	12.1
	Total	485	100	21	100	65	100	126	100	68	100	33	100

Source: Author's Field Report, 2015

The sampling technique used for this study includes the multi-stage sampling based on the six (6) Agricultural Zones in the State as demarcated by the Akwa Ibom State Agricultural Development Project (AKADEP). In the first stage, purposive sampling was used in selecting Local Government Areas with established registered farmers. In the second stage, the lists of registered farmers were being sorted out for the respective LGAs for computation and administration of copies of the questionnaire.

DATA ANALYSIS

The data obtained from the field were analyzed using descriptive and inferential statistics. Descriptively, tables, charts, percentages, averages, frequencies, mean and maps was used to bring the study to a clear perspective. On the other hand, Analysis of Variance (ANOVA) statistical tool was used to determine the spatial variation of income poverty among farmers across the six (6) agricultural zones in the area.

RESULTS AND DISCUSSIONS

Annual Income of Respondent

The annual income in across the six agricultural zones in Akwa Ibom State as shown in Table 5a indicates that in Uyo Zone, the farmers annual income was between ₦121,000 – ₦140,000,810 as the option had a value of 23.3 per cent. In Eket Agric zone, the respondents' income level was less than ₦100,000.00 annually. In the same vein, the farmers' in Abak zone were within ₦141,000.00–₦160,000.00 annual income range as the option had a value of 32.3 per cent. In Oron and Etinan Agric zones, the respondents were within ₦100,000.00- ₦120,000.00 with 27.9 per cent and 55.5 per cent values respectively.

Annual Income of Respondents in Akwa Ibom State

From the foregoing, it can be observed that the annual income of the respondents in the area was relatively low as the people who earn less than ₦100, 000.00 and ₦120,000.00 were much with a total value of 26.4 per cent which was the highest. This was closely followed by those within the income level of ₦121,000.00 - ₦140,000.00 and ₦141,000.00—₦160,000.00 with a percent value of 19.3 per cent respectively. This showed that, poverty in the area was still high as the income level was relatively low. Those within the lowest rung of the income ladder were second with percentage of 19.4 percent. These was closely followed by those within the ₦120,000.00 - ₦140,000.00 and the ₦141,000.00- ₦160,000.00 with 19.3 per cent value each. The respondents with annual income in excess of ₦160,000.00 were mere 15.5 per cent, on the whole, table 5b reveals that income levels were generally low, suggesting a high prevalence of income poverty

Table 2: Annual income of respondents in Akwa Ibom State

S/N	Option	Frequency	Percentage
a	Less than ₦ 100,000	155	19.4
b	₦ 100,000 - ₦ 120,000	211	26.4
c	₦ 120,000 - ₦ 140,000	154	19.3
d	₦ 141,000 - ₦ 160,000	154	19.3
e	Above ₦ 160,000	124	15.5
	Total	798	100

Source: Author’s Field Report, 2015

Spatial Variation of income poverty among farmers across the six agricultural zones

In an attempt to determine the spatial variation of income poverty among farmers across the six agricultural zones, a study hypothesis was postulated as follows;

Ho: There is no significant variation in income poverty among farmers in the six agric zones.

H1: There is a significant variation in income poverty among farmers in the six agric zones.

From the result, since the calculated F- value of 53.426 is greater than the table value of 2.64 at 0.010 significant level, the “H₁” which states that there is a significant variation in income poverty among farmers across the six agricultural zones in Akwa Ibom State was therefore accepted. The result showed that the actual difference in the mean scores between group was quite large with the effect size calculated using eta squared giving a value of 0.06 which is large effect as classified by Cohen (1988).

TABLE 4: Results for Analysis of Variance on income poverty Across the six Agricultural Zones Agriczone

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	29258.160	5	5851.632	53.426	.010
Within Groups	2519.150	23	109.528		
Total	31777.310	28			

Source: SPSS Version 18.0 output

CONCLUSION/RECOMMENDATION

The study highlighted the poverty situation in Akwa Ibom State. The results revealed that the level of rural poverty was actually high across the entire agricultural zones in Akwa Ibom State. The annual income across the six agricultural zones in Akwa Ibom State indicates that in Uyo Zone, the farmers annual income was between ₦121,000 – ₦140,000,810. In Eket Agric zone, the respondents' income level was less than ₦100,000.00 annually. In the same vein, the farmers' in Abak zone were within ₦141,000.00 – ₦160,000.00 annual income range. In Oron and Etinan Agric zones, the respondents earned between ₦100, 000.00 - ₦120,000.00 annually respectively. Furthermore, the results showed that annual income of the respondents in the area was relatively low as the people earned less than ₦100, 000.00 and ₦120,000.00. This was closely followed by those within the income level of ₦121,000.00 - ₦140,000.00 and ₦141,000.00- ₦160,000.00 with a percent value of 19.3 per cent respectively. Furthermore, those within the lowest rung of the income ladder were second with percentage of 19.4 percent, closely followed by those within the ₦120,000.00 - ₦140,000.00 and the ₦141,000.00- ₦160,000.00 with 19.3 per cent values respectively.

Consequent upon these findings, the authorities concerned with poverty reduction/alleviation responsibilities should adopt a geo-spatial approach in handling poverty issues. For instance, this study adopted the geo-spatial perspective (six agricultural zones) in carrying out its aim. Therefore, if each of these agricultural zones is studied in detailed manner, poverty levels would be drastically reduced over time.

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**Conference On National Capacity Building Strategy For
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**Tract Four: National Capacity Building Strategy in Physical
Sciences and Applied Sciences (NCBSPSAS)**

A COMPARATIVE STUDY OF THE HYGROSCOPIC PROPERTIES OF HOLLOW AND SOLID SANDCRETE BLOCKS

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ABSTRACT

Building collapse has been a cause for major concern due to the colossal loss that occurs when it happens. It hampers growth and development; hence efforts must be made to stem the tide. The use of poor quality materials as a result of poor hygroscopic property can be identified as one of the factors responsible for building collapse in many parts of the world. This study examines the hygroscopic properties of both hollow and solid sandcrete blocks. Commercial samples of both types of blocks were collected from block manufacturers and tested for water absorption, volume porosity and moisture content. Laboratory experiment was also set up to obtain values under ideal conditions. Test results reveals that the moisture content of solid sandcrete blocks is higher than that of hollow sandcrete blocks while the water absorption and total volume porosity ratio are lower in solid sandcrete blocks than hollow sandcrete blocks in both the commercial samples and the control experiment. Also the values obtained for all tests in the Laboratory experiment are better than that of the commercial

KEYWORDS: building collapse, quality materials, development, hygroscopic properties and sandcrete blocks.

INTRODCUTION

Generally speaking, development is often driven by the particular need of the moment, without due consideration for the wider or future impacts. This kind of approach can cause large scale crises of diverse nature with the attendant problem of jeopardising the future prospects of the coming generation. Sustainable development therefore is about finding better ways of doing things, both for the future and the present which has at its core an approach to development that looks to balance different, and often competing, needs against an awareness of the environmental, social and economic limitations we face as a society. Brundtland Report defines Sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of needs, in particular the essential needs of the world's poor, to which overriding priority should be given; and *the idea of* limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs”. Infrastructural development is a component in the attainment of national capacity building, sustainable development and poverty alleviation. Buildings, private, corporate or public, residential or industrial constitute part of infrastructural development. Therefore, it must be properly planned, designed and constructed so as to provide adequate stability and desirable satisfaction from the environment. To accomplish this, the materials of construction must be durable and resistant to weather.

Omopariola (2014a), opined that, the use of poor quality materials is one of the major causes of building collapse. This tends to have a dire consequence on national capacity building, sustainable development and poverty alleviation. According to Omopariola (2014b), the collapse of buildings generally goes along with attending colossal waste and human casualties. This can have direct bearing on the economy of an individual, corporate organisation and the nation due to the resulting loss of time, waste of both human and financial resources. Therefore, curtailment of building collapse by ensuring the use of quality materials will enhance individual and national capacity building, sustainable development and as well reduce poverty.

The term hygroscopic has been defined as the property of a substance to absorb or adsorb water from its surroundings (<http://chemistry.about.com>). Wikipedia defines hygroscopic as the ability of a substance to attract and hold water molecules from the surrounding environment. Stating that this is achieved through either absorption or adsorption with the absorbing or adsorbing substance becoming physically changed somewhat. Generally building materials are hygroscopic in that they take up water and subsequently maintain a dynamic equilibrium of water content by absorbing water from the environment or desorb it. This behaviour leads to the expansion and contraction of the material which in turn leads to damage through cracking. The gradual expansion of cracks in buildings as a result of

the hygroscopic properties of blocks will definitely lead to building collapse. Consequently, sustainable infrastructural development and national capacity building will be hampered. However if sandcrete blocks are produced to meet the required standard especially in the area of the hygroscopic properties with adequate moisture content, the Total water absorption will be greatly reduced. Consequently, the Total Volume Porosity will also be greatly reduced and the tendency for the building to collapse as a result of defect in this properties will be avoided. The result will thus enhance national capacity building for sustainable development and poverty alleviation.

LITERATURE REVIEW

According to Omopariola (2014c), there are three basic necessities of life, food, clothing and shelter, the latter being the most lacked in the society today especially in developing countries Omopariola (2014d), stated that one of the major challenges and problems identified in the developing countries in this twenty first century is provision of shelter. As professionals, the optimum input for developing new technologies creating and designing solutions towards alleviating problems is a paramount task hence there is therefore a need for devising appropriate technology which is defined as the art, science and skill suitable to housing and this comprises of all kinds of materials and suitable substances to achieve housing of desired standard. The use of solid sandcrete blocks of smaller thickness is one of such means of accomplishing this task. However due consideration must be given to provision of building materials that is durable to attain sustainable development. Such materials must not be susceptible to any form of failure or result in building collapse. Fagbenle and Oluwunmi (2010) defined building failure as the inability of a building component to perform what are normally expected or required of those components. They posited that when part or the whole of the structure has failed and suddenly gave way in a way that as a result of this failure, the building could not meet the purpose for which it is intended, the building has collapsed. They further stated that this can occur during the different stages of construction process and after and that building failure or collapse cuts across cultural and ethnic barriers.

Oyekan and Kamiyo (2008) opined that for a long time until perhaps a few years ago, sandcrete blocks were manufactured without any reference to any specification either to suit local building requirements or for good quality work. They further stated that the situation has since changed as the standard organisation of Nigeria now has a document in place giving the specifications both for the manufacture and use of standard sandcrete blocks. However according to Omopariola (2014d), the

astronomical increase in the cost of cement has untold effect on the cost of building blocks. This has resulted in compromise of the quality of commercial block production as manufacturers to sharp practices in block production processes by lowering the mix ratio of constituent materials. Baiden and Tuuli (2004), confirmed that mix ratio, materials quality, and mixing of the constituent materials affect the quality of sandcrete blocks. Afolayan et. al. (2008) reported that the commercial blocks which are produced have high coefficient of variation which is an indication of very poor quality control in the production process. However, the author is not aware of any reported research on the hygroscopic properties of solid sandcrete blocks in literature. This study thus present a benchmark for further research in this direction.

According to Hermes, M (2012), water is essential part in the production and application of building materials, it was further stated that several years may pass until construction moisture dries out and the building components achieve moisture equilibrium. However, Thermal-survey.co.uk, is of the opinion that "the main failure of buildings is the damage caused by water and its interactions on the building and local environment. Ingress of water can occur in either vapour or liquid form but only leave the substrate as a vapour. When in liquid form, the water can not only enter by direct means such as rain or direct water contact but also by capillary action. Therefore it is important to understand the effects water has on the materials making up the building. Where most of the effects occur is at a microscopic level at the boundary of the water and the substrate. To a lesser extent there are effects at a macro level but these are associated with weather extremes and are less common in Nigeria. Some of the properties of sandcrete blocks that can affect the quality and hence the durability of sandcrete blocks are water content, water absorption and volume porosity which are considered in this study.

Water content is the quantity of water contained in a material such as soil, rock, ceramics, fruit or wood. It is the amount of water present in a moist sample can be expressed on wet or dry basis. The four states of moisture content were highlighted as: Oven-dry state (OD), Air-dry state (AD), Saturated- surface-dry state (SSD) and Wet state out of which the SSD state is the best choice as a reference state for the following reasons: It represents the "equilibrium moisture" state of the aggregate in concrete; that is, the aggregate will neither absorb water nor give up water to the paste; the moisture content of aggregates in the field is much closer to the SSD state than the OD state; the bulk specific gravity (BSG) of aggregates is more accurately determined by the displacement method in the SSD

condition and the moisture content can be calculated directly from measurements of (BSG) using the displacement method (www.engr.psu.edu).

Water absorption is used to determine the amount of water absorbed under specified conditions. Water absorption is the rate at which water is taken into, and morphed into another object or phase. It is the amount of water absorbed by a composite material when immersed in water for a stipulated period of time or the ratio of the weight of water absorbed by a material, to the weight of the dry materials. Composite.about.com stated that all organic polymeric materials will absorb moisture to some extent resulting in swelling, dissolving, leaching, plasticizing and/or hydrolysing, events which can result in discolouration, embrittlement, loss of mechanical and electrical properties, lower resistance to heat and weathering and stress cracking. www.intertek.com further stated that water absorption is used to determine the amount of water absorbed under specified conditions and that the factors affecting water absorption include: type of plastic, additives used, temperature and length of exposure. Factors affecting water absorption includes: type of plastic, additives used, temperature and length of exposure. Keralli (2001) stated that the total amount of water absorbed is a useful measure of bulk quality. The reason for this is that the total volume of voids (or pore space) in a block can be estimated by the amount of water it can absorb. This property is clearly distinct from the ease with which water can penetrate a block and permeate through it. Knowledge of the value of the total water absorption (TWA) of a block is important because it can be used for routine quality checks on blocks (surrogate test for quality), comparison purposes with set standards and values for other like materials, the classification of blocks according to required durability and structural use and approximation of the voids content of a block. Omopariola (2014d) stated that, the less water a block absorbs and retains the better is its performance likely to be. As a result, reduction in TWA capacity of a block has often been considered as one of the ways of improving its quality. The deleterious effects of moisture on block properties were block that readily absorbs water is likely to be vulnerable to repeated swelling and shrinkage as moisture and temperature variations take place. Repeated swelling and shrinkage is likely to progressively lead to the weakening of a block fabric (either directly or indirectly). A block that contains absorbed water is often weaker with a less hard surface than when it is dry. The presence of absorbed water can also lead to the creation of conditions suitable for the resumption and acceleration of otherwise dormant chemical activity (BS 7543, 1992). Blocks with lower water absorption capacity are not likely to be durable.

Solid materials have pores in them and that sometimes these pores are almost microscopic in size, and sometimes they are very visible. It is the state or quality of being porous; it is a measure of the void (i.e. "empty") spaces in a material, and its fraction of the volume of voids over the total volume, between 0 and 1, or as a percentage between 0 and 100%. It is a measure of how much air or liquid can be present in a material, the ability to absorb moisture into void spaces; it describes the fraction of void space in the material, where the void may contain, for example, air or water and is calculated as the ratio between the pore volumes of a medium. Porosity is controlled by: rock type, grain size, pore distribution, cementation, diagenetic history and composition. The shape, size and volume of pores within a block can determine its bulk performance. (Omopariola 2014b) posited that the capillary porosity which is often the most predominant is believed to be a function of the water-cement ratio and the degree of hydration achieved. He further stated that the value of the degree of hydration achieved can only increase as long as moisture is available to ensure the completion of hydration. Proper moist curing can therefore be a vital factor in influencing the volume fraction porosity of a block.

MATERIALS AND METHODS

Materials

Constituent materials used for the production of sandcrete blocks are Ordinary Portland Cement (OPC) from West African Portland Cement Company, Ewekoro in Ogun State whose properties conform to BS 12, (1978), well graded sand with a continuous or dense gradation, of low plasticity index and free from clay, loam, dirt, soluble salts and organic or chemical matter which can have harmful effects on OPC both during hydration and even after hardening and fresh, colourless, odourless and tasteless portable water.

METHODS

Commercial block production sites were visited in order to ascertain their conformity to lay down processes of production as stipulated in relevant codes and standards. Block samples were also collected from commercial block producers for the purpose of carrying out laboratory tests. In order to obtain desirable result when production is done according to laid down procedures control experiment was set up. The description of the specimen design and preparation was based on the four main stages of sandcrete block production which consists of soil preparation, mixing, moulding and curing. The procedures adopted and the precautions taken to produce the required number of block specimens for the various tests planned were also highlighted. The mix ratio used in the control experiment was 1:8, while the water cement ratio was

0.5. The primary phase of curing was done by spraying with water daily for seven days and also by covering the blocks with waterproof polythene sheet to prevent direct rays of sunlight. While the secondary phase consisted of stacking the blocks side by side for a further 21 days while the curing temperatures were maintained at (22-24°C). The blocks were then removed for testing at the stipulated age of 28 days. Attempts were made to ensure that the results obtained satisfied three basic conditions: accuracy, reliability and reproducibility for all the laboratory based experiments that were carried out.

TEST PROCEDURES

Soil Grading Test: Particle size distribution system of soil analysis was used in grading the soil particles used for the production of both the collected samples as well as the control experiment. The results are shown in tables 1 and 2 in the results and discussions.

The hygroscopic properties identified as likely to influence durability of sandcrete blocks include: Total water absorption (TWA), Total volume porosity (TVP) and Moisture Content (MC). Each of these properties was investigated in this study.

Moisture Content Test: The procedure for moisture content test involves the pre-soaking of the block samples for 24 hours after which it is removed and stacked for 30 minutes to allow the water to drain off. The wet mass was obtained by weighing it in an accurate weighing balance. It was thereafter weighed in the oven dried state for 48 hours after which it was weighed again

The moisture content was determined by using the formulae.

$$Mc = \frac{Ww - Wd}{Vs} = \frac{Mw}{Vs} \quad (1)$$

Where Mc = Moisture content (Kg/m³), Ww = Mass of wet sample, Wd = Mass of dry sample Mw = Mass of water and Vs = Volume of block sample.

Total Water Absorption Test: For the water absorption test, the specimens are dried in an oven for a specified time and temperature and then placed in desiccators to cool. Immediately upon cooling the specimens are weighed. The material is then emerged in water at agreed upon conditions, often 23°C for 24 hours or until equilibrium. Specimens are removed, patted dry with a lint free cloth, and weighed. Water absorption is expressed as increase in weight percent.

Water Absorption = [(Wet weight - Dry weight) / Dry weight] x 100

$$TWA = \{(Ww - Wd) / Wd\} \times 100\% \quad (2)$$

Where TWA = Total Water Absorption, Ww = Wet weight and Wd = Dry weight

Total Volume Porosity Test: The total volume fraction porosity (TVP) in a SCB was determined directly by measuring the weight gain on saturation with water of an initially dry block after evacuation to remove air from the pore network. Total volume porosity is expressed as

$$n = Vv/Vt \quad (3)$$

Where n is the Total volume porosity Vv is the volume of void-space (such as fluids) and Vt is the total or bulk volume of material, including the solid and void components.

RESULTS AND DISCUSSION

Visit to Commercial block production site, revealed that the mix ratio being used in all the sites visited and varies from 1:10 to 1:12. Water was being added randomly as deemed fit by the operators hence there no specific water - cement ratio used for block production. Also manual method was used for mixing the damp soil and the stabiliser. Mechanical method was used for compression of the 150mm and 225mm hollow blocks while manual method was used for the solid sandcrete blocks. The curing of green blocks was done by spraying or sprinkling of water in the morning and in the evening for two days in an open place.

Moisture Content

The moisture content of the commercial samples show a considerable range of variation for both traditional hollow blocks and the solid blocks of smaller thickness, the values obtained are also considerably lower than the recommended values in literature (see Table 3). This is perhaps due to the fact that there was no specified water cement ratio and the fact that poor curing process was followed. It can thus be adduced to be responsible for the higher value of water absorption which is an indication of poor quality block. For the control experiment, the obtained values are higher and within the recommended value of 80kg/m³ (Taylor), and the values increase with size both for the hollow blocks and the solid blocks of smaller thickness.

Total Water Absorption:

The results of the TWA values shown in Table 4 compare well with current recommended maximum values for sandcrete blocks. The recommended maximum is 15% (ILO, 1987). Although this value is neither absolute nor widely adopted by other researchers, it still serves a useful purpose. The values obtained were favourable when compared with those of like materials (clay bricks 0 to 30%; concrete blocks 4 to 25%; calcium silicate bricks 6 to 16% (Jackson and Dhir, 1996)) see Fig 4.2. According to BS 5628 Part 1, TWA values below 7% are regarded as being low, while those above 12% as high. The values for all collected samples of both traditional hollow blocks and the solid

blocks of smaller thickness is slightly higher than 12% and as such can be regarded as high while for the control experiment the values for the traditional hollow blocks falls within the range and can be regarded as moderate and the values for the solid blocks of smaller thickness are lower than 7 hence can be regarded as low. There are marked significant differences in the values of the collected samples and that of the control

experiment (see Table 4). This can be attributed to lack of adherence to specified procedure by the commercial block producers as there was no specified water/ cement ratio and also the curing process was not properly carried out. The above results also confirm that sandcrete blocks have the potential to absorb appreciable amounts of water and possibly retain it too.

Table 1: Grain size distribution of sand used for the commercial samples

Sieve size(inch)	Sieve size(mm)	Weight retained	Weight passing	% Cumulative retained	% Cumulative passing
3	76.2				
2½	63.5				
2	50.8				
1½	38.1				
1¼	31.8				
1	25.4				
¾	19.0				
½	12.7				
⅜	9.5				
³/₁₆	4.76				
No7	2.36	0	922	0	100
No14	1.18	33	889	3.58	96.42
No25	600	180	709	23.10	76.90
No36	425	214	495	46.31	53.69
No52	300	189	306	66.81	33.19
No72	200	150	156	83.08	16.92
No100	150	93	63	93.17	6.83
No 200	75	63	0	100	0
Dust					

Table 2: Grain size distribution of sand used for the control Experiment.

Sieve size(inch)	Sieve size(mm)	Weight retained	Weight passing	% Cumulative retained	% Cumulative passing
3	76.2				
2½	63.5				
2	50.8				
1½	38.1				
1¼	31.8				
1	25.4				
¾	19.0				
½	12.7				
⅜	9.5				
³/₁₆	4.76				
No7	2.36	0	967	0	100
No14	1.18	34	933	3.52	96.48
No25	600	202	731	24.41	75.59
No36	425	198	533	44.88	55.12
No52	300	185	348	64.01	35.99
No72	200	180	168	82.63	17.37
No100	150	118	50	94.83	5.17
No 200	75	50	0	100	0
Dust					

Table 3 Blocks Mean value of Moisture Content

Type	Thickness of blocks (mm)	Mean TWA (%) Commercial Samples	Mean TWA (%) Control Experiment
Solid Sandcrete Blocks	100	17.30	76.83
	125	23.20	73.20
Hollow Sandcrete Blocks	150	12.21	68.06
	225	21.20	66.75

Table 4 Mean Total Water Absorption of Blocks

Type	Thickness of blocks (mm)	Mean TWA (%) Commercial Samples	Mean TWA (%) Control Experiment
Solid Sandcrete Blocks	100	13.01	3.97
	125	12.05	4.50
Hollow Sandcrete Blocks	150	12.99	5.66
	225	12.33	5.61

Table 5 Mean Total Volume Fraction Porosity of Block

Type	Thickness of blocks (mm)	Mean TVP (%) Commercial Sample	Mean TVP (%) Control experiment
Solid Sandcrete Blocks	100	18.74	7.12
	125	19.89	8.08
Hollow Sandcrete Blocks	150	20.30	10.28
	225	20.34	10.21

Volume Fraction Porosity

The total volume porosity values are lower in solid blocks than in their traditional hollow counterparts in both the collected samples as well as in the control experiment as shown in Table 5. The values for both categories of blocks however compare well with those of like materials. Materials with TVP above 30% are considered to be of high porosity (Jackson and Dhir, 1996). All the blocks examined during this research can therefore be considered to be of low porosity.

CONCLUSION AND RECOMMENDATION

Conclusion

The values of the moisture content and total water absorption obtained in the commercial samples did not give a clear indication for comparison between hollow sandcrete blocks and solid sandcrete blocks of smaller thickness. However, the values of the moisture content obtained for hollow sandcrete blocks are lower than that of solid sandcrete blocks of smaller thickness in the control experiment. Consequently, the total water absorption is higher in hollow sandcrete blocks than solid sandcrete blocks of smaller thickness in the control experiment. The results also confirm that sandcrete blocks have the potential to absorb appreciable amounts of water and possibly retain it too. The total volume porosity values are higher in hollow sandcrete blocks than that of the solid sandcrete blocks of smaller thickness in both the commercial samples and in the control experiment. All the blocks examined during this research can be considered to be of low porosity.

Recommendation

It is recommended that commercial block producers be mandated to follow all necessary procedures in the relevant codes and standards in the production of sandcrete blocks. They should also be enlightened on

the need to apply the required water-cement ratio and carry out adequate curing regime in the course of their production processes. Compulsory and regular organised workshop and training on quality control practices in block production processes should be arranged for all stakeholders in the construction industry. Finally, I wish to recommend that if solid sandcrete blocks are produced in accordance with laid down procedures as specified in the relevant codes and standards, it can be used effectively as partition walls as well as in the construction of bungalows and framed structures.

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Samuel Sunday Omopariola is an Engineer with the Works and Services Department of The Federal Polytechnic, Ilaro. He holds a Master of Engineering degree (Structural Engineering Option), he is a member of many professional associations and a COREN registered Engineer. He has presented papers in both national and international conferences and has publications in international journals. Engineer Omopariola is happily married with children.

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THERMAL TRANSMITTANCE OF EXTERIOR WALLS USING THE COMPOSITE ILLITE CLAY – CORK

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ABSTRACT

The development of insulating materials using materials suitable for sustainable buildings development and poverty alleviation by the decrease of their energy consumption and the increase of the comfort of its inhabitant with very low income is very crucial. For this purpose, a series of experimental studies were performed on a type of clay samples, the clay is taken from a mountainous zone in Morocco and was analyzed by the mean of X-ray diffraction. The results show that the clay sample is mainly made up of Illite/muscovite which is a non-swelling clay. Hot plate method and Flash methods were carried out on unfired clay/cork bricks prepared at different proportion of cork. The density of the cork used in this study is 160 Kg/m^3 , the thermal conductivity is $0.049\text{-}0.05 \text{ W.m}^{-1}.\text{K}^{-1}$. The results obtained indicate that for the Illite clay, the thermal conductivity decrease by adding cork from $0.51 \text{ W.m}^{-1}.\text{K}^{-1}$ (for clay alone) to $0.32 \text{ W.m}^{-1}.\text{K}^{-1}$ (60% of cork), to $0.259 \text{ W.m}^{-1}.\text{K}^{-1}$ (80% of cork), to $0.246 \text{ W.m}^{-1}.\text{K}^{-1}$ (for 100% of cork). Finally a comparison of thermal transmittance of exterior walls in Morocco and Mediterranean area for instance Italy was done from the composite material clay-cork air dried using the thermal blocks (Illite clay-100% cork) instead of the existing standard thermal block to see their effect on the energy efficiency of building.

KEYWORDS: composite illite clay. hot plate method, flash method, thermal conductivity, thermal block air dried

INTRODUCTION

Insulation in mountainous area such as Bensmim is the most effective way of improving a home's energy efficiency and can make your home more comfortable as it acts as a barrier to heat flow. In fact, by correctly installing insulation in ceilings and walls, you can effectively reduce heating costs by up to 50% and help to reduce green house gas emissions. Unfired clay blocks proved to be less cost and energy efficient. On the one hand, since clay will be extracted from the region itself and will be sun baked, unfired clay blocks will not require firing and transportation costs that usually largely affect the price of the brick. Furthermore, knowing that Bensmim is a poor rural area and the companies of brickyards in Morocco such as Rabat brickyard consumes an exceed of energy (1305 KJ/kg instead of 1295 KJ/kg of international standard) according to the ministry of environment and the allemande company Hans Lingl Anlagenbau und Verfahrenstechnik GmbH & Co and in the supply of turnkey factories for the production of bricks ("Briqueteries," 2013). According to those reason authors try in this work to improve insulation of a Mountainous area in Morocco for people with very low income by proposing a full brick composed from materials clay-cork and air dried which assure the best energy efficiency for houses. A review in state of the art gives authors the idea to use clay and cork so as to have an air dried brick with a good building insulation

such as the work of Jelle which has treated the advantages and disadvantages of the thermal building insulation materials and consider that cork can be produced as both filler materials or as a boards (Jelle, 2011). Also the study of Asdrubali which treats the acoustical properties of sustainable materials both natural and from recycled materials and consider that cork show good thermal insulation properties, is light and can be very effective for impact sound insulation and not harmful for human health (F. Asdrubali, Schiavoni, & Horoshenkov, 2012). Another work of Khabbazi, and al. which describes the thermal and the mechanical properties of a new material based on granular cork and cement mortar by varying the percentages of cork by using the box method (Khabbazi, Garoum, & OMAR, 2005). Another work, for Mounir and al. which studies the thermal characterization of a mixture of clay bounded by cork and evaluates the energy saving from this composites (Mounir, Maaloufa, Cherki, & Khabbazi, 2014). Moreover, a lot of researches have been done about clay such as the work of N.Laaroussi and al. concerning the thermal properties of a sample prepared using mixtures of clay bricks (Laaroussi, Cherki, Garoum, Khabbazi, & Feiz, 2013). According to all those studies authors try in this work to improve the thermal properties of the material clay by combining it with additives granular cork and characterizing its thermal properties using the recent asymmetrical Hot Plate (Bouchair, 2008; Jannot,

Felix, & Degiovanni, 2010; Lin et al., 2014; Yves Jannot, 2011) and Flash methods (Degiovanni, Batsale, & Maillat, 1996; Degiovanni, Laurent, & Prost, 1979; Parker, Jenkins, Butler, & Abbott, 1961). Furthermore, they studied the effect of volume fraction granular cork variation on the thermal properties of the composites obtained. Finally a comparison of thermal transmittance for exterior walls between the stratigraphy of Moroccan and Mediterranean area such as Italy was conducted to evaluate the best energy efficient system clay-cork.

Cork (Bussler, 1961) is natural, ecological, hydrophobic and renewable product with important thermal and acoustic properties due to its microstructure and porosity. It is coming from Mediterranean area

(Moroccan, Portuguese, Algerian, Tunisian...Forests). Clay is a mineral coming from the decomposition of rock. It's a heterogeneous material on different scales. The mineral clay is formed specially from a mixing of hydrated phyllosilicate. The majority mineral gives the names of this phyllosilicate. It is combined with a different mineral like: Carbonate; silica; oxide and hydroxide of aluminum and Ferriferous mineral.

DESCRIPTION OF USED MATERIALS

CLAY

The clay sample extracted from Bensmim area close to Ifrane was characterized through X-ray diffraction. The results are represented in figure 1.

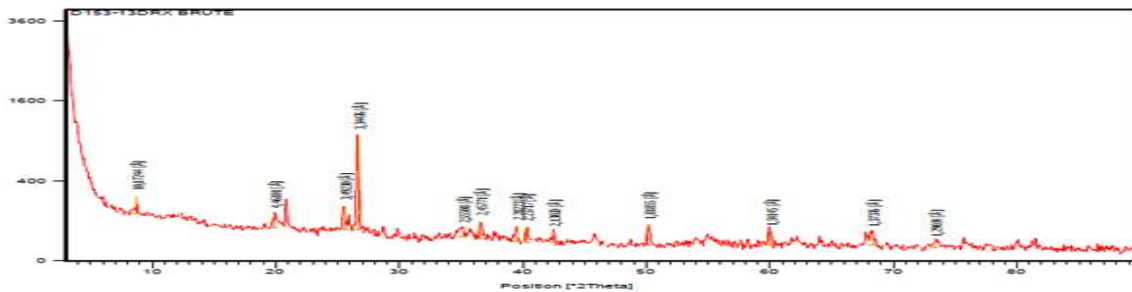


Figure 1: X-Ray diffractometer spectrum of the clay sample extracted from Ifrane Region

The results presented above show that the X-Ray diffraction of the powdered soil sample presents various peaks occurring at different positions. A predominance of quartz in the soil, SiO₂ (d=3.34Å°). The Clayed part

is composed of Muscovite/Illite (d =10.00 Å°). More XRD analysis were conducted through oriented planes to study more the clay part of the sample. The results are represented in the figure 2.

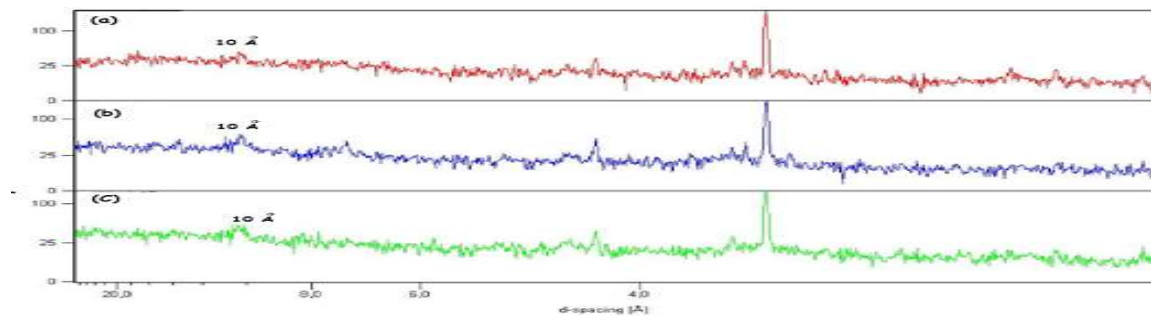


Figure 2: X-Ray diffraction of the (a) clay sample oriented, (b) clay calcinated at 500°C and oriented lame saturated with ethylene glycol.

The figure 2 confirms the presence of the non swelling clay Illite/muscovite clay reflection d=10.00 present at the angle 2θ equal 8° at the interatomic spacing. No change in the present pics was observed after ethylene glycol saturation which confirms again the absence of swelling clay.

CORK

Cork coming from oak Maamora tree is a flexible material, light, compressible, resistant to gases and liquids, fire resistant and it acts as an outstanding acoustic and thermal insulator. Moreover, it's highly

resistant to abrasion. Indeed all these characteristics are immensely influenced as a result of its chemical properties comprising of mainly suberin (45%) which can be echoed (Bussler, 1961). The density of used cork is 160 Kg/m³; the thermal conductivity is 0.049-0.05W.m⁻¹. K⁻¹



Figure 3: Images of Illite Clay in different volume fraction of granular cork

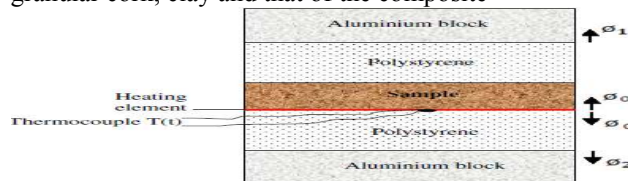
DESCRIPTION OF THE EXPERIMENTAL APPROACH

Samples Preparation And Their Corresponding Densities Measurement

Authors prepared many four samples corresponding to four different percentage volume fraction of granular cork which size is (d-D= 6.3-8mm) by using a normalized sieving process to take into account the effect of volume fraction of granular cork on the thermal properties of the medium. We proceeded to the preparation of many samples. our experience has been done in a mold which dimensions are 100x100x20mm³, in this mold we filled a volume fraction of granular cork until we get a full mold, then we considered that this volume of cork corresponds to 100% in the samples and according to this, we calculated the proportion corresponding to 80% as well as 60% of volume fraction granular cork. Then we added clay in order to fill in the void existing between grains of cork. Furthermore, authors prepared samples of clays without granular cork, having the same dimensions as the other three, in order to compare the thermal properties variation of the mixture. The four samples are then drawn in a stove, to remove moisture present into the pores of each one. Next, dry masses are measured and packed in plastic bags so they can maintain uniform moisture content near zero. The experimental measurements will be performed on these dry samples material. From the knowledge of the dimensions and masses of the fours samples, Authors could easily determine the apparent density of each one. However, the density of the granular cork is determined by the water volume variation method: weighing a quantity of granular cork that filled in a vessel containing a known water volume; the change in volume of water corresponds to the volume of impregnated cork, so we deduce the density of granular cork (The quantity of water penetrating into the granular cork is negligible considering the short experiment's duration which's 5s, due to hydrophobic character of cork). Knowing separately the densities of clay, granular cork and that of the mixture and depending on the mixture's law, we can deduce the granular cork volume fraction in each sample of the composite material according to the formula shown below

$$V = \frac{\rho_{c+co} - \rho_c}{\rho_{co} - \rho_c}$$

: ρ_{co} , ρ_c and ρ_{c+co} are respectively the densities of granular cork, clay and that of the composite



ASYMMETRICAL HOT PLATE METHODS DESCRIPTION

Transient Hot Plate method

The thermal effusivity (E) and thermal capacity (ρ_c) were measured using the transient hot plate method (Yves Jannot, 2011)(Jannot et al., 2010). Contrary to the classical and symmetrical Hot plate transient method, which required two similar samples; we used here the recent asymmetrical experimental device (represented in Figure 5 (a) and 6) that allows characterizing materials by using only one sample. The system is modeled with the hypothesis that the heat transfer remains unidirectional (1D) at the center of the sample (Jannot et al., 2010)

$$\begin{bmatrix} \theta \\ \phi_{h,1} \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ c_h & 1 \end{bmatrix} \begin{bmatrix} 1 & B_1 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} A_1 & B_1 \\ c_1 & D_1 \end{bmatrix} \begin{bmatrix} \theta_1 \\ \phi_1 \end{bmatrix} \\ = \begin{bmatrix} A_2 & B_2 \\ c_2 & D_2 \end{bmatrix} \begin{bmatrix} \theta_2 \\ \phi_2 \end{bmatrix} \quad (2)$$

$$\begin{bmatrix} \theta \\ \phi_{h,2} \end{bmatrix} = \begin{bmatrix} A_2 & B_2 \\ c_2 & D_2 \end{bmatrix} \begin{bmatrix} \theta_2 \\ \phi_2 \end{bmatrix} \quad (3)$$

$$\begin{aligned} \phi_0 &= \frac{P}{P} \\ &= \phi_{01} + \phi_{02} \end{aligned} \quad (4)$$

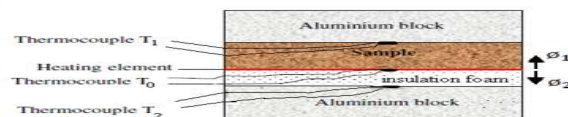
C_h the thermal capacity of the heating element per area unit: $C_h = \rho_h c_h e_h$; R_c the thermal contact resistance between the heating element and the sample. P is the Laplace parameter

$$\begin{aligned} A = D &= \cosh\left(\frac{Pc}{E} e \sqrt{p}\right); B = \frac{\sinh\left(\frac{Pc}{E} e \sqrt{p}\right)}{E \sqrt{p}}; C \\ &= E \sqrt{p} \sinh\left(\frac{Pc}{E} e \sqrt{p}\right) \end{aligned} \quad (5)$$

$$\begin{aligned} A_1 = D_1 &= \cosh\left(\frac{p}{\alpha_1} e_1\right); B = \frac{\sinh\left(\frac{p}{\alpha_1} e_1\right)}{\lambda_1 \sqrt{p}}; C \\ &= \lambda_1 \sqrt{p} \sinh\left(\frac{p}{\alpha_1} e_1\right) \end{aligned} \quad (6)$$

E is the sample thermal effusivity $E = \sqrt{\lambda \rho c}$, ρc the sample thermal capacity, e the sample thickness, λ_i the Polystyrene thermal conductivity; α_i is the Polystyrene thermal diffusivity, e_i the Polystyrene thickness

$$(1)$$



Combining those five equations, the system leads to

$$\theta(p) = \frac{\frac{\theta_0(p)}{s_1 + b_1}}{\frac{s_1 + b_1}{s_1} + \frac{b_2}{s_1}} \quad (7)$$

The method's principle is to estimate the value of the parameters (E), (pc), (Rc) and (Ch) that minimize the sum of the quadratic error

$\Psi = \sum_{j=0}^N [T_{exp}(t_j) - T_{mod}(t_j)]^2$ between the experimental curve and the theoretical curve calculated with relation using the Levenberg-Maquardt algorithm(Marquardt, 1963). The inverse Laplace transformation is realized by using the De Hoog algorithm(de Hoog, Knight, & Stokes, 1982)

Hot Plate In Steady State Regime

The Hot Plate method in steady state regime (Jannot et al., 2010; Yves Jannot, 2011; Yves Jannot, Benjamin Remy, & Alain Degiovanni, n.d.) enables to characterize thermal conductivity (λ) of samples. Figure 2 (b) illustrates the experimental device of this method, once the system reaches the steady state regime, we can write:

$$\phi = \phi_1 + \phi_2, \quad \phi_1 = \frac{\lambda_1}{e_1} (T_0 - T_1), \quad \phi_2 = \frac{\lambda_2}{e_2} (T_1 - T_2) \quad (8)$$

$$\lambda_1 = \frac{\phi_1}{T_0 - T_1} \left[\phi - \frac{\lambda_2}{e_2} (T_1 - T_2) \right] \quad (9)$$

ϕ is the total flow emitted by the heating element. λ_1 The thermal conductivity of the sample that we look for, e_1 the thickness of the sample; $\lambda_2 = 0.04 \text{ W.m}^{-1}\text{K}^{-1}$ and $e_2 = 10 \text{ mm}$: are successively thermal conductivity and thickness of the insulating foam

FLASH METHOD

Experimental approach of the flash method

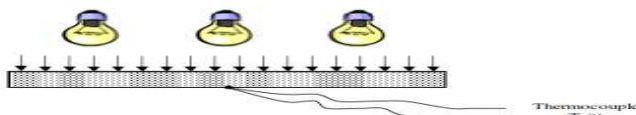


Figure 6: Schema of flash method

This method permits to determine the diffusivity of solid(Degiovanni et al., 1996, 1979). Its principle is described in the figure 4. we send a strong luminous flow on the sample's parallel faces in a short period. A thermocouple in touch with the bottom face permits to register the rise of temperature in the moment when the face receives the flash. A modeling of heat transfer in the sample has been done to estimate the thermal diffusivity with the experimental thermogram. According to laplace. The method of quadruples permits to write

$$\begin{bmatrix} \theta_1(p) \\ s_1(p) \end{bmatrix} = \begin{bmatrix} \cosh qe & \frac{1}{\lambda q s} \sinh qe \\ \frac{1}{\lambda q s} \sinh qe & \lambda q s \sinh qe \end{bmatrix} \begin{bmatrix} \theta_2(p) \\ s_2(p) \end{bmatrix} = \begin{bmatrix} A & B \\ C & D \end{bmatrix} \begin{bmatrix} \theta_2(p) \\ s_2(p) \end{bmatrix}$$

According to the Laplace transformation:

$$\theta_0(p) = L[\theta_0(t)] = \theta_0/p [1 - \exp(-pt_0)] \quad (11)$$

We combine this relation we have

$$\theta_2(p) = \frac{\theta_0}{p} \cdot \frac{1 - \exp(-pt_0)}{C + 2Ah + B^2h^2} \quad (12)$$

RESULTS

Density

The density measurements of all samples were made by weighing each one and knowing their dimensions. Concerning the granular cork, it was made using the water volume variation method. Different samples were made with the variation of the volume fraction percentage of granular cork in the medium. The results that are presented in Figure 7 show a correlation between densities and volume fraction granular cork. The results of Illite clay cork characterization indicate that the density is decreasing from 2029 (kg/m³) (clay alone) to 1109(kg/m³) (composite 100%-cork)

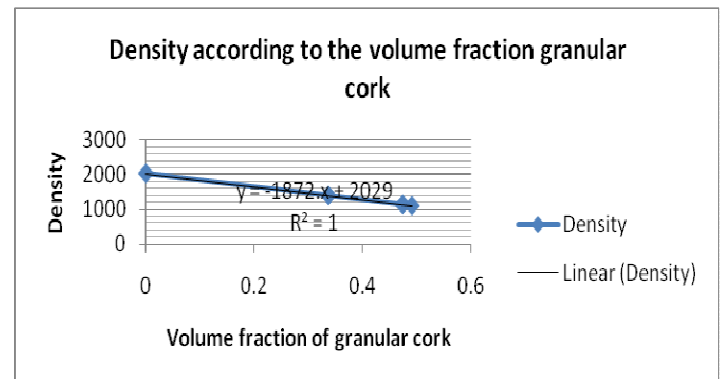


Figure 7: Figure of density according to the volume of granular cork

Thermal Effusivity By The Asymmetrical Transient Hot Plate Method

Authors apply the method for each sample with (w/g=0.25). Figure 8 shows the correlation between thermal effusivity and volume fraction granular cork. This thermal property for Illite clay decreases from 862 to 492 (J.m⁻².K⁻¹.s^{-1/2}) (for composite 100% cork) with the increase of granular cork volume fraction from 0 to 0.49

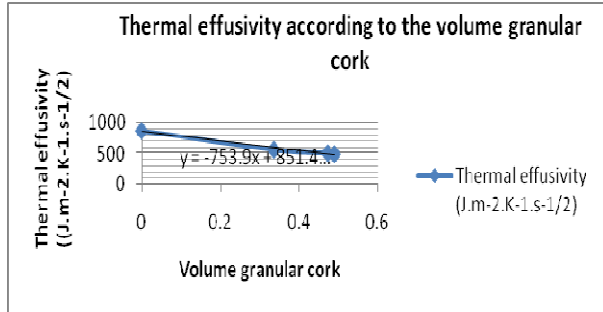


Figure 8: Figure of Thermal Effusivity according to the volume of granular cork

Thermal Conductivity By The Method Hot Plate In Steady State Regime

Authors use the hot plate method in the steady state regime to characterize this thermal property. Results show that thermal conductivity for Illite clay decreases from 0.51 (clay alone) to 0.246 (W.m⁻¹.K⁻¹) (for composite clay-100% cork). Figure 9 shows the correlation between thermal conductivity and volume fraction granular cork

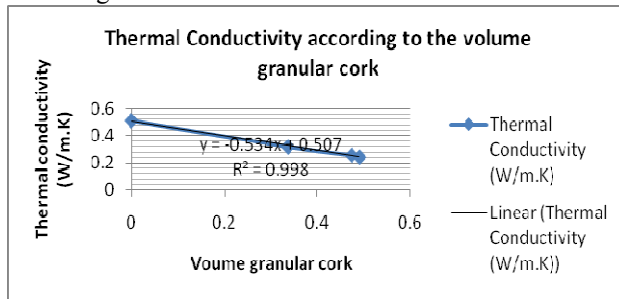


Figure 9: Figure of Thermal conductivity according to the volume of granular cork

Thermal Diffusivity By The Flash Method

Results show that thermal diffusivity of the composites decreases from 5.07.10⁻⁷ (clay alone) to 3.09 .10⁻⁷ (m².s⁻¹) (clay-100% cork) when the volume fraction cork increase from 0 to 0.489. Figure 10 shows the correlation between thermal diffusivity and volume fraction granular cork

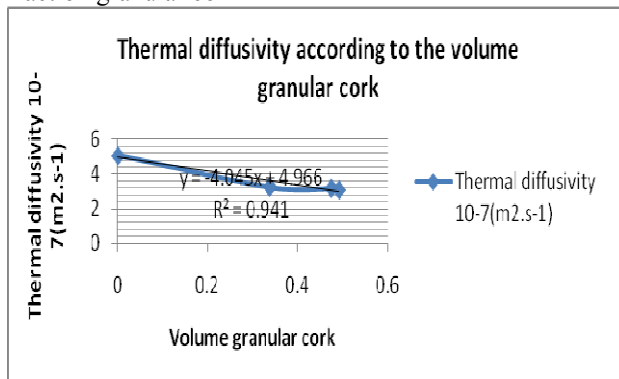


Figure 10: Figure of Thermal diffusivity according to the volume of granular cork

Thermal Transmittance Of An Exterior Walls In Morocco And In Italy As A Mediterranean Area

According to the research of Asdrubali (Francesco Asdrubali, D'Alessandro, Baldinelli, & Bianchi, 2014) evaluating in situ thermal transmittance of green building masonries-A case study where the thermal transmittance of different thickness and layer for an exterior walls is calculated. The thermal transmittance is calculated according to the ISO 6949 using the formulae.

$$\frac{1}{U} = \frac{1}{h_i} + \frac{1}{h_e} + \sum_i \frac{e_i}{\lambda_i} \quad 13$$

In the thesis of Idchabani (Idchabani, 2014), the composition of Moroccan wall is composed from :standard brick of 7cm-air gap 7cm-standard brick of 7cm. Authors will analyze the value of thermal transmittance using instead of standard wall's block of Morocco and Mediterranean area (Italy) (using Asdrubali's research (Francesco Asdrubali et al., 2014)), our proposed thermal block of $\lambda=0.246$ W/m. K

We conclude that the thermal block proposed in our research reduced thermal transmittance in standard Moroccan wall's from 1.44 W/m².K to 0.93W/m².K. and for the Mediterranean composition for the first case it gives above the same thermal transmittance .In the second case it reduces thermal transmittance from 0.29 to 0.23 W/m².K which proves the interest of our thermal block clay_cork , in the third case the thermal blocks gives the same thermal transmittance as Asdrubali's thermal block in the fourth case it gives a value of thermal transmittance higher than the blocks of Asdrubali's (Francesco Asdrubali et al., 2014) as shown in table1.

Table 1. Results of thermal transmittance using the thermal block Illite Clay-Cork in Morocco and in the Mediterranean area

Mediterranean Wall Composition		Moroccan Wall Composition	
Type of Material	Thickness (cm)	Type of Material	Thickness (cm)
Case 1		Case 1	
Plaster	e=1.5 cm	Mortar	e=1.5 cm
Thermal Block $\lambda_{eq}=0.24$ W/m.K	e=15 cm	Brick of 7cm thickness R=0.16 W/m.K	e=7 cm
Thermal insulation $\lambda=0.033$ W/m.K	e=6 cm	Air gap	e=7 cm
Mortar	e=1 cm	Brick of 7cm thickness R=0.16 W/m.K	e=7 cm
Thermal Block $\lambda_{eq}=0.24$ W/m.K	e=12 cm	Mortar	e=1.5 cm
Total thickness	e=37 cm	Total thickness	e=24 cm
Calculated Transmittance	0.34 W/m ² .K	Calculated Transmittance	1.44 W/m ² .K
Case 2		Case 2	
Plaster	e=1.5 cm	Mortar	e=1.5 cm
Thermal Block $\lambda_{eq}=0.24$ W/m.K	e=12 cm	Thermal Block $\lambda_{eq}=0.24$ W/m.K	e=21 cm
Air gap	e=2 cm	Mortar	e=1.5 cm
Thermal insulation $\lambda=0.033$ W/m.K	e=6 cm	-	-
Mortar	e=1 cm	-	-
Thermal Block $\lambda_{eq}=0.24$ W/m.K	e=18 cm	-	-
Total thickness	e=42 cm	Total thickness	e=24 cm
Calculated Transmittance	0.29 W/m ² .K	Calculated Transmittance	0.93 W/m ² .K
Case 3		Case 3	
Plaster	e=1.5 cm	Mortar	e=1.5 cm
Thermal Block $\lambda_{eq}=0.246$ W/m.K	e=25 cm	Thermal Block $\lambda_{eq}=0.24$ W/m.K	e=7cm
Air gap	e=3 cm	Air gap	e=7 cm
Thermal insulation $\lambda=0.033$ W/m.K	e=6 cm	Thermal Block $\lambda_{eq}=0.24$ W/m.K	e=7 cm
Mortar	e=1 cm	Mortar	-
Thermal Block $\lambda_{eq}=0.246$ W/m.K	e=12 cm	-	-
Total thickness	e=49 cm	Total thickness	e=24 cm
Calculated Transmittance	0.27 W/m ² .K	Calculated Transmittance	0.27 W/m ² .K
Case 4		Case 4	
Plaster	e=2 cm	Mortar	e=1.5 cm
Thermal Block $\lambda_{eq}=0.246$ W/m.K	e=25 cm	Thermal Block $\lambda_{eq}=0.24$ W/m.K	e=12 cm
Air gap	e=4 cm	Air gap	e=7 cm
Thermal insulation $\lambda=0.033$ W/m.K	e=6 cm	Brick of 7cm thickness R=0.16 W/m.K	e=7 cm
Mortar	e=1 cm	Mortar	e=1.5 cm
Thermal Block $\lambda_{eq}=0.246$ W/m.K	e=12 cm	-	-
Total thickness	e=50 cm	Total thickness	e=29 cm
Calculated Transmittance	0.268 W/m ² .K	Calculated Transmittance	0.268 W/m ² .K

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EMPLOYMENT KIOSK

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ABSTRACT

The major reason for poverty in most of the places is unemployment. To improve the financial status of a person, a good employment is required. This model is used to provide employment and eventually eradicate poverty. The idea is to install kiosk booths in poverty struck areas. The kiosk will bridge the gap between recruiters and unemployed person. The kiosk contains information about the job vacancies throughout the world. Each person below the poverty line is given a 4 digit unique pin which will be used by him/her to access his/her account. The database of each account user is maintained. When the person enters his 4 digit pin, all the jobs related to his/her domain are displayed and the person can select the job which suits him/her the best. Later a hard copy in the form of printout is produced which can be used by the person to get job from the particular company. We might not be sure that the person who is going to use the kiosk is a literate or not. Therefore the output from the kiosk comes as speech. The input which is to be given to the kiosk by the user is in the form of numbers. The voice which is from the kiosk can be the local's language. Therefore by providing job opportunities for people struck by poverty and by providing proper guidance to them, poverty can be eradicated.

KEYWORDS: kiosk, mongodb, touchscreen, linux, virtual keyboard.

INTRODUCTION

The Employment kiosk gives a solution to the problem which is raised now, poverty alleviation. The basic idea is to build an Employment kiosk where a direct link exists between the firm which provides job and people who require it without the involvement of a middle man. When a person chooses the job he/she wants, an intimation is sent to the company regarding the same and a letter is printed immediately for the person to carry the same during interview. The kiosk is made user friendly. Open kiosk is one of the best kiosk software available in the open-source community. Its goal is to achieve simplicity and elegance in kiosk terminals. The benefits of the proposed model are as follows

- Easier to find job
- Can get work in their field of expertise
- Can know the job competition
- Need not struggle to search for job
- Immediate employment

By implementing this idea, the development of a country can also be achieved. The reason is that when the people of a particular country are employed, the economic status of the country will be uplifted because the people below the poverty line will be slowly moving out. As a result of this, the National capacity of a

country is well built and a country reaches a higher status.

STRUCTURE

Kiosk software is a system and user interface software designed for an interactive system. The software locks down the application in order to protect the kiosk from user manipulation. The locking system is done by prevailing entry through a password or card. This software can be extended to offer remote monitoring to manage multiple kiosks from any location.

Kiosk software that is created has a touch screen. The touch screen allows the user to touch the monitor screen to make selections. A virtual keyboard is used instead of the computer keyboard.

Text-to-speech technology brings the written word to life, offering people who are not trained to read and write.

Options are to be clicked for selection by the user.

PROCESS FLOW

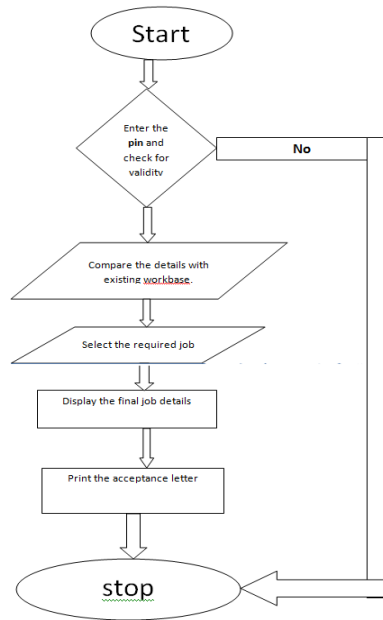


Fig. 1: Process flow

Fig. 1 is a flowchart which shows the process flow. Initially the pin is entered and checked whether it is valid or not. If it is valid, it proceeds to the next step and if not the process terminates. Then the details of the user are compared with the requirements of the company which exists in the work base. After the comparison, the jobs which match the user are given to the user from which he is asked to shortlist according to his requirement. Finally, the letter is printed for the user to carry over while he/she meets the company executives.

ALGORITHM

```

begin
read the company details from the memory
read the employee details from the memory
if company number ="cpin"
begin
if input="update"
begin
read the details from the user
update the information in the memory
end(update)
if employeeedetails=jobdetails
begin
select the desired job and company
send a confirmation print to the employee
end(details)
end (cpin)
if employee number="epin"
  
```

```

begin
if input="update"
begin
read the details from the user
update the information in the memory
end(update)
if jobdetails=employeeedetails
begin
select the desired job and company
send a confirmation print to the employee
end(details)
end(epin)
end
  
```

KIOSK

There are different types of kiosks which are used for various purposes. Some kiosks come with a keyboard while some are touch screen. There is no necessity for a kiosk with keyboard in this case because the input is only numbers and no alphabets are used. Therefore a kiosk with only Numerical pad or a touch screen kiosk is used. Based on the analysis made by us regarding the type of kiosk to be used, we settled on edge wall mount (Fig.: 2) as it appears economical and also user friendly. A printer can also be connected to the kiosk in order to print the letter which is to be carried by the user. It is more important that a speaker is connected to the kiosk as the output from the kiosk is in the form of voice. For better understanding by the user, good quality speakers are to be connected to the kiosk.



Fig. 2: Kiosk

PROGRAMMING THE KIOSK

HTML with CSS is used to design the front end of the kiosk. HTML is more user friendly when compared to other programming languages and is also easy to code. The back end is programmed using PHP which is a server side scripting language designed primarily for web development but can also be used as a general-purpose programming language. The database is maintained using MongoDB which is a cross platform, no SQL database.

OPERATING SYSTEM

Employment Kiosk is a Linux-based operating system, developed for self-service terminals. Thus a very simple and cost effective device can be made. Approved for different platforms and hardware configurations - including low processing power machines - the system provides a tool for remote administration and comfort to users by supporting touch screen devices.

KIOSK ARCHITECTURAL NEEDS

Secure Browser

The KIOSK SERVICE PLATFORM (KSP) browser uses an IE8-based browser. This browser allows developers to use web based development tools and duplicate the web's look in the custom applications. This function allows easy porting of existing web-based applications to the kiosk.

Local Kiosk and Device Control Function

KSP controls all devices connected to the kiosk I/O ports and uses the local program to monitor the status, control the terminal and peripherals. The KSP manage all maintenance and servicing requirements. The software platform handles all exceptions locally. KSP uses the intelligent middleware to maintain constant knowledge of the states of all hardware components and kiosk peripherals. If a failure occurs the detailed information is automatically forwarded to management and maintenance, they suggest repair actions together.

Management and Maintenance Function

KSP set operations like menus, volume control, security code settings, shut down and restart functions, log file management, etc. To simplify the maintenance guidance is provided on the screen of the kiosk.

SECURITY

The system software addresses security by deterring users from maliciously attacking or hacking into the kiosk. It is critical that the kiosk software prevent the user from ever reaching the desktop or file system. This type of security can be difficult because standard print dialog allows the content to be printed to a file and enable the user access to the file system.

Kiosk software comes in a number of versions. A standard lockdown browser environment or information kiosk software where a touch screen keyboard might be needed. The touch screen keyboard is often part of the kiosk software and is custom touch screen keyboard.

Kiosk software has the facility for an administrator to configure the software to suit the users Administrators can enable or disable parts of the kiosk software via secure log in.

Additional kiosk system software can be attached to secure the kiosk more effectively.

Security Features

- Multiple security levels are present for management and maintenance
- Secured customer information are not stored locally
- Secured customer information are protected in case sessions
- Proximity sensor a type of sensor that indicates when a user has left the kiosk without logging out, then secured customer information is deleted automatically after some time.

PERVASIVE NETWORKING CAPABILITIES

In the past, the only way to update or modify a kiosk application was to reinstall the kiosk software in each place. But now advances in network computing has made it possible to update kiosks from a centrally located computer, which has made it easy to enter the changes in price, up-to-the-minute product availability, or new interest rates, etc. In addition, a growing number of organizations are saving on hardware costs by installing kiosks that are "thin clients" (computers with limited processing power and storage capabilities networked to a central client/server application to control most of the kiosk operations).

EASIER INFORMATION ACCESS

Kiosks can dispense information 24 /7, minimizing the need for customer service personnel. Open Kiosk is an integrated multi-platform kiosk management system. Open Kiosk is suited for use in locations where a controlled computing environment is paramount such as public access systems. Open Kiosk simplifies the way users launch and interact with programs making it an ideal solution for introducing a Linux box to newcomers. The Kiosk Mode Desktop can be administered remotely, by completely replacing the standard Linux/Windows desktop with a much more controlled but intuitive environment that looks the same across all platforms. The customer will not know

whether you are running a Windows or another OS under the hood.

FRONT END OF THE KIOSK

Fig. 3.1 shows the screenshot of the first page of the kiosk in which the pin of the user is to be entered.

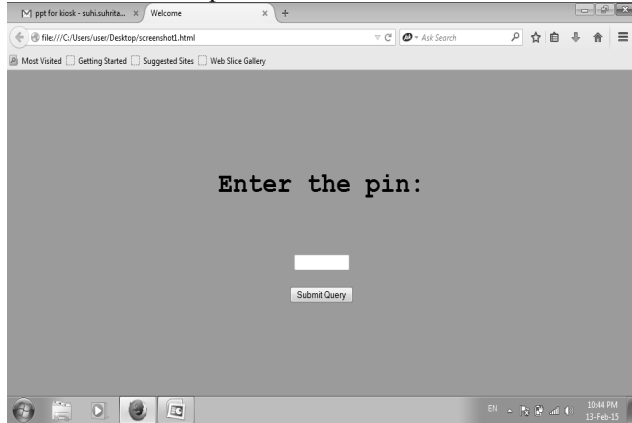


Fig. 3.1: First page

Fig. 3.2 shows the screenshot of the second page of the kiosk which displays the details of the recruiting companies



Fig. 3.2: Company details

Fig 3.3 shows the screenshot of the approval form which will be made as a hard copy.

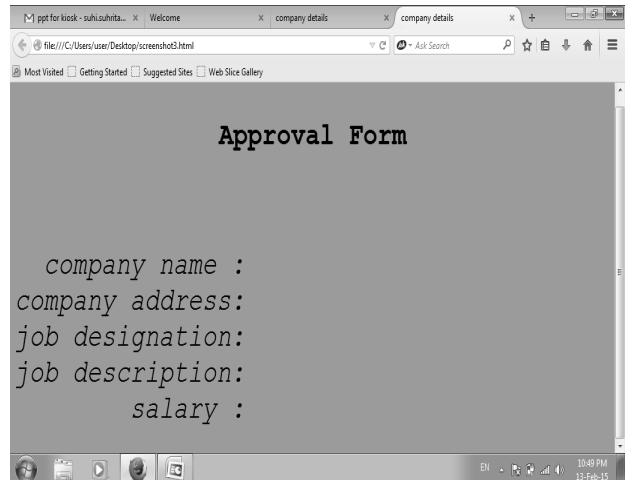


Fig. 3.3: Approval form

CONCLUSION

The main reason for poverty is unemployment. When a solution to unemployment is found then poverty eventually gets eradicated. This is an attempt to find a solution to unemployment by bridging the gap between an unemployed person and a company without the involvement of a third party. By giving proper guidance to people struck by poverty, it is positive that they get the job they deserve.

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Swathi P.K. was born on 20th June, 1994. She is pursuing Bachelor of Computer Science and Engineering at RMK Engineering College and is presently in third year. She completed 12th grade in the year 2012 in Maharishi Vidya Mandir and 10th grade in the year 2010 at S.B.O.A. Matriculation and Higher Secondary School. She has attended several conferences, workshops and symposiums. She is an effective communicator and has presented her papers in several conferences and conventions and won a few. Her areas of interest are Artificial Intelligence, Big data and Web technology.

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THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN PROVIDING JOB OPPORTUNITIES FOR YOUTH IN THE DEVELOPING WORLD

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ABSTRACT

Information and communication technology (ICT) plays an important role in our everyday life such that it becomes indispensable in the contemporary world. The use of information and communication technology (ICT) has become integral part of our life in such a way that it is inevitable in every aspect of human Endeavour ranging from educational needs, social needs, commercial needs and above all security needs. As part of human capacity building many ICT centers employ youth to manned the centers sometimes twenty four hours daily serving customers in the developing world. The ICT centers in the developing world is now becoming center of attraction as youth engage themselves to seek employment, to chat with friends as well as to propagate social and political views among others..In addition ICT provide the youth with technical knowhow of architectural design in building thereby earning a lot of money from their clients. It also provides job opportunities for the youth where maintenance and repairs are being carried out by the youth. This paper focuses on the major role being played by ICT in the developing world and its contribution to human capacity building and job creation.

KEYWORDS: information, communication, technology, job opportunities and development

INTRODCUTION

Information and communication technology (ICT) have profound influence in the contemporary world such that it has taken every sphere of life today. The advent of information and communication technology has made the world a global village where all activities concerning human and material resources are utilized for optimum result. ICT has made every aspect of life easier such that patients living in some part of the world could be diagnosed in another part of the world in a couple of minutes in the same vein commodities manufactured in one part of the world could be sold in another part of the world in few second as maintained by Adebayo and Akinola (2008) that the presence of ICT make the match of globalization an indisputable reality. Indeed, the fast growing developing economies such as China, Singapore and India depend largely on ICT as their major track for their development in all ramifications .The fast growing development of ICT has reached every part of the world including African countries. In his view Oremadu (2003) stated that the advent of ICT and E-commerce have bound the economies of the world together. In view of the above foregoing significance of the ICT it was generally define by Tinio (2015) as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." "ICT implies the technology which consists of electronic devices and associated human interactive materials that

enable the user to employ them for a wide range of teaching - learning processes in addition to personal use." These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony. "ICT is that technology which uses the information to meet human need or purposes including processing and exchanging. The system could also be seen as "The acquisition, recording, and processing of data which is finally retrieved as information via electronic signals for usage. ICT therefore refers to the convergence of audio-visual and telephone networks with computer networks, and the technology encompasses a wide range of activities, ranging from office data processing to remote control and monitoring of manufacturing robots. It also covers the cabling infrastructure e.g. fiber optic cables, which carry voice, data and video communications. A major offshoot of the convergence of information and communication technology is the emergence of the internet, which is a content distribution network comprising of a global system of interconnected computer networks through which data is interchanged. The technology consists of millions of private and public academic, business and government networks of both local and global scope which facilitates the dissemination and exchange of information, and makes diverse other forms of non-physical interaction the new reality.

Human Capacity Building In ICT And Job Creation In The Developing World

The rapid development of information and communication technology (ICT) in the developing world has become an avenue of providing job opportunities for youth in many counties of the world. According to the latest ITU report, Digital Opportunities: Innovative Solutions for Youth Employment (2014) maintained that High youth unemployment not only hampers economic growth but for youth it can be a debilitating experience that affects their ability to lead productive and rewarding lives. The report further maintained that "To promote youth unemployment it is essential that youth in their countries obtain digital skills, including how to become ICT creators". Moreover, the emergence of social network such as face book, whatsapp, you tube, and twitter has greatly improve the use of ICT in the world. A number of public and private ICT centre's have been running for almost twenty four hours daily in order to serve people with different needs of life. The trend of development in ICT has immensely contributed to providing job opportunities for young men and women who are rooming the streets due to lack of employment in the developing World. It is undoubtedly true that ICT is making significant role in facilitating employment opportunities among youth by manning the centre's as well as performing creativity work such as design of buildings, design of arts work as well as maintenance activities of ICT equipments among others. According to peter Jack (2014) the ICT sector in Nigeria is currently boosting the federal government effort in job creation on an average of about 12 million jobs from 2012 to date which is a significant improvement against the 2.5 million jobs the sector created" between" 2002 - 2012. In line with its investment policy the World Bank express its readiness in providing 2 million dollar investment on facilities to promote growth and employment projects on ICT in Nigeria in the year 2014. In his view Christine zhen- Wei Qiang in(2009) stated that "The mobile platform is emerging as the single most powerful way to extend economic opportunities and key services to millions of people". He further maintained that, investment in telecom services in African region between the years 2000-2007 reached \$20 billion and number of mobile subscribers increased from 2 million in 2000 to over 150 million in 2007.

The universality of ICT has made it an indispensable media for transacting every aspect of human and material resources in the world. This trend of development has provided significant changes in the life of thousandth of youth in the developing world. The trend of development is manifested in the provision of jobs opportunity for self reliance across the globe. For

instance, in Nigeria many private organizations have been training young men and women in ICT management in order to be self reliant. Also, governmental organizations such as Subsidy reinvestment programme(SURE-P),National Directorate of Employment(NDE) as well as voluntary agencies are training young people in ICT capabilities. Similarly, Peterson (2012) reported that due to shortage of manpower in ICT, Microsoft South African innovation centre and the International youth foundation promote the students to business enablement programme that aim to place 10,000 graduates in jobs by 2010. Also, IBM is setting an innovation centre in Johannesburg to help company develop ICT skills and workers meet business challenges. The centre will give access to 38 innovation centres and 60 R&D laboratories that IBM has worldwide. MTN is investing in skills development to deal with South Africa's human resources shortage. CISCO is also investing in skills development with the Global Talent Acceleration Program in South Africa. The African Development Bank is investing in information and technology skills at two regional Centers' of Excellence in ICT in Tunisia and Rwanda and in a High Tech Centre in ICT in Mali. These centre's train senior level managers, entrepreneurs, government and private sector employees, and university students pursuing advanced ICT studies. The International Telecommunication Union (ITU) is promoting a scholarship for ICT studies, a Youth Education Scheme (YES), and an internship to develop ICT professional skills, (YIS). Applications for YES can be 12 times higher than that for scholarships. Only Alcatel-Lucent and Thales Communications are participating on YIS by offering training, but taking into account the large number of ICT companies in Africa, more should be involved. The ITU is also promoting a project aiming to raise ICT awareness in indigenous communities. The UN Conference on Trade and Development (UNCTAD) is providing custom training for engineers and technicians from least developed African countries under its Connect Africa project. Lesotho is the first pilot project and gets 220 computers and open source software. UNCTAD is also working on courses that concentrate on biotechnology and ICTs. Nine courses were held between 2006 and 2008 in China, Egypt, India, South Africa, Tanzania and Tunisia. There are three times more applications than there are places. According to the World Bank report on World economic forum (2010), the ICT is becoming the largest distribution flat form of providing public and private services to millions of people in rural and poor areas market information, financial services, education and health services that had largely been unavailable in those areas in the past due to lack of connectivity of any kind. The report further stated that out of 26 sectors from 56 developing countries indicate that businesses

that use ICT(phone pc and e mail) more intensively are more productive, grow faster invest more and are more profitable The study include small and medium enterprise globally. A study conducted by World Bank in September 2013, revealed that there are three global drivers responsible for the increase in ICT related jobs worldwide:

- a. Greater connectivity- more than 120 countries now have 80 percent market penetration of mobile telephones
- b. Digitization of more aspect work- today telecommunicating and outsourcing have become standard business practices globally
- c. More globalized skills-India and the Philippines have become major out sourcing hubs thank to their English language skills, and other countries are targeting the sector for future growth.

In terms of connectivity, the World Bank report further stated that ICT connect about 12 million people worldwide find work by connecting them with employers globally. Companies such as Babajob in India, Duma and M- Kazi in Kenya, and souktel in the Middle East and North Africa are example of job search services using internet- base and mobile tools. Such services empower workers by making labour markets more transparent and inclusive. In another development USAID in Serbia reported that from February to November, 2014 ICT academy equipped unemployed youth with the knowledge and skills in demand by the IT industry. The world economic forum (2009) reports on ICT stated that one of the most opportunities for positive socio economic change lies in the scaling of mobile Health and mobile financial services (MFS).

In a similar development the ICT sector in New Zealand showed that there are around 2300 businesses in the sector employing about 46,000 people. The ICT Market in New Zealand appears buoyant as one consultant's survey of 500 employers in private and public sectors showed 75% plan to hire new staff in 2013 compared with 70% in January, 2012. Also, the institute of IT professionals in New Zealand noted that ICT job adverts were 30% up in 2012 compared with two years earlier. A similar development has been the ICT4D programmed which is a programmed designed by the world Bank aimed at bridging the digital divide and aid economic development by fostering equitable access to modern communication technologies .It is a powerful tool for economic and social development (ICTD, 2012). According to Ademiluyi (2014) ICT has offered the developing World with employment opportunities for youths inform of outsourcing, online entrepreneurial opportunities and so on; big corporations abroad prefer

outsourcing services to firms in the developing world as it is economical than hiring employees elsewhere.

ICT AND EDUCATION IN THE DEVELOPING WORLD

The importance of ICT in education in the developing world and the extent to which ICT provide job opportunities in educational sector is one of the tremendous effort made by governments and organizations such as the World Bank in their contributions towards bridging the Digital divide between the developed and developing countries of the world. According to the World Bank report in (2009) it expressed readiness to kick- start a \$2m investment on facilities to promote growth and employment in Nigeria.

The use and integration of ICT in building inclusive knowledge societies for all and for overall socio-economic development is increasingly on the agenda of almost all developing countries of Sub-Saharan Africa. ICT are seen as an important catalyst and accelerator for development, having the ability to attract investment, create job opportunities, promote knowledge building and sharing, facilitate innovation and contribute to good governance and more efficient and transparent provision of public services. ICT facilitate inclusiveness by enabling citizens anywhere to access information and knowledge. ICT together with education empower citizens to be aware of their rights and to participate actively in shaping public policy, governance and development. The International Institute for communication Development (IICD) report in 1998 stated that, IICD develops teacher's abilities to integrate pedagogical and content knowledge in the classroom, helping alleviate common challenges like crowded classroom, resource shortages and outdated pedagogical methods.

The diverse usage of ICT has made it indispensable for the smooth running of education in the developing world in order to achieve excellence in education. The following are some of the uses of ICT in education:

- To broadcast material, online facility or CD-ROM can be used as sources of information in different subjects;
- To facilitate communication for pupils with special needs;
- To use electronic toys to develop spatial awareness and psycho-motor control;
- To use the online resource like, email, Chat, discussion forum to support collaborative writing and sharing of information.
- To facilitate video-conferencing or other form of Tele conferencing to involve wide range of students from distant Geographic areas.
- For Blended learning by combining conventional classroom learning with E-learning learning systems

- To process administrative and assessment data.
- To exchange and share ideas -among teachers for the professional growth.
- To carry out internet-based research to enhance, educational process.

ADVANTAGES OF THE USE OF ICT IN EDUCATION

The advantages of ICT in education are numerous it encompasses all those gadgets that deal with the processing of information for better and effective communication. In education, communication process takes place between teachers, students, management and administrative personnel which requires plenty of data to be stored for retrieval as and when required, to be disseminated or transmitted in the desired format. The hardware and software like printed materials ROM and RAM, Television, Radio, Computers and related software are used in the educational process. However ICT today is mostly focused on the use of Computer technology for processing the data. In this context, advantages of ICT in education can be listed down as follows:

- **Quick access to information:** Information can be accessed in seconds by connecting to the internet and surfing through Web pages.
- **Easy availability of updated data:** Sitting at home or at any comfortable place the desired information can be accessed easily. This helps the students to learn the updated content. Teachers too can keep themselves abreast of the latest teaching learning strategies and related technologies.
- **Connecting Geographically dispersed regions:** With the advancement of ICT, education does not remain restricted within four walls of the educational institutions. Students from different parts of the world can learn together by using online, offline resources. This would result in the enriching learning experience. Such collaborative learning can result in developing...
 - Divergent thinking ability in students,
 - Global perspectives
 - Respect for varied nature of human life and acculturation.
 - Facilitation of learning.

ICT has contributed in shifting the focus on learning than teaching. ICT helps students to explore knowledge to learn the content through self study. Teacher can help the students by ensuring the right direction towards effective learning. Situational learning, Programmed learning, many Online learning courses are some of the example of self learning strategies that are being utilized with the help of ICT.

- **Catering to the Individual differences:** ICT can contribute in catering to individual needs of the students as per their capabilities and interest. Crowded class

rooms have always been a challenge for the teacher to consider the needs of every student in the class.

- **Wider range of communication media:** With the advent of ICT, different means of communication are being introduced in the teaching learning Process. Offline learning, on line learning, blended learning is some of the resources that can be used in educational institutions. Collaborative learning, individualized learning strategies can enhance the quality of group as well as individual learning.

- **Wider learning opportunities for pupils** Application of latest ICT in education has provided many options to the learners to opt for the course of their choices. Many Online courses are available for them to select any as per their aptitude and interest. Students can evaluate their own progress through different quizzes, ready to use online tests. This can ensure fulfillment of the employment required in the job market thus minimizing the problem of unemployment. It can also provide more efficient and effective citizens to the society as per the changing needs.

ICT AND COMMERCIAL NEEDS IN THE DEVELOPING WORLD

The tremendous contributions made by ICTs have brought about significant changes in business practices with respect to banking transactions and, to some extent, the buying and selling of goods and services, through the possibilities of the medium to promote trade and commerce through wider access to prospective customers from anywhere on the globe for products and services. ICTs have thus transformed the business world, including the banking, trading and entertainment sectors, making the sectors more efficient and less limited by the barriers of time, distance and costs. ICTs also have the potential to contribute to poverty alleviation through websites promoting local products in international markets, and facilitating access to market information for competitive prices for locally produced crafts, clothing and farm produce. The technology further offers an opportunity for the exploitation of foreign markets for cultural products, a market which continues to expand in line with increases in the African Diaspora eager for means to access local food, clothes, music, films and other aspects of their cultural identity and heritage. In their own view on ICT Nwabueze and Ozioko (2011) stated that ICT is an essential part of national infrastructure and factor greatly in both public and private sectors business enterprises, it creates business opportunities especially for companies located far from urban centre's and improve links among firms, supplies and clients.

On its part, in the banking sector, the replacement of the age-old ledger system with computers linked to internet facilities has brought about a revolution in the sector.

Online/e-banking allows customers to carry out a wide variety of banking and other financial activities online, through a website operated by the bank. A major benefit of internet banking is the ease and convenience of managing one's finances from a place and time of one's choosing. Thus, financial transactions including checking of account balance, monitoring transactions, payment of utility bills, transfer of funds and monitoring, confirmation and stoppage of cheques can be conveniently carried out from any location. A related development is the use of electronic devices such as magnetically encoded plastic cards that permit customers to make cash withdrawals and pay for transactions without visiting banking halls, through ATMs (Automated Teller Machines), POS (Point of Sale) and other online channels. The possibilities provided by e-banking, which reduces the need to carry cash on personal and business trips, while also affording ready 24-hour access and convenience for users represents one of the most obvious and potent impacts of ICT in the developing world.

ICT AND CYBER SECURITY CHALLENGES IN THE DEVELOPING WORLD

ICT security challenges are more prevalent in the developed world but the trend has now gradually descended to the developing world. North Korea recently launched cyber security attack on Sony web site in April, 2014 through her citizen called "Geoltot" Hertz a 21 year old hacker who uncovered (and subsequently shared online) the play station 3s. As a pay back the anonymous an online community launched a series of DDoS (Distributed denial of service) and lock low orbit lon cannon) attacks against the company the two attacks went under the names #Op Sony and # Sony Recon. The attack came as a result of some vulnerability of the cyber protection systems of Sony and was able to breach into its data servers, stealing the personal data of more than 77 million of user's worldwide (Global cyber, 2014). These security challenges should adequately be address through intensive research in cyber security handling and monitoring to guard against intercepting Security information all over the world as maintained by president Barrack Obama during world conference on cyber security attack among nations in the World in mid February, 2015.

The problem of cybercrime is a global one whose extent, magnitude and impact reverberate throughout various walks of life, leaving hitherto unimaginable damage in its wake. Therefore it is imperative for government and private organizations to guard against any possible attack of cyber crime on their web site no matter their complexities in all parts of the world.

CONCLUSION

The role of information and communication technology in providing job opportunities in the developing World could not be overemphasized as millionth of youth were given job opportunities by both public and private institutions all over the world in ICT capabilities. These opportunities range from educational, commercial, as well as social and security needs in the developing world. The rapid development of ICT has turned the world in to global village as ICT is universally used all over the world in all ramifications.

RECOMMENDATIONS

- Developing nations should as a matter of urgency provide all necessary facilities for the training of youth in ICT management so as to provide job opportunities for the teaming unemployed youth in their countries.
- Since the use of ICT has become indispensable in all sectors of human Endeavour, therefore greater emphasis should given to provision of ICT facilities in all nook and corners in the developing countries for schools and public consumption so as to bridge the digital divide between developed and developing nations.
- The developing nations are far left behind in terms of provision of ICT facilities for their people, therefore, an intensive commitment in funding all requirements for the provision of ICT facilities should be provided by the governments.
- Developing nations should greatly imbibe maintenance culture in ICT equipments such as the developed nations so that thousands of unemployed youth will gain employment in ICT maintenance.
- Developing nations should intensify effort in the provision of sufficient electricity power supply which is a catalyst for the development of every country in the World and an indispensable by-product of ICT operation.

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MECHANICAL DEVICE FOR STARCH EXTRACTION DURING RICE FLOUR FERMENTATION: COST EFFECTIVE AND PRODUCT QUALITY CONSISTENT APPROACH

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ABSTRACT

A fork-like paddle stirrer device designed and fabricated served dual functions in the batch rice fermentation; starch extraction and for aeration. The yield and characteristics of the device-associated fermentation was contrast with features from fermentation simulating indigenous practices using a wooden spoon stirrer. Contrasting features include continuous aeration with the device-associated system that ensured frequent microbe-substrate contact, higher percentage yield of starch and a short time to result (7 days versus 15 days with the wooden spoon stirrer). The wooden spoon stirrer system only permitted occasional agitation, yielded less starch but produced more quantity of protein-rich fermented rice granules. Lactic acid bacteria and yeasts were dominant fermentative flora and flourished at pH 3.5 to 4.5. The mechanical device consists of a long beam which furcated into five prongs. The prongs are made of two arms which bifurcate and a third arm that runs vertically from the base. The paddles are spade-like in shape with circular blunt ends. The paddles contain circular perforations with area of πr^2 . This perforation serves as a sieve for extrusion of starch. The upper arm of the beam is attached to a thick rectangular beam at a fulcrum which allows it to rotate 360° and two flexible spring cords that make the device to move both upward and downward. These mechanisms of operation ensure efficient agitation and facilitated the processes of extraction and aeration.

KEYWORDS: rice starch, extraction device, fermentation, aeration, fermentative flora

INTRODUCTION

Fermentation technologies have remained the bedrock in the advancement of the food and pharmaceutical industries. The enhanced value which fermentation has added to agricultural produce especially starchy crops is unquantifiable. Fermentation benefits include enrichment of the human dietary through development of a wide diversity of flavors and textures in food, preservation of substantial amounts of food through alcoholic, acetic acid, lactic acid and alkaline fermentations, enrichment of food substrates biologically with protein, essential amino acids, essential fatty acids and vitamins, detoxification and removal of antinutrients (phytic acid, tanins and polyphenols) and decrease in cooking times (Blandino *et al.*, 2003; Egounlety, 2002; Holzapfel, 2002; Ross *et al.*, 2002; Steinkraus, 1994).

Traditional fermentations are likely to remain an important part of global food supply especially with the promotion of entrepreneur enterprise. This medieval process may receive significant enhancement with the use of starter cultures or genetic modification technology. Notwithstanding, the natives continue to evolve products and few examples from rice fermentation include Idli a fermented, thick suspension

made of a blend of rice (*Oryza sativum*) and dehulled black gram (*Phaseolus mungo*) is used in several traditional foods in Southeast Asian countries. Idli is a low calorie, starchy and nutritious food, which is consumed as breakfast or snack (Nagaraju and Manohar, 2000). Steamed idli contains about 3.4% protein, 20.3% carbohydrate and 70% moisture. Philippine balao balao is a lactic acid fermented rice/shrimp mixture prepared by mixing boiled rice, whole raw shrimp and solar salt (about 3% w/w), packing in an anaerobic container and allowing the mixture to ferment over several days or weeks (Steinkraus, 1994). The chitinous shell becomes soft and when the fermented product is cooked, the whole shrimp can be eaten (Steinkraus, 1983). Boza is a highly viscous traditional fermented Turkish beverage made from cereals such as maize, rice and wheat flours. The preparation of boza is normally carried out by natural fermentation involving mixed cultures of lactic acid bacteria and yeasts (Zorba *et al.*, 2003).

Starch is extracted at industrial scale mostly from maize, wheat, potatoes and cassava and to a lesser extent from rice, barley and sorghum because of the more complex technology required in cracking the small

kernels of the latter group of starchy crops. Starchy crops provide approximately 75% of the nutritional energy and dietary fiber in human and animal diets (Charalampopoulos *et al.*, 2002). The demand for starch is global from direct consumption as food to applications in chemicals and pharmaceuticals, textiles and the paper industry. The product that emerges from the extraction process known as native starch can be utilized in this form or as modified starch, or processed further into different kinds of sweeteners and for use in a wide range of fermentation processes. The production processes involved in starch extraction are basically the same for all crops and include milling and mechanical separation of the component parts. Cereals such as maize, wheat and rice are milled by grinding whereas tubers/roots such as potatoes and cassava are shredded using rasps. The subsequent separation of the component elements is carried out either on the basis of their different sizes using screens or filters, or different weights using gravitational forces in centrifugal separators (decanter centrifuges, nozzle centrifuges or hydrocyclones) (Alfa Laval, www.alfalaval.com).

Rice starch has been purified from endosperm using alkali, detergent, or by protease digestion (Juliano, 1980; Yamamoto *et al.*, 1973). The only pitfall in the use of alkali and detergent as purifying agents is the alkaline or salty effluents produced and with protease the long digestion time of 24 h at near neutral pH and 38° C which will result in high cost of production industrially. However the onus of this study is not to ride rice flour of its protein content but to reduce the calorific value by extracting crude (native) starch in whatever proportion before subjecting the rice particles to fermentation process to modify the final product which will serve for human food. The mechanical device introduced in this study is to aid in starch extraction and provide constant aeration in the batch fermentation vessel. The aim therefore of this study is to optimize the process of starch extraction and provide the environment and homogeneity required for microbial fermentative activity.

MATERIALS AND METHODS

Experimental Design:

The processes for the reduction of the calorific value of rice and microbial fermentation are outlined in Figure 1. The major steps are milling, starch extraction before and after fermentation and the use of fabricated mechanical device to aid starch extraction and provide continuous aeration within the fermentation vessel. In a parallel experiment, initial starch extraction was by mixing the slurry with a wooden spoon before screening. White rice (*Oryza sativum* L) was purchased from the local market and used in this study.

Batch fermentation was used to simulate conventional rural fermentation practices. Briefly, Rice grains were weighed out and milled into fine flour that can be retained on a sieve with pore size of 0.4mm but some can pass through a sieve of pore size 0.5mm. The flour was weighed and mixed with sterile water in a batch fermenting vessel in the ratio of 1:10 w/v. Within the fermenting vessel the slurry was stirred vigorously with the aid of the fork-like device fabricated and powered at a revolution of 1500rpm. The slurry was then poured and screened through a sieve with pore size of 0.3mm that will only allow the crude starch to pass through. The filtered starch was left to settle under gravity for 18-24 h, the supernatant decanted and the starch slurry spread over clean stainless pan and air-dried. The quantity of starch harvested per known weight of flour was recorded. The starch yield at each stage of extraction using wooden spoon or the mechanical device was determined.

The particles retained on the sieve were harvested and subjected to spontaneous fermentation under static conditions and continuous agitation at 20±2°C as described below. In the static state the substrate in the fermentation vessel was stirred twice daily with a wooden stirrer; the lid of the fermenting vessel opened during each stirring operation and sample collection. In the second set-up, the fabricated device was fitted into the fermenting vessel and was powered electrically to rotate at a speed of 100rpm continuously; this occluded periodic opening of the vessel except during sampling. In a parallel experiment, initial starch extraction was by mixing the slurry with a wooden spoon before screening and followed by other processes as described above.

Mechanical Extraction and Agitation:

The step of agitation uses a paddle like mechanism which can be adapted for manual application or automated for industrial scale production. The mechanical device was designed and fabricated specifically for this study. The fork-like paddle stirrer (Figure 2) consists of a long beam (a) at the base (crab claw structure-b) which furcated into five prongs (c-g). The prongs are made of two arms which bifurcate (c, d and f, g), and the third arm (e) runs vertically from the base. The paddles are spade-like in shape. The ends are circular and blunt; this avoids abrasion of surfaces it comes in contact with during operation. The paddles contain circular perforations with area of πr^2 . This perforation serves as a sieve and as particles pass through it starch is extruded. The upper arm of the beam is attached to a thick rectangular beam (z) at a fulcrum (y) which allows it to rotate 360° and two flexible spring cords (x) that make the device to move both upward and downward. These mechanisms of operation ensured efficient agitation and facilitated the process of starch

extraction from the flour and provided the convection current for substrate –microbe contact within the fermentation vessel.

Fermentation and Product Analysis:

The rice granules after initial starch extraction were tested for starch content and thereafter subjected to natural fermentation either under static conditions or under aeration using the mechanical device. The ratio of starch flour and water in the fermentation vessel was maintained at 1:9 (10g to 90ml sterile water w/v). This step determines the duration of fermentation and the pattern of microbial succession. This stage is important in selecting potential starter culture organisms. Samples were collected from both set-ups on days 1, 3, 5, 7, 14, 15, 18 and 21 for both microbiological and physico-chemical analyses. Proximate analyses and nutritional content (protein, fats, carbohydrates and ash) tests were done for these products and the initial starch extract as described by Association of Official Analytical Chemists (AOAC, 2005) and Guzman and Jimenez (1992) with the total carbohydrate calculated by difference. The calorific values of the rice flour and fermented products were determined using Oxygen Bomb Calorimeter of model OSK 100A. The calorific value (Kcal/g) of the samples under test was calculated from the temperature rise in the calorimeter vessel and the mean effective heat capacity of the system (Sumner *et al.*, 1983). Samples were cultured on MRS agar, Rose Bengal chloramphenicol agar, Malt extract agar, Yeast extract agar and CZAPEK DOX agar (all products of Biolab) for selective cultivation of yeast, molds and lactic acid bacteria. Incubation criteria were governed by the temperature and atmospheric requirements of the pre-determined organisms sought on each agar medium. Identification of isolates was done using a combination of microscopy, cultural features, and biochemical tests with the API bioMerieux kits.

Product Utility:

The fermented rice granules were air or oven dried and toasted over dry heat to produce friable granular powder the fermented rice product. The yield from a pre-determined amount of rice flour was recorded. This product based on different treatment processes can be converted into puddings, flakes and fries or baked snacks. The fermented rice granular powder can also be soaked in water and taken direct as a meal. The native starch extract was air dried and served as binder, adjuvant and when fortified with minerals and vitamins can be consumed in gel form as custard meal.

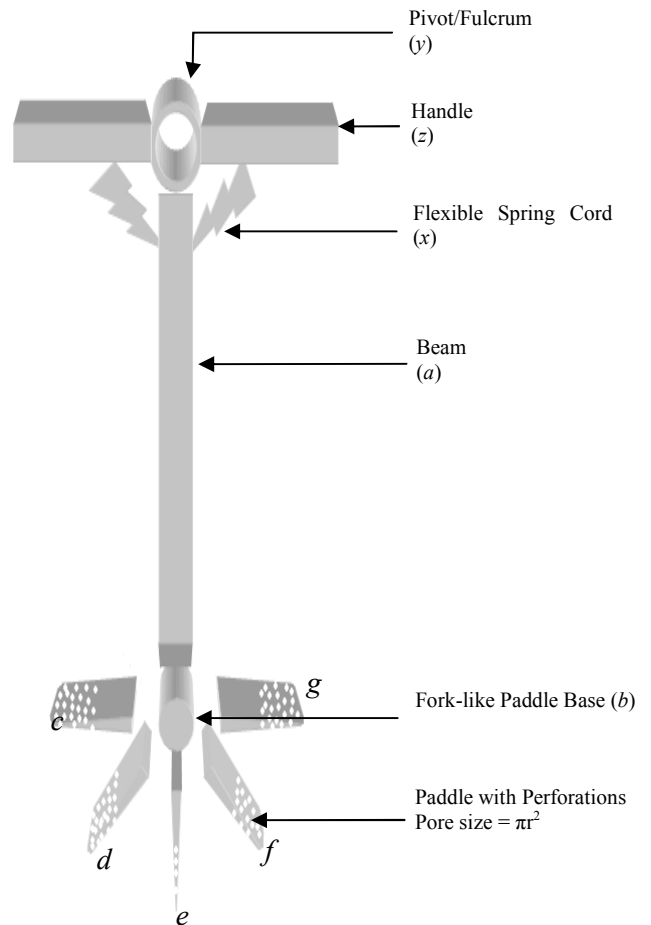


Figure 2: Mechanical device for agitation and dislodging of starch from grains

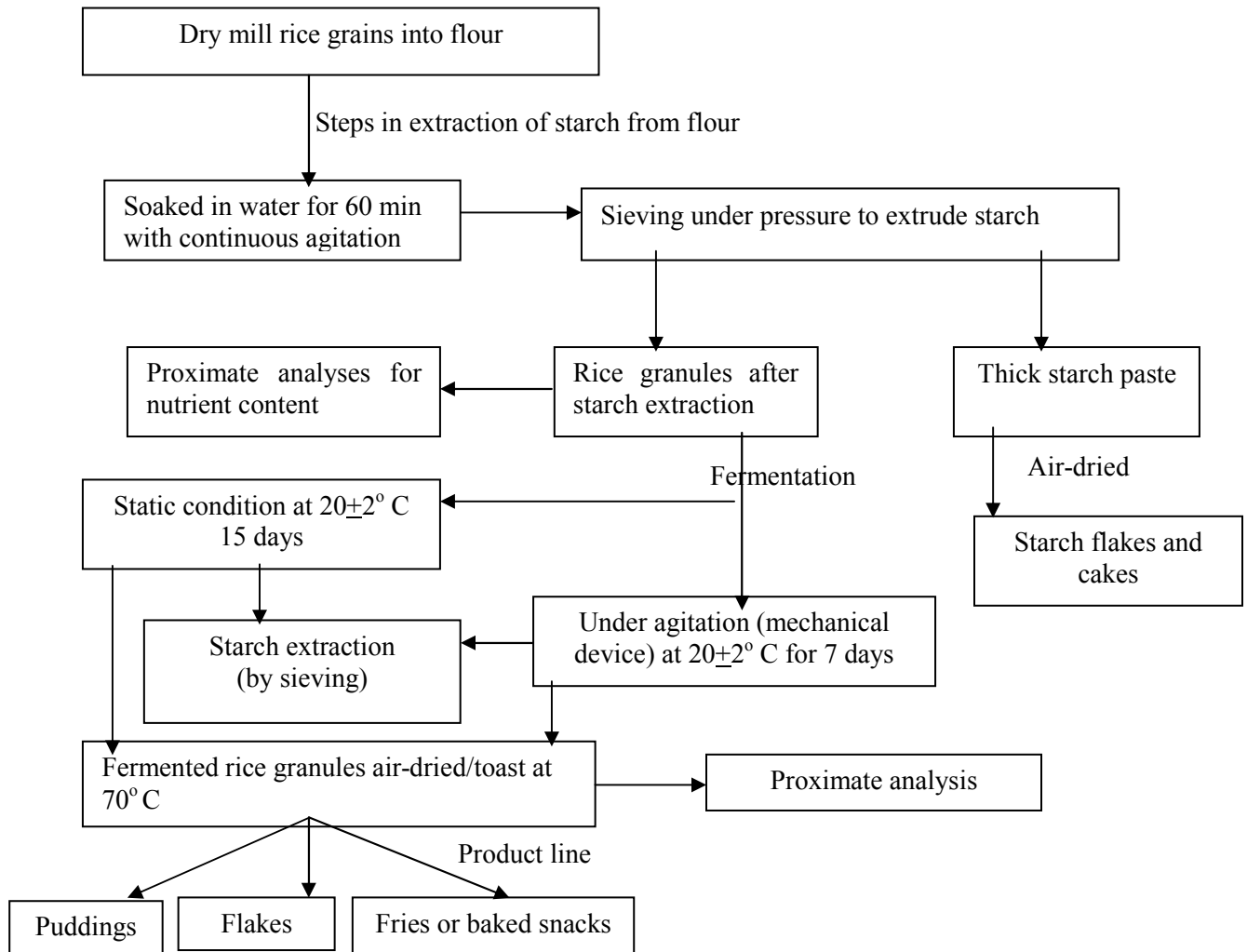


Figure 1: Flow chart for production of fermented rice meals

RESULTS

Comparing Tables 1 and 2 showed the reduction of starch content in the fermented product following initial starch extraction. From 80.5g in rice flour to 54g or 62g of fermented rice granules when extraction was done with the fork-like device or wooden spoon respectively. The calorific value of the product decreased from 357Kcal to 253Kcal and 264Kcal with the device-assisted and WS-assisted fermentation respectively. This gave an energy difference of between 104Kcal and 93Kcal. Other parameters such as protein, moisture and ash contents were relatively stable. With the device assisted fermentation it took 7 days for complete fermentation while with the WS-system complete fermentation was obtained on day 15. Total product yield was 80% with WS-system and 66% with device assisted system. Similarly the final protein content was higher in the WS-system. Acid pH was achieved rapidly in the device assisted culture and value as low as 3.5 was obtained. The lowest pH in the WS-batch culture

was 4.5 and usually attained as from day 7. The microorganisms in both fermentations qualitatively were the same as shown in Table 3. However, the pH values showed that *Enterobacter*, *Bacillus*, *Enterococcus* and *Staphylococcus* are early colonizers. As the pH is lowered *Lactobacillus*, *Leuconostoc*, *Pediococcus* and yeasts become dominant fermenting flora. *Penicillium* and *Aspergillus* were isolated mostly in the WS-system and possibly represented contamination since these were not uniformly isolated from all fermenting vessels.

Table 1: Characteristics of rice flour

Properties	values
Carbohydrate (starch) (g)	80.5
Protein (g)	6.4
Ash (g)	0.2
Moisture (%)	11
Calorie (Kcal/g)	357
pH	6.8

Table 2: Method influenced properties

Properties	Device-assisted extraction	WS- assisted extraction
Starch yield‡ (%) BF	22	14
Starch yield (%) AF	12	6
TTR (days)	7	15
Product yield (%)	66	80
pH range (Mean)	3.5-5.5 (3.8)	4.0-6.5 (4.5)
Moisture (%)	11	11
Ash (g)	0.8	0.7
Protein (g)	3.8	4.6
Carbohydrate (g)	54	62g
Calorie (Kcal/g)	253	264

‡Percentage of weight of rice flour used

BF; before fermentation

AF; after fermentation

WS; wooden spoon

TTR; time to result (i.e., when final product was harvested)

Table 3: Predominant microflora and pH changes

Microflora	Under continuous aeration		Under static conditions#	
	pH range	Days predominant	pH range	Days predominant
<i>Lactobacillus</i> spp*	3.5-5.5	4-7	4.5-5.5	7-15
<i>Leuconostoc mesenteroides</i>	3.5-5.5	4-7	4.5-5.5	7-15
<i>Pediococcus cerevisiae</i>	4.0-5.5	3-7	4.5-5.5	7-15
<i>Bacillus</i> spp	4.5-6.5	2-7	4.5-6.5	7-15
<i>Enterococcus faecalis</i>	4.0-6.5	1-5	4.5-6.6	1-14
<i>Staphylococcus</i> spp	3.5-6.5	1-5	4.5-6.5	1-14
<i>Enterobacter</i> spp	5.0-6.5	1-3	5.0-6.5	1-7
Yeasts†	3.5-5.5	3-7	4.5-6.5	3-14
<i>Aspergillus</i> spp	3.5-5.5	5-7	4.5-6.5	7-15
<i>Penicillium</i> spp	3.5-5.5	5-7	4.5-6.5	7-15

#Represent batch wooden spoon was used as stirrer and stirring was twice daily.

**Lactobacillus delbrueckii*, *Lactobacillus fermenti* and *Lactobacillus lactis*

† *Geotrichum candidum*, *Torulopsis holmii*, *Torulopsis candida* and *Trichosporon pullulans*

DISCUSSION

The starch content of different variety of rice range from 45% to over 80% depending on the method of extraction (Ashogbon and Akintayo, 2012; Bhattacharyya *et al.*, 2004) and to a great extent this amount of starch is consumed as whole meal (Marshall *et al.*, 1990) and in many instances have been complemented with other starchy food especially maize, further increasing the carbohydrate burden of the meal. Thus for people with the propensity to be obese or

diabetic, such high calorific intake may be of health risk. Furthermore rice starch for its flavor enhancing property and hypoallergenicity is used frequently in the processing of many value added products including gluten free bread, beverages, processed meat, low fat sauces, puddings and salad dressings (Deis, 1997). The array of uses to which rice, its flour and starch is put into requires that the calorific value of products intended for human consumption be low for health implication. That objective in part was achieved in this study by formulating a rice-based product low in calorie through two-steps starch extraction and fermentation. The end product the fermented rice granules can be served as a direct meal or used as raw materials for production of snacks and other rice based meals. The characteristics and uses of the starch extracted are the subject of another report.

It is instructive to note that the process applied in starch extraction differ from the conventional NaOH, detergent or protease digestion that produce higher yield of starch and at the same time free starch of its protein content (Baldwin, 2001; Singh *et al.*, 2000; Morrison and Azudin, 1987). It was the purpose of this study to retain as much as possible the nutritional constituents of rice in the fermented product. The reduction in starch content with the paddle device was 34% as opposed to 20% with the wooden stirrer. This correlated well with the energy content of the final products from each method of starch extraction. The significant reduction in calorific value of the fermented rice granules by 104Kcal with the paddle device satisfied the objective of obtaining a low-calorie rice product for food. It is also worthy of note that the process did not ride the fermented rice totally of protein as with the device only about 40.6% protein was loss (from 6.4g in rice flour to 3.8g in fermented product). This product may fall into the same class as idli both in nutrient content and dynamics of microbial activity. The commercial advantage of introducing the paddle device include the reduction in time to result for product, product consistency as a result of uniformity of conditions throughout the fermentation vessel and reduction in rate of contamination of products. For the purpose of emphasis, this study did not consider the alkali, detergent or protease digestion methods of starch extraction because these methods leave little residues and the starch obtained is completely free of protein. This could have negated the object of this study of developing rice meal suitable for diabetics and those that desire low-starch/calorie meal.

Like many other cereal rice fermentation was characterized by succession of microorganisms and their occurrence in the fermentation vessel governed by the prevailing environment. Significant among which is the

pH value. The present study showed *Enterobacter*, *Staphylococcus*, *Streptococcus* and *Bacillus* as early colonizers. A shift in flora to more predominant lactic acid bacteria and yeasts occurred as fermentation advanced and pH becomes more acidic. As stated earlier, Idli a low-calorie fermented rice is a product of natural fermentation involving a consortium of lactic acid bacteria and yeasts (Nagaraju and Manohar, 2000; Shortt, 1998; Purushothaman *et al.*, 1993; Ramakrishnan, 1993; Chavan and Kadam, 1989). Lactic acid bacteria enhance flavor, nutritive value and available lysine content in food (Lee *et al.*, 1999). Fermentation is such an important process which significantly lowers the content of antinutrients of cereal grains (Sindhu and Khetarpaul, 2001), provides optimum pH conditions for enzymatic degradation of phytate in cereals resulting in the release of polyvalent cations such as iron, zinc, calcium, magnesium into the medium (Blandino *et al.*, 2003; Nout and Ngoddy, 1997). Fermentation processes have yielded major staples in Nigeria especially gari and fufu produce from cassava (Onyekwere *et al.*, 1989; Adegoke and Babalola, 1988) and ogi a custard like meal from maize which is variously fortified either with soya or vitamins and is now a generally accepted meal for adults and for weaning (Teniola and Odunfa, 2001; Nwosu and Oyeka, 1998).

CONCLUSION

The aeration and starch extraction device is a simple and cost effective mechanism for accelerating starch extraction from any starchy food crop and creating sufficient aeration and mobility for organism-substrate contact for uniformity of products at each stage of fermentation. Further the device as used in this study facilitated the production of fermented rice with low calorific value and reduced duration of fermentation by 50% compared to fermentation under static conditions as practiced under unorthodox settings. The invention by this process achieves developing new food types from the microbial fermentation of rice. Industrially, this is of value as it creates many product lines and food meals from the staple which till now is consumed as a single diet of rice meal, though can be augmented severally as desired. The fabrication of a device assisted mechanism for small scale fermentation processes opens up business opportunities in the engineering and technical sector of the economy. In totality, the findings of this study have health related benefits in ameliorating obesity and diabetes, food and commerce as it has created new product lines from rice while at the same time has kept the industry within the reach of the peasants through the use of a low cost and efficient stirring device.

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BIOGRAPHY

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GROWTH RESPONSE OF TMS 96/0304 CULTIVAR OF CASSAVA *Manihot esculenta* (CRANTZ) EXPOSED TO SIMULATED ACID RAIN OF DIFFERENT pH

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ABSTRACT

Southern Nigeria is a major cassava producing area that has been subjected to air pollution from increasing industrial activities and population explosion in the coastal towns and cities. Cassava being a staple food in southern Nigeria for millions of Nigerian can potentially be affected by acid rain. The level of pollution is not expected to change drastically in the immediate future. Investigations were carried out to study the changes in the morphology, survival, growth and yield of TMS 96/0304 cultivar of cassava *Manihot esculenta* (Crantz) to simulated acid rain. The plants were exposed to simulated acid rain of pH 2.0, 3.0, 4.0, 5.0, 6.0 and 7.0 (control) respectively. Simulated acid rain induced morphological changes including chlorosis, early leaf senescence, necrosis, leaf abscission, leaf folding and death. Plant height, leaf area, fresh weight, dry weight, relative growth rate, chlorophyll content and the harvest index was the highest at pH 7.0 (control) and significantly ($p < 0.05$) decreased with increasing acidity. There was significant reduction in the growth and productivity. The results indicated that TMS 96/0304 cultivar of *Manihot esculenta* exhibited growth stimulation at low acidity of pH 2.0 and it is likely to be retarded in future due to rapid and uncontrolled industrialization.

KEYWORDS: lesions, photosynthetic pigment, dehydration, *manihot esculenta*, root production

INTRODUCTION

Acid rain is a major polluting event harmful to terrestrial and aquatic ecosystems (Brimblecombe *et al.*, 2007). It is the wet deposition of pollutants such as oxides of sulphur and nitrogen contained in power plant emission, factory smoke and car exhaust, react with the moisture in the atmosphere (Kita *et al.*, 2004). In natural conditions atmospheric precipitation is slightly acidic due to the dissolution of atmospheric carbon dioxide. Rain that presents a concentration of H^+ ions greater than $2.5 \mu eq^{-1}$ and pH values lower than 5.6 is considered as acid. Acid deposition may cause decline in health and growth of trees as well as other plants (Wyriwicha & Sklodowska, 2006). Several experiments have been carried out in the field and in greenhouses to investigate the effect of simulated acid rain in plants. Banwart, *et al.*, 1990 reported that acid rain inhibited the growth of soybean cultivars *Glycine max* and cause a significant decrease on the yield. Also, Caporn and Hutchinson (1987) reported that acid rain sprays caused both extensive visible injury to the cotyledons of cabbage (*Brassica oleracea*) and also a reduction in the seedling growth. Acid rain exposure of plants results in characteristic foliar injury symptoms, modified leaf anatomy (Stoynora & Velikova, 2004), structural changes in the photosynthetic pigment apparatus and a

decrease in the chlorophyll concentrations (Sant' Anna-Santos *et al.*, 2006) and has reported reduction in plant growth and yield of field corn (Banwart, *et al.*, 1988), green pepper (Shripal *et al.*, 2000) and tomato (Dursun *et al.*, 2002).

Cassava (*Manihot esculenta* Crantz) belongs to the family Euphorbiaceae (Nweke *et al.*, 2002). Since the introduction into Nigeria it has become very popular throughout the country. It is grown in 70% of the Nigerian states, available from the swamp forest area to the Guinea savannah of Nigeria. Aside being a major source of food in Nigeria, other important products produced from cassava are starch, beer, vinegar and alcohol. The cassava cultivar TMS 96/0304 is grown in most of the Nigerian home gardens and even on large scale production. The tuber is used for human consumption in three processed forms, the toasted meal 'garri', the retted meal and the flour. 'Garri' is the most popular form of consumption in Africa. The objective of the present study was to examine the growth and productivity of cassava cultivar TMS 96/1672 under simulated acid rain.

METHODS AND PROCEDURES

Planting Procedure

A field experiment was conducted in the school farm of the Federal University of Technology, Akure, Ondo state, Nigeria from October 2012 to March 2013. Stem cuttings of 30cm long each of TMS 96/0304 cultivar of *M. esculenta* were planted horizontally with a spacing of 100cm and four stem cuttings were planted on each row. Each pH treatment had four replicates and was arranged in a Completely Randomised Design (CRD). The plants were watered every other day and grown for a week before the application of the simulated acid rain treatment. The experimental field was hoe weeded as necessary. Simulated acid rain was sprayed to the planted cassava cultivars according to their pH values of 2.0, 3.0, 4.0, 5.0, 6.0 and 7.0 which was the control. The solutions were applied using a medium size pressurized sprayer on the plants. The plants grew for twenty five weeks before the experiment was terminated.

Preparation of Simulated Acid Rain

The acids used was an acidic mixture of concentrated sulphuric acid (H₂SO₄) and concentrated nitric acid (HNO₃) in 2:1 ratio. The acidic solution was then calibrated using distilled water with a Deluxe pH meter to get the desired pH (2.0, 3.0, 4.0, 5.0 and 6.0) and cross checked with pH pen. The control pH (7.0) had distilled water. Several parameters were used in assessing the growth and productivity of the plant. The height of shoots was measured using a tape rule in (cm) from the soil level to the terminal bud. The measurements were taken in an interval of 2 weeks from the day the acid rain treatment commenced to the day of harvest. Leaf area was determined by the proportional method of weighing a cut-out of traced area of the leaves on graph paper with standard paper of known weight to area ratio. The fresh and dry weights were determined after twenty four weeks of treatment following the method of Hunt (1990). Relative growth rate (RGR) was calculated following the methods of Hunt (1990) and the fresh weight of the whole plant was used to determine the relative growth rate.

$$RGR = (\log_e W_2 - \log_e W_1) / (T_2 - T_1)$$

Where: W₂ = final weight, W₁ = initial weight
T₂ = final time
T₁ = initial time.

The chlorophyll content of the leaves was determined by the following method. Three grams (3g) of the youngest leaves of each seedling was ground with few grains of washed sand (sand washed with concentrated H₂SO₄ and then thoroughly washed with distilled water). Chlorophyll was extracted with 20 ml of 80 % acetone and centrifuged at 2500 rpm for 15 minutes. The clear supernatant was collected and the absorbance read at 645nm and 663nm on Spectronic 20 Spectrophotometer with 80 % acetone as reference blank.

The harvest index was determined by the method of Ekanayake (1994).

$$\text{Harvest Index (HI)} = \frac{\text{Tuber dry weight}}{\text{Total plant dry weight}}$$

Statistical Analysis

Data obtained were subjected to analysis using the Statistical Package for Social Sciences, Version 15.0 (SPSS, 2003). Treatment means were separated using the Duncan's Multiple Range Test (Zar, 1984).

RESULT

Morphological changes were observed in TMS 96/0304 cultivar of throughout the period of the experiment. Table 1 shows the effects of simulated acid rain on the morphology of TMS 96/0304 at 24 weeks after simulated acid rain treatment. Leaves turned brownish, withered with 70% leaf abscission. The dropping and eventual collapse of leaves stretched over a period of 16-20 weeks. At 4.0 pH treatment, leaf abscission started with the leaves at the base of the shoot droppings with long petiole. Leaves were chlorotic and necrotic.

Table 1: Morphological changes observed in TMS 96/0304 cultivar of *Manihot esculenta* polluted with Simulated Acid Rain 24 weeks after treatment

pH Treatments	Observed effects
7.0 (Control)	Luxuriant growth
6.0	Good growth. Leaves had small brownish dots on its surface.
5.0	Production of new leaves on the stem and at the leaf apex. Growth was retarded. There was 100% survival. Older leaves showed signs of curling and chlorosis. Had increased brownish spots on the leaf surface.
4.0	The leaves were curled and chlorotic. Plant growth was stunted. Leaves were showing signs of burnt surfaces from the tip. Had 70% leaf abscission. There was 80% survival.
3.0	Plants had stunted growth. The new leaves became folded, chlorotic followed by necrosis and eventually some of the plants died. 50% survival. 60% leaf abscission.
2.0	Had stunted growth. 30% survival. All the surfaces of the leaves were necrotic and curled. Had 40% leaf abscission from the base of the shoot.

Table 2: Effect of Simulated Acid Rain (SAR) on the Plant height (cm), Leaf area (cm), Fresh weight (g), Dry weight (g) of TMS 96/0304 cultivar of *Manihot esculenta*, 24 weeks after treatment

pH of SAR	Plant height (cm)	Leaf area (cm)	Fresh weight (g)	Dry weight (g)
7.0 (Control)	172.10 ± 4.26 a	323.40 ± 4.12 a	904.20 ± 0.18 a	422.30 ± 0.24 a
6.0	94.62 ± 4.14 b	272.44 ± 3.20 b	726.42 ± 0.12 b	376.12 ± 0.18 b
5.0	90.10 ± 3.20 b	250.32 ± 3.12 b	502.16 ± 0.10 c	324.20 ± 0.16 b
4.0	72.89 ± 3.12 b	234.26 ± 2.18b	356.10 ± 0.08 d	242.34 ± 0.12 c
3.0	40.13 ± 2.34 c	170.16 ± 2.04c	280.11 ± 0.07e	160.16 ± 0.08 d
2.0	34.81 ± 2.11 d	140.14 ± 1.48c	121.20 ± 0.03 f	92.48 ± 0.04 e

Each value is a mean of ± standard error of three replicates. Means within the same column followed by the same letter are not significantly different at (P>0.05) from each other using New Duncan Multiple Range Test.

The results on the plant height, leaf area, fresh and dry weights are presented in Table 2. There was a significant decrease in acidity concentrations of the parameters. The plant had the highest plant height, leaf area, fresh weight and dry weight significantly higher (p< 0.05) at the control (pH 7.0) compared to the other acidity treatments.

Table 3: Effect of Simulated Acid Rain (SAR) on the Relative Growth Rate (gg⁻¹d⁻¹), Chlorophyll content (mg/g) and Harvest index of TMS 96/0304 cultivar of *Manihot esculenta*, 24 weeks after treatment

pH of SAR	Relative growth rate	Chlorophyll content	Harvest index
7.0 (Control)	3.6 ± 0.24 a	2.8 ± 0.21 a	0.5
6.0	2.8 ± 0.21 a	2.2 ± 0.17 a	0.4
5.0	1.9 ± 0.19 b	1.4 ± 0.13 b	0.3
4.0	1.7 ± 0.16 b	1.1 ± 0.10 b	0.2
3.0	1.0 ± 0.14 b	0.7 ± 0.07 c	0.1
2.0	0.6 ± 0.06 c	0.3 ± 0.04 c	0.1

The effect of simulated acid rain on the relative growth rate (RGR), the chlorophyll content and the harvest index is presented in Table 3. The cultivar had the relative growth rate, the chlorophyll content and the harvest index significantly higher (p< 0.05) at pH 7.0 compared to the other acidity treatments. There was a significant reduction in the relative growth rate, the chlorophyll content and the harvest index with decreasing pH level.

DISCUSSION

Simulated acid rain treatment deposited on leaves affect mainly the epidermal cells causing erosion of the cuticle and altering the leaf permeability (Evans, 1984).

Symptoms of plants polluted with simulated acid rain include chlorosis, necrosis, stunted growth, lesion, suppression of leaf production, leaf curling, withering of leaves, leaf abscission and even death of plants. Silva *et*

al, 2006 found that plants exposed to low pH rain (pH 3.0) are generally retarded with leaf chlorosis, necrotic spot coupled with dehydration of the plants. Simulated acid rain exposure caused chlorosis, necrotic lesions and leaf tip injuries at different pH levels (Table 1). Necrosis progressed from nodal region to the adjacent inter-nodal region leading to large scale leaf abscission. Marked chlorotic and marginal necrotic symptoms were observed at pH 4.0 and 5.0. However, this was less pronounced in comparison to pH 3.0 and pH 2.0. Similar symptoms were also observed by Huany *et al.*, 2005 on wheat at pH 4.3 and 2.3.

TMS 96/0304 cultivar of *Manihot esculenta* showed marked decrease in growth parameters compared to the control. Simulated acid rain at pH 2.0 caused characteristic burned irregular lesions on the plant leaves. It is well reported by many workers that plants sensitive to acid rain can present changes in their morphology, anatomy, physiology and biochemistry (Neufeld *et al.*, 1985). All the plant growth parameters studied the plant height, leaf area, fresh weight and dry weight were decreased significantly at all acidity levels with respect to the control set and highest reduction were observed at pH 2.0 level (Table 2). The adverse effects of simulated acid rain on plant growth parameters on several crops were observed by (Halman *et al.*, 2008; Evans *et al.* 1997, Banwart *et al.*, 1990).

Photosynthetic pigments were also inhibited with respect to acidity levels. Chlorophyll content was significantly reduced by simulated acid rain treatment relative to the control at pH 2.0 and pH 3.0 (Table 3). The greater foliar injury noticed in plants exposed to pH 2.0 is associated with the decreased chlorophyll content and the damage to the photosynthetic apparatus. This is similar to the earlier results of Liu *et al.*, 2010; Evans 1984. Reduction was due to the removal of Mg⁺ from the tetrapyrrol ring of the chlorophyll molecules by H⁺ (Foster, 1990) or due to increase of transpiration by acid rain (Evans *et al.*, 1997). Recently similar results were also observed on many crops like mustard, radish, potato, bean plant Chehregani, 2007; Agrawal *et al.*, 2005; Kausar *et al.*, 2005; Khan & Devpura 2005; Varshney *et al.*, 2005).

Relative growth rate and harvest index was highest at pH 2.0 and pH 3.0 compared to the control plants (Table 3) and this have been reported by a number of authors (Steinfeld *et al.*, 1998; Ekanayake 1994; Cock *et al.*, 1977). According to Iglesias *et al.*, (1994), harvest index of 0.5- 0.6 is the optimum level because at higher values of harvest index, root production decreases due to reduced leaf area, light interception and photosynthesis.

CONCLUSION

It is evident from this study that simulated acid rain treatment at pH 2.0 and 3.0 markedly suppressed growth and yield of TMS 96/ 0304 cultivar of *Manihot esculenta* due to reduction of photosynthesis as a result of chlorosis, necrosis and leaf abscission. This result shows that TMS 96/1672 cultivar is likely to be retarded in future in view of rapid and uncontrolled industrialization as well as global warming. More varieties of cassava should be tested for their tolerance/ sensitivities to acidic precipitation.

This paper is relevance to Track Three because the incidence of acid rains have been reported in countries like Canada, Brazil, United States of America leading to loss of food. Acid rains destroy crops and also have an adverse effect on the soil, human health and on our environment.

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ANTIDIABETIC POTENTIALS OF JUTE LEAF (*CORCHORUS OLITORIUS*) ON TYPE-2 DIABETIC RATS

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ABSTRACT

The use of functional foods and their bioactive constituents have been considered as a new approach in the prevention and management of type-2 diabetes and its complications. This study sought to evaluate the antidiabetic potentials of jute leaf (*Corchorus olitorius*) on low dose streptozotocin/high fat diet induced diabetic rats. In this study, average food intake, average weight, blood glucose, intestinal alpha-glucosidase, pancreatic alpha-amylase, lung angiotensin-1-converting enzyme activities, lipid peroxidation in pancreas, total cholesterol and triglyceride were measured. NTPDase, 5'-nucleotidase and adenosine deaminase activities were also examined in the platelets of diabetic rats. The results showed that there was a significant increase ($P < 0.05$) in the blood glucose, α -amylase, α -glucosidase, angiotensin-1-converting enzyme activities, lipid peroxidation in pancreas, total cholesterol and triglyceride levels in diabetic rats when compared to the normal (control) rats. However, the supplementation of 10% of jute leaf showed a significant reduction ($P < 0.05$) of these biochemical parameters when compared to the diabetic control group. Furthermore, the dietary inclusion of this vegetable also significantly increased ($P < 0.05$) ATP, ADP and AMP hydrolyses except for adenosine hydrolysis in the platelets of diabetic rats when compared to the diabetic control group. In conclusion, the supplementation of vegetable diet in type-2 diabetic rats showed antihyperglycemic, antihyperlipidemic and antiperoxidative effects. It also exhibited modulatory effects on purinergic enzymes involved in the prevention of platelet abnormality and consequent vascular complications in diabetic state. Thus, this vegetable could be a good source of functional food for dietary intervention in the management of type-2 diabetes and its associated complications.

KEYWORDS: jute, antihyperglycemic, antihyperlipidemic, antiperoxidative, type-2 diabetic rats.

INTRODUCTION

Type 2 diabetes is a complex metabolic disorder associated with developing insulin resistance, impaired insulin signaling and β -cell dysfunction, abnormal glucose and lipid metabolism, sub-clinical inflammation and increased oxidative stress; these metabolic disorders lead to long-term pathogenic conditions including micro- and macro-vascular complications, neuropathy, retinopathy, nephropathy, and a consequent decrease in quality of life and an increase in the rate of mortality (Santaguida *et al.*, 2008). Among the multiple risk factors underlining the incidence and progression of type 2 diabetes, diet is the main modifiable factor. Both experimental and epidemiological evidences have shown that consumption of vegetables rich in phenolic compounds and possess high antioxidant capacity may have inverse relationship with the incidence and prevalence of type-2 diabetes (Bahadoran *et al.*, 2013). Dietary control remains one of the most desirable

avenues for the prevention and management of chronic degenerative diseases such as type 2 diabetes and cardiovascular diseases. The growing number of diabetics coupled with the harsh side effects of some synthetic drugs has led to the increasing search for alternatives which are relatively cheap with minimal side effects. Green leafy vegetables and fruits have been reported to have some health benefits.

Consequently, jute leaf is a green leafy vegetable popularly used as food and in traditional medicine for the management of diabetes mellitus. However, there is dearth of information on the possible mechanisms of action by which these vegetables exert their health benefits. Therefore, this study sought to investigate the possible mechanisms of action of this vegetable in type-2 diabetic model and its associated diabetic complications.

METHODS AND PROCEDURES

Bioassays Animals

Adult male Wistar rats (150–200g) from the Central Animal House of the Federal University of Santa Maria, RS, Brazil, were used in this experiment. The animals were maintained at a constant temperature (23±1°C) on a 12-h light/dark cycle with free access to water and to a standard commercial chow (Supra, Porto Alegre, RS, Brazil). All animal procedures of Animal Ethics Committee from the Federal University of Santa Maria were followed. They were acclimatized under these conditions for two weeks prior to the commencement of the experiments.

High-fat fed-diet with low dose of streptozotocin-induced diabetes (type-2 diabetic rat model) bioassay

All the rats were provided with formulated basal diet and water *ad libitum*, prior to the dietary manipulation. After two weeks of acclimatization, a fraction of the rats were placed on normal control (NC) diet [(wheat flour (30%), soybean oil (5%), casein (15.5%), sucrose (10%), cornstarch (35%), vitamins and minerals (4.5%), while the high-fat diet (HFD)-fed rats were allocated into a dietary regimens consisting of (wheat flour (30%), Fat (35%) soybean oil (5%), casein (15.5%), sucrose (10%), vitamins and minerals (4.5%), as a percentage of total feed weight]. After 2 weeks of dietary manipulation, the rats fed with HFD were injected intraperitoneally (i.p.) with low dose of streptozotocin (STZ) (35 mg/kg) for the induction of diabetes, according to a modified method described by Srinivasan *et al.*, (2005).

The rats were randomly divided into five (5) groups comprising five animals each per group as given below;

- Group 1 were normal rats received citrate buffer (pH 4.5) (1 ml/kg, i.p) on basal diet (wheat flour (30%), soybean oil (5%), casein (15.5%), sucrose (10%), corn starch (35%), vitamins and minerals (4.5%).
- Group 2 were diabetic control rats on high fat diet [(wheat flour (30%), Fat (35%) soybean oil (5%), casein (15.5%), sucrose (10%), vitamins and minerals (4.5%)].
- Group 3 were diabetic rats on high fat diet and received acarbose (50mg/kg/bwt) orally.
- Group 4 were diabetic rats on high fat diet and 10% Jute leaf
- Group 5 were normal rats on basal diet and 10% of Jute leaf

Streptozotocin (STZ) was freshly prepared in citrate buffer (0.1 M, pH 4.5) and injected intraperitoneally (i.p.) at a single dose of 35 mg/kg body weight in rats fed high fat diet (Srinivasan *et al.*, 2005). Diabetic state was checked 72 hours after induction with STZ. Blood samples were taken by tail vein puncture and glucose

level was monitored using auto-analyzer (Accucheck Auto-coding™). Animals with blood glucose ≥ 200 mg/dl after 72 hours were considered diabetic and were used in the study. The non-diabetic animals received 1ml of 0.1M citrate buffer intraperitoneally. The diabetic rats were randomly divided into five groups consisting each of five rats and were further placed on dietary regimen containing 10% vegetable supplementation [as a percentage of total feed weight], for the period of thirty days. During the experiment, fasting blood glucose was monitored at 5 days interval. The experiment lasted for 30 days and the rats were decapitated after an overnight fast. The blood was rapidly collected by direct heart puncture and the pancreas, lungs and the small intestine were isolated, rinsed in 1.15% KCl, blotted with filter paper and weighed. The organs were then minced with scissors in 4 volumes of ice cold 0.1M phosphate buffer, pH 6.9 and homogenized in a potter-Elvehjem homogenizer. The homogenates were later centrifuged at 12000xg for 15 minutes at 4°C to obtain Post Mitochondrial Fraction (PMF) which were stored at 4°C and later used for biochemical assays.

The serum was assayed for blood glucose, lipid profile (Total cholesterol and Triglyceride) commercially available kits (Randox Laboratories UK). The pancreas was assayed for the α -amylase activity (Worthington, 1993), the small intestine was assayed for α -glucosidase activity (Apostolidis *et al.*, 2007) and the lung was assayed for the ACE activity (Cushman and Cheung, 1971). Pancreatic malondialdehyde (MDA) content was determined as described by Okhawa *et al.*, (1979).

α -Amylase Assay

Pancreatic homogenate of 50 μ l was added to 250 μ l of 0.02 M sodium phosphate buffer (pH 6.9 with 0.006 M NaCl) was incubated at 25°C for 10 min. Then, 50 μ l of 1% starch solution in 0.02 M sodium phosphate buffer (pH 6.9 with 0.006 M NaCl) was added to each tube. The reaction mixtures was incubated at 25 °C for 10 min and stopped with 1.0 ml of dinitrosalicylic acid colour reagent. Thereafter, the mixture was incubated in a boiling water bath for 5 min, and cooled to room temperature. The reaction mixture was then diluted by adding 2 ml of distilled water, and absorbance measured at 540 nm. The α -amylase activity was expressed as enzyme activity as shown in the appendix (Worthington, 1993).

α -Glucosidase Assay

Briefly, 15 μ l of intestinal α -glucosidase (EC 3.2.1.20) solution in 0.1 M phosphate buffer (pH 6.9) was incubated at 37°C for 10 min. Then, 40 μ l of 5 mM *p*-nitrophenyl- α -D-glucopyranoside solution in 0.1 M phosphate buffer (pH 6.9) was added. The mixtures

were incubated at 37°C for 10 min, before reading the absorbance at 405 nm in the spectrophotometer. The α -glucosidase activity was calculated and expressed as shown in appendix (Apostolidis *et al.*, 2007).

Angiotensin-I Converting Enzyme (ACE) Assay

The ACE assay was done using a slightly modified method of Cushman and Cheung (1971). Lung's homogenate of 50 μ l was added to tris buffer. The enzymatic reaction was initiated by adding 150 μ l of 8.33 mM of the substrate Bz-Gly-His-Leu in 125 mM Tris-HCl buffer (pH 8.3) to the mixture. After incubation for 30 min at 37 °C, the reaction was arrested by adding 250 μ l of 1 M HCl. The Gly-His bond was then cleaved and the Bz-Gly produced by the reaction was extracted with 1.5 ml ethyl acetate. Thereafter the mixture was centrifuged to separate the ethyl acetate layer; then 1 ml of the ethyl acetate layer was transferred to a clean test tube and evaporated. The residue was redissolved in distilled water and its absorbance was measured at 228 nm.

Determination of MDA Contents

The lipid peroxidation assay was carried out using the modified method of Okhawa *et al.* (1979). Lipid peroxidation expressed as units/mg protein.

Determination of Serum Total Cholesterol and Triglyceride Concentrations

Serum cholesterol and triglycerides were determined using RANDOX kit procedure.

Determination of NTPDase and 5¹-Nucleotidase Activity

This reaction was initiated by the addition of ATP or ADP to a final concentration of 1.0 mM. Briefly, 160 μ l of the medium containing 5.0 mM KCl, 1.5 mM CaCl₂,

0.1 mM EDTA, 10 mM glucose, 225 mM sucrose and 45 mM Tris-HCl buffer, pH 8.0, was added to the platelet containing the enzyme in a final volume of 200 μ l. The platelet (10–20 μ g protein) was added to the reaction mixture and pre-incubated for 10 min at 37°C. Then, 20 μ l of nucleotide (ATP or ADP or AMP) was added. The reaction medium was then incubated for 20 minutes and stopped by the addition of 200 μ l 10% trichloroacetic acid. The samples were chilled on ice for 10 min, and 100 μ l samples were taken for the assay of released inorganic phosphate (Pi) (Chan *et al.*, 1986). 200 μ l of the aliquot of ATP or ADP were transferred into another test tube. 200 μ l of distilled water was then added. Finally, 3ml of aliquot of malachite green was added and the absorbance read at 630nm after 15 minutes. Enzyme activities were expressed as nmol of inorganic phosphate released per min per milligram of protein (nmolPi.min⁻¹mg⁻¹of protein).

Adenosine Deaminase Activity Determination (ADA)

Adenosine deaminase activity was measured spectrophotometrically in platelet by the method of Giusti *et al.*, (1974). The reaction mixture was vortexed and incubated for 30 minutes at 37°C and read at 620 nm. Ammonium sulphate of 75 μ mol/l was used as ammonium standard. The ammonia concentration is directly proportional to the absorption of indophenol at 620 nm. The specific activity is reported as U/l.

DATA ANALYSIS

The results of replicate readings were pooled and expressed as mean \pm standard deviation. One way analysis of variance was used to analyze the results and Duncan multiple tests was used for the post hoc (Zar, 1984). Statistical package for Social Science (SPSS) 17.0 for Windows was used for the analysis.

RESULTS AND DISCUSSION

Table1: Average Feed intakes of high-fat diet and low-dose STZ- induced type-2 diabetic rats fed vegetable supplemented diets

Groups	Treatments	Average Feed Intake	
		(g/rat/day)	
I	Normal rats (Basal)		17.79 \pm 3.2 ^a
II	HFD fed rats + STZ (35 mg/kg) Control rats	15.28 \pm 2.8 ^a	
III	HFD fed rats + STZ (35 mg/kg) + Acarbose	16.32 \pm 3.0 ^a	
IV	HFD fed rats + STZ (35 mg/kg) + Jute leaf (10%)	15.42 \pm 2.9 ^a	
V	Normal rats + Jute leaf (10%)		16.95 \pm 2.9 ^a

Values represent mean \pm standard deviation (n = 5).

Table 2: Average weight (g/rat) of type-2 diabetic rats fed vegetables supplemented diets.

Groups	Weight (g/rat)		Weight gain/loss (%)
	1st day	30th day	
I	200.5±11.7	222.4±13.9	10.9 ^b
II	210.6±13.8	176.3±9.8	-16.3 ^c
III	217.2±12.8	240.5±15.4	10.7 ^b
IV	212.7±11.2	235.6±12.3	10.8 ^b
V	205.2±10.7	231.2±17.5	12.7 ^a

Values represent mean ± standard deviation (n = 5).

Values with the same superscript alphabet on the same row are not significantly (P>0.05) different.

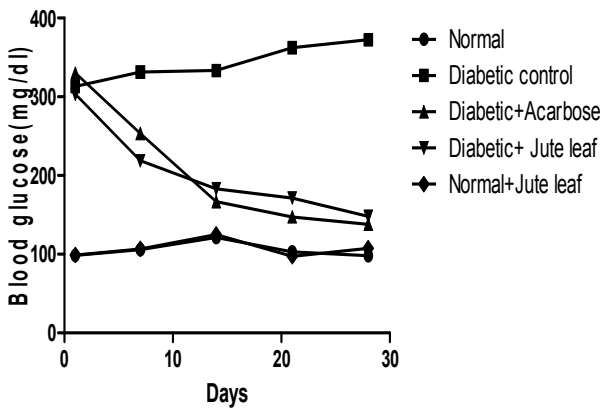


Figure 1: Effect of Jute leaf on blood glucose of diabetic rats.

As shown in Figure 2, significant (P<0.05) increase in the pancreatic α -amylase activity was observed in type-2 diabetic control rat group when compared with the normal control rat group. However, significant (P<0.05) decrease in α -amylase activity was observed in both the treated type-2 diabetic rat groups and vegetable supplemented normal rat groups when compared with type-2 diabetic and normal control rat groups. However, acarbose treated type-2 diabetic rat group had the highest reduction in α -amylase activity.

Furthermore, there was significant (P<0.05) increase in the intestinal α -glucosidase in type-2 diabetic control rat group when compared with the normal control rat group. Moreover, significant (P<0.05) decrease was observed in intestinal α -glucosidase activity of both the treated type-2 diabetic rat groups and vegetable supplemented normal rat groups when compared with type-2 diabetic and normal control rat groups.

Lung angiotensin-I-converting enzyme (ACE) activities was significantly (P<0.05) elevated in type-2 diabetic control rat group when compared with the normal control rat group and other groups. However, the ACE

activity in the lungs was significantly (P<0.05) reduced in all the rat groups when compared to the diabetic rats (Figure 3). Furthermore, there was no significant difference among the groups except for the diabetic rats.

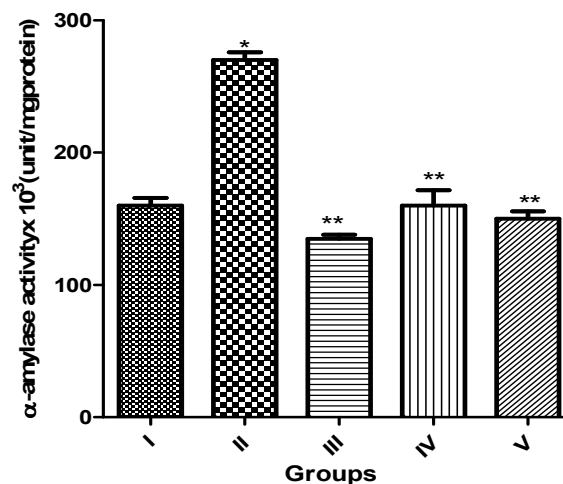
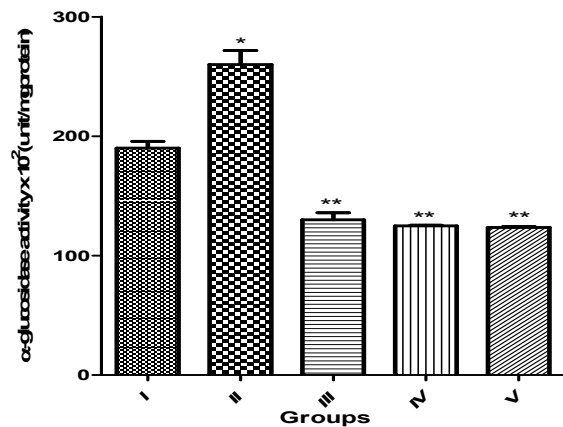


Figure 2: Effect of Jute leaf on Alpha amylase and alpha glucosidase activities of Diabetic Rats.

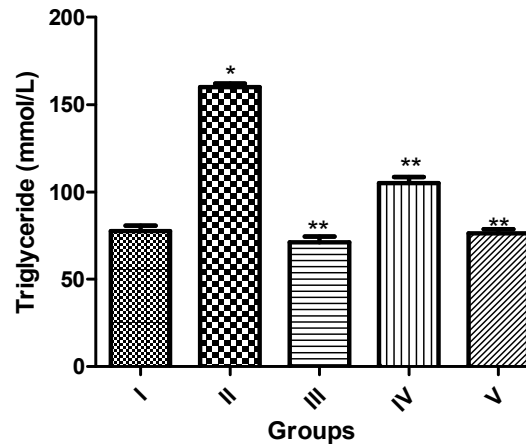
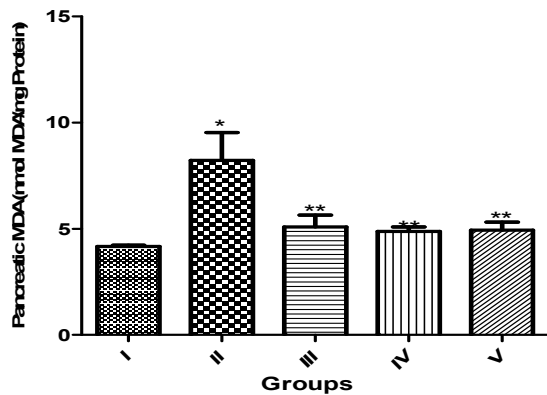
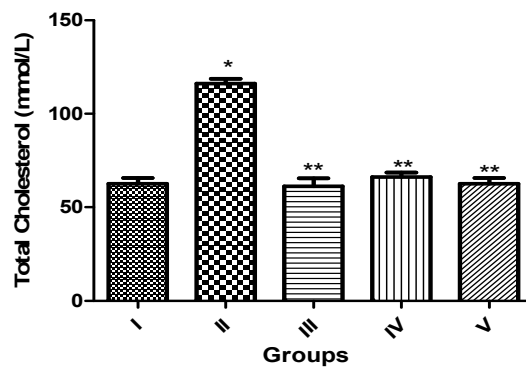
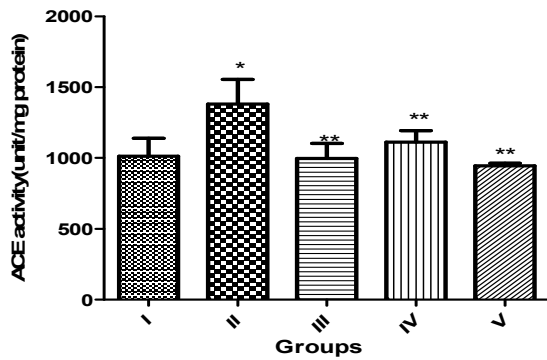


Figure 3: Effect of Jute leaf on angiotensin-1-converting enzyme (ACE) activity and lipid peroxidation in pancreas of diabetic rats.

Figure 4: Effect of Jute Leaf on Serum Total Cholesterol and Triglyceride levels of Diabetic Rats

Effect of jute leaf on lipid peroxidation in pancreas of diabetic rats was also shown in Figure 3. The result showed that there was significant increase ($P < 0.05$) in lipid peroxidation of the diabetic rat group when compared to the normal control and other treated groups. However, there was no significant difference between the normal control and the vegetable supplemented normal rats.

*Values are significantly ($P < 0.05$) different from normal group
**Values are significantly ($P < 0.05$) different from control group

The result of the serum lipid profile [(triglyceride (TG) and total cholesterol (TC)] showed that there were significant ($P < 0.05$) elevation in the levels of plasma TG and TC compared to the normal control rat group (Figure 4). However, the levels of serum TG and TC were significantly ($P < 0.05$) reduced in both metformin and acarbose and vegetable treated type-2 diabetic rats when compared with the type-2 diabetic rats.

The results shown in Figure 5-6 revealed the effects of Jute leaf on the activities of ectonucleotidases. There were significant difference ($P < 0.05$) in the activities of both NTPdase and 5'-nucleotidase in diabetic rats when compared to the normal rats as shown in the rate of ATP and ADP hydrolysis (NTPdases) and AMP hydrolysis (5'-nucleotidase). However, the vegetable treated rats showed significantly elevated levels of activities ($P < 0.05$) when compared to the diabetic rats.

Conversely, the result obtained in Figure 6 showed that there was a significant ($P < 0.05$) elevation of adenosine deaminase (ADA) activity in diabetic control group when compared to the normal control group. However, a significant ($P < 0.05$) reduction in the adenosine deaminase (ADA) activity was observed in the vegetable treated diabetic rats when compared to the diabetic rats.

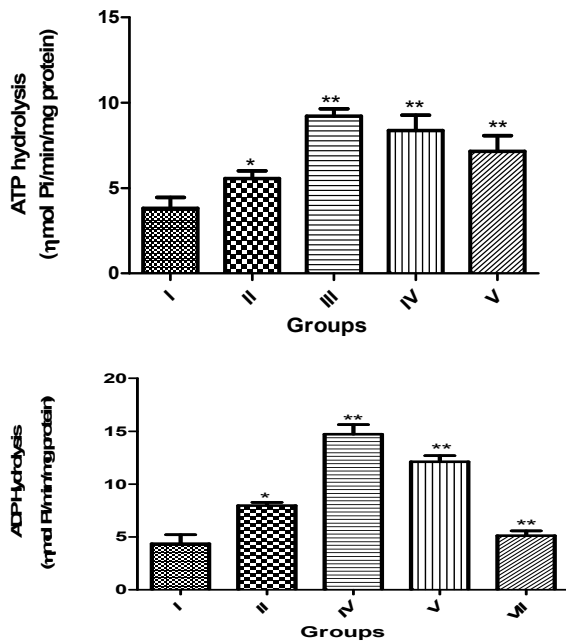


Figure 5: Effect of Jute Leaf on ATP and ADP Hydrolyses in platelets of Diabetic Rats.

*Values are significantly (P<0.05) different from normal group

**Values are significantly (P<0.05) different from control group

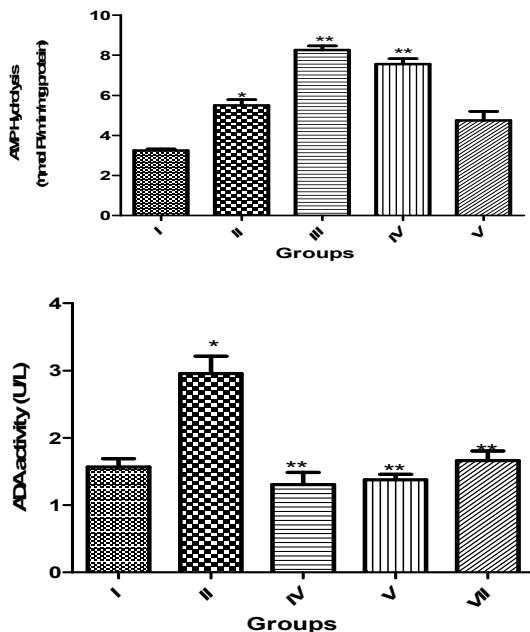


Figure 6: Effect of Jute Leaf on AMP Hydrolysis and Adenosine Deaminase (ADA) Activity of Diabetic Rats.

*Values are significantly (P<0.05) different from normal group

**Values are significantly (P<0.05) different from control group

In this study, the effect of jute leaf was investigated using the type 2-diabetic rat model by high-fat feeding and streptozotocin injection. Chemical, like streptozotocin (STZ) exhibits its diabetological action through the production of free radicals causing damages to β -cells of the islets of Langerhans. STZ may also exert its differential wreck action to hepatocytes, nephrons and cardiomyocytes (Rosholt *et al.*, 1994). The combination of high fat diet (HFD) and low doses of STZ resulted in characteristic of type 2 diabetes mellitus; HFD induces insulin resistance while low doses of intraperitoneal STZ induce moderate impairment of insulin secretion (Zhang *et al.*, 2003). Furthermore, although high-dose STZ severely impairs insulin secretion mimicking type 1 diabetes, however, insulin resistance will be developed in these animals when fasting blood glucose increased in diabetic rats.

The blood glucose lowering effect of jute leaf may indicate that these vegetables may possess antidiabetic agents which could control hyperglycemia. This is in consonance with earlier reports that green leafy vegetables possess antidiabetic properties (Zhang *et al.*, 2010; Balamurugan and Ignacimuthu, 2011).

One therapeutic approach for treating in the early stage diabetes is to decrease post-prandial hyperglycaemia. This is done by retarding the absorption of glucose through the inhibition of the carbohydrate-hydrolyzing enzymes, α -amylase and α -glucosidase, in the digestive tract. Consequently, inhibitors of these enzymes determine a reduction in the rate of glucose absorption and consequently blunting the post-prandial plasma glucose rise (Chen *et al.*, 2006).

As observed in this study, the significant increase in pancreatic α -amylase and intestinal α -glucosidase activities in type-2 diabetic rats agree with earlier works where elevated activities of the carbohydrate hydrolyzing enzymes were reported in type-2 diabetic animals and human subjects (Shankaraiah and Reddy, 2011; Ademiluyi and Oboh, 2013). However, the increased pancreatic α -amylase and intestinal α -glucosidase activities in type-2 diabetic rats may have contributed to the observed elevation in blood glucose level. Furthermore, the increased intestinal α -glucosidase and pancreatic α -amylase activities in type-2 diabetic rats were observed to be reduced in vegetables treated type-2 diabetic rats. The observed reduction in the activities of the carbohydrate hydrolyzing enzyme activities (pancreatic α -amylase and α -glucosidase) of vegetables treated type-2 diabetic rats could be linked to the inhibition of the enzymes by phenolics present in the vegetables (Saliu *et al.*, 2012).

Regulation of the renin-angiotensin system may retard or prevent glomerular hypertension, which is a major factor in the progression of diabetic nephropathy. The reduced activity of ACE observed in vegetable treated rats may be linked to the inhibition of ACE by the phenolics in the vegetables (Saliu *et al.*, 2012). Lipid peroxidation is well known as an important parameter of oxidative stress (Puntel *et al.*, 2005). The increase in pancreatic malondialdehyde (MDA) in type-2 diabetic rats may have originated from hyperglycemia leading to oxidative and cellular damage. This inhibition of lipid peroxidation might be due to the high antioxidant potentials of the polyphenolic constituents of jute leaf as reported in earlier works (Obloh *et al.*, 2012).

The hypertriglyceridaemia observed in these type-2 diabetic rats may be due to increased absorption and formation of triglycerides in the form of chylomicrons following exogenous consumption of diet rich in fat or through increased endogenous production of TG-enriched hepatic VLDL and decreased TG uptake in peripheral tissues. Hypercholesterolaemia may be attributed to the increased dietary cholesterol absorption from the small intestine following the intake of HFD in a diabetic condition (Srinivasan *et al.*, 2005). However, the levels of serum TG and TC were significantly reduced in the vegetable treated type-2 diabetic rats. Moreover, it can be conjectured that the lipid lowering effects of these vegetable supplemented diets could be due to the inhibition of hepatic cholesterol, triglyceride and fatty acid synthesis by the phenolic constituents of the vegetables investigated (Balamurugan and Ignacimuthu, 2011). An enhanced increment in NTPDase and 5¹-nucleotidase activities in platelets of type-2 diabetic rats with vegetable supplementation indicates that the consumption of both vegetables interferes with purinergic signaling. This consequent increase in the ectonucleotidases activities reflects an increased degradation of ATP, ADP, and AMP resulting in an increment in the adenosine formation. In this sense, it can be suggested that the supplementation of jute leaf may have an antiaggregant effect similar to the report for red wine, limiting the bioavailability of ADP, the main agonist to platelet aggregation (Anfossi *et al.*, 2002). Moreover, it also promotes the production of adenosine, an antiaggregant and vasodilating agent, contributing to the control of hemostasis in diabetic state (Birk *et al.*, 2002).

Based on these findings, it could be suggested that jute leaf may be able to preserve adenosine levels in the circulation, which act upon platelet adenosine receptors and can inhibit platelet aggregation and promote vasodilatation, exerting an important protective role in the prevention of the development and progression of vascular complications caused by the hyperglycemic

state. In fact, studies have shown that polyphenolic compounds present in some plant foods can inhibit the process of thrombus formation (Dohadwala, and Vita, 2009; Gresele *et al.*, 2011). Thus, these results support the hypothesis that one of the ways by which jute exerts its cardioprotective actions may be mediated by an increase in the adenosine levels and an amplification of the effect of this nucleoside via adenosine receptors, since this vegetable has demonstrated the ability to reduce ADA activity.

CONCLUSION

Dietary supplementation of jute leaf in type 2 diabetic rat showed antihyperglycemic and hypolipidemic properties of this vegetable by enhancing glucose homeostasis via delaying carbohydrate digestion, protecting the tissue damage, improving blood lipid profile and membrane integrity and suppressing oxidative stress. Furthermore, they could interfere with the ectoenzymes' activities in the platelet of diabetic rats thereby contributing to the prevention of platelet abnormality and consequently vascular complications in diabetic state. In addition, this study provides a biochemical rationale for clinical studies. Further studies in animal models and human volunteers need to be done to substantiate these findings. Jute leaf may therefore represent a potential functional food for the prevention and management of type-2 diabetes and its attendant complications.

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IN-VITRO ANTHELMINTIC ACTIVITY OF *MUCUNA PRURIENS* (DC) AND *CANARIUM SCHWEINFURTHII* (ENGL) ON *ACARIS SUUM*

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ABSTRACT

Mucuna pruriens and *Canarium schweinfurthii* used in traditional medicinal practices in Northern Nigeria, for the treatment of worms infestation were investigated. The *in-vitro* anthelmintic evaluation of the crude and solvent partitions extracts, on *Pheretima posthuma* and *Ascaris suum* (eggs and L₂ stage) respectively. Showed that the hexane fraction (leaves and stem bark) of *Canarium schweinfurthii* and *Mucuna pruriens* (leaves) had ovicidal potency of (100.00 ± 0.33) at 80mg/ml. While the Chloroform fractions showed ovicidal activity of 98.20±0.12 and 98.20±0.12 80 mg/ml on the two plants respectively. The results of determination of larvicidal potency showed that the hexane fraction (0.06%) was the most potent, followed by the Chloroform fractions (0.1 and 0.2 % respectively). These results clearly justified the uses of these plants in the treatment of worms in ethno-medicinal practices.

KEYWORDS: anthelmintic activity, mucuna pruriens, canarium schweinfurthii, pheretima posthuma, a. suum, eclodibility

INTRODCUTION

Helminth infections are among the most widespread infections in humans, distressing a huge population of the world. The majority of infections due to helminthes is generally restricted to tropical regions and cause enormous hazards to health and contributes to the prevalence of malnourishment, anemia, eosinophilia and pneumonia [1]. Ever since the advent of broad-spectrum anthelmintics in the 1960's, anthelmintics of the macrocyclic lactone family have a significantly longer residual effect in comparison with the other anthelmintics.

Over time, questions have been raised concerning the long-term impact of the massive application of these highly efficacious, broad-spectrum anthelmintic compounds on the environment. Due to the bioavailability of some of these drugs, high percentages of these substances are being excreted unchanged after oral or systemic administration [2][3]. To this day however, we remain oblivious to what the possible long-term ecological effects of these drugs and their residues are on pasture fauna and flora [4]. The gastrointestinal helminthes are becoming resistant to both the benzimidazole and macrocyclic lactone which are the available anthelmintic, therefore there is a foremost problem in treatment of helminthes diseases [5]. This concern, among others, is stimulating the need for alternative, more biological measures of parasite control. Hence there is an increasing demand towards

new anthelmintics, which may take time before they become less effective.

In biological farming, the use of traditional synthetic drugs is not allowed and therefore, organic farmers prefer a phytopharmaceutical approach for the control of parasitic infections on their farm [6]. Nevertheless, continued efforts could be made to standardize the plant extracts with good anthelmintic activity and formulate best alternative herbal preparations to replace or complement the synthetic drugs, which are currently in use.

M.pruriens is a tropical legume known as velvet bean and devils bean. The genus *Mucuna* belongs to the family *Leguminosae* and consists of 100 species of climbing vines and shrubs. The chemical compounds responsible for the itch is a protein, mucunain [7] and serotonin. *C. schweinfurthii* (Bursaceae), is a wild tree found mostly in Africa, which produces fruit similar to olives. It is commonly known as African elemi; incense tree, bush candle tree or purple canary tree [8]. In Nigeria, the trees are found mostly in the north-central Nigeria which includes: Pankshin, Mangu, Barkin Ladi and Bokkos LGAs of Plateau state as well as Niger State [9]. These plants have a wide reputation among natives of being curative for helminthiasis like elephantiasis [10], intestinal worms, genito-urinary diseases, black tongue, round worm, gonorrhoea and

stomach disorders^[11]. Aim of this study is to establish the anthelmintic potential of *M. pruriens* and *C. schweinfurthii* of the crude extract on *Pheretima posthuma* and partitioned crude on two stages of *A. suum*.

MATERIALS AND METHODS

Plants

The leaves of *M. pruriens* and *C. schweinfurthii* were procured from University of Ibadan Botanical garden and the Pankshin area of Jos, Plateau state respectively. The plant materials were identified and authenticated by the curator; Mallam Musa Mohammed in the Department of Biological Sciences, Ahmadu Bello University Zaria, Kaduna State. Voucher numbers of 392 and 7232 were deposited for *M. pruriens* and *C. schweinfurthii* respectively.

Extraction of *Mucuna pruriens* and *Canarium schweinfurthii*

The powdered plant materials were extracted with methanol using both the soxhlet and maceration method. Crude extract of *M. pruriens* leaves and *C. schweinfurthii* leaves and bark were subjected to column fractionation with solvent of different polarity starting with n-hexane, chloroform, ethylacetate and methanol, in order of increasing polarity. The different solvent fraction obtained were evaporated to dryness and subjected to bioassays.

Biological Assay

Helminthes

The helminthes were collected according to the method described by Jabbar et al.^[12]. Briefly; The *P. posthuma* and *A. suum* were identified by Mallam Yusuf Magagi, Department of Veterinary medicine, Parasitology and Entomology, Ahmadu Bello University Zaria.

Anthelmintic Studies on *Pheretima Posthuma*

This was carried out according to the method described by Marie-Magdeleine et al.^[13], to establish the potency of the plant as claimed by the ethno-medicinal usage. The choice of *P. posthuma* is as a result of the anatomical similarity to that of the parasite.

Egg Hatch Assay

The egg hatch assay was conducted as published by McGaw et al., (2007)^[14] and Bizimenyera et al., (2006)^[15]. The counted number of eggs in a 0.5 mL of egg suspension was pipetted into a 96-well microtitre plate. Wells 1 to 3 were used for *Mucuna pruriens* leaves experiments, well 5 to 7 for *Canarium schweinfurthii* leaves experiments, wells 9 to 11 *Canarium schweinfurthii* bark and wells 12 to 14 were used for both negative and positive controls. In addition, 0.5 mL of plant extract at different concentrations of 10, 20, 40 and 80 mg/mL were added. A commercial anthelmintic drug Albendazole ® (Levamisole, Afrivet, South Africa) was used as the positive control at the same

concentrations and DMSO water used as a negative control. All tests were repeated 3 times.

The plate was incubated under humidified conditions at 25°C temperature for 48 hours thereafter a drop of Lugol's iodine solution was added to each well to stop further hatching. All unhatched eggs and L₁ larvae were then counted.

Inhibition percentages were calculated using a formula by Cala et al., 2012^[16].

$$E (\%) = \frac{(\text{Eggs} + L_1) - L_1}{(\text{Eggs} + L_1)} \times 100$$

Larval Development Assay

The larval development assay was conducted as described by Bizimenyera et al., (2006)^[15]. The counted number of eggs in a 0.5 mL of the egg suspension was put into each well in a 96-microtitre plate with a 100 µl of lyophilized penicillin- streptomycin to combat fungal growth. The contents of the wells were then mixed, and the plates placed in an incubator under humidified conditions at ambient temperature for 48 hours for incubation of the eggs. After 48 hours, 0.5 mL of the extracts of *Mucuna pruriens* and *Canarium schweinfurthii* as well as Albendazole ® (Levamisole, Afrivet, South Africa) as a positive control at 10, 20, 40 and 80 mg/mL were added to respective plates. The negative control plates received 0.5 mL of DMSO. All experiments were replicated three times. Incubation of the plates was continued for 21 days, after which all the plates were examined to determine the survival of larvae at different concentrations. All the L₃ stage larvae in each well were counted and a percentage inhibition of larval development was calculated using the formula (Cala et al., 2012)^[16].

$$E (\%) = \frac{(L_1 + L_2 + L_3) - L_3}{L_1 + L_2 + L_3} \times 100$$

RESULT AND DISCUSSION

The hexane partitioned crude of *C. schweinfurthii* (Engl) and the chloroform partitioned crude of *C. schweinfurthii* (Engl) are yellowish oil and white crystals containing tannins and, flavonoids and tannins respectively while ethylacetate and methanol indicates the presence of alkaloid, cardiac glycoside, tannins, saponins and flavonoids which are potential antinematocidal compounds^[17].

In-Vitro Anthelmintic Activity of the Crude Extract on *Pheretima Posthuma*

The Soxhlet leave extract of *M. pruriens* (DC), *C. schweinfurthii* (Engl) and barks of *C. schweinfurthii* (Engl); time for paralysis at 10mg/ml were 14.75±0.71, 22.00±0.41 and 27.00±0.32 minutes, while death

occurred at 22.00±0.41, 30.50±0.12 and 145.00±0.07, minutes respectively. Macerated leave extract of *M.pruriens* (DC), *C. schweinfurthii* (Engl) and *C. schweinfurthii* (Engl) barks, paralysis time at 10mg/ml were 7.50±0.11, 14.00±0.41 and 17.00±0.30 minutes, whereas death took place at 22.00±0.41, 66.00±0.31, 36.5±0.40 minutes respectively. The time for paralysis and death for albendazole at 10 mg/ml were 15.00 ±0.50 and 35.00±0.40 minutes respectively.

The crude extracts of the plants showed a significant anthelmintic activity (Table 1). The macerated extract contains thermolabile compounds that are potential anti-nematodical agent which its biological activity have been lost or affected by heat.

Crude macerated and soxhlet extract of *M.pruriens* (DC) showed significant difference in the time for

paralysis but no significant difference in the time for death; this indicates that both extracts contains different tegumental diffusing agent (Table I).

Alkaloids were absent in the soxhlet extract and research on HL60 tissue-culture cells have shown that some alkaloids block the narrow region of the channels, which subsequently cause muscle contractions in nematodes.

This leads to worm paralysis in a contractile state and, once rendered immobile, the worms are expelled. The crude macerated and soxhlet extracts caused death in 22.5±0.41 minutes, this is an indication that both extracts contains similar death-inducing compounds.

Table 1: *In-vitro* anthelmintic activity of various extracts on *Pheretima posthuma*

Drug/extracts (Conc. 10 mg/ml)	Earthworm (<i>Pheretima posthuma</i>)	
	Time of paralysis (min.)	Time for death (min.)
Positive control (Albendazole)	15.00 ± 0.50	35.00 ± 0.40
Negative control (DMSO)	NA	NA
<i>M. pruriens</i>	Soxhlet	14.00 ± 0.11
	Maceration	7.50 ± 0.11
<i>C. schweinfurthii</i> leaves	Soxhlet	22.00 ± 0.51
	Maceration	14.00 ± 0.41
<i>C. schweinfurthii</i> bark	Maceration	17.00 ± 0.30
	Soxhlet	27.00± 0.32

The macerated and soxhlet extracts of *M.pruriens* (DC) leaves contain more potent antinematodal agent than *C. schweinfurthii* (Engl) leave and bark extracts; and the positive control (Table 1). Generally the extracts obtained through the cold extraction procedure (maceration) are more potent compared to the extracts obtained by hot-continuous process. These indicate that the type of extraction and temperature plays an important role on the anthelmintic activity of various crude plant extracts (Table 1).

Effect of the Extracts on the Eggs of *Ascaris Suum*

The effect of the leaves and bark of *C. schweinfurthii* (Engl) and leaves of *M.pruriens* (DC) on the unembryonated *A.suum* egg are presented in Figure I-III and Table 2 as percentage inhibition. The partitioned crude extract of *C. schweinfurthii* (Engl) leaves and bark and *Mucuna pruriens*(DC) yielded four, three and three partitioned crude respectively.

The most potent partition of *C. schweinfurthii* (Engl) leaves and bark, and leaves of *M.pruriens* (DC) are hexane, chloroform and chloroform partitioned crude respectively. There is no significant difference in the percentage inhibition of unembryonated eggs of *A.suum* for the *C. schweinfurthii* (Engl) leaves, *C. schweinfurthii* (Engl) bark and *M.pruriens* (DC) leaves at all concentrations for all the partition extract. The methanol partition crude of *C. schweinfurthii* (Engl) bark, and chloroform and ethylacetate partition crude of *M.pruriens* (DC) leaves showed a significant difference at all concentration.

The methanol partitioned crude of *C. schweinfurthii* (Engl) bark showed a very low activity (Fig II), which is an indication of the absence of ovicidal phytochemical agents (Table 2). The in-vitro test of all the partition crude ovicidal activity at all tested concentrations and caused complete lyses of the eggs. Statistical differences (P<0.05) were also observed among plant extracts.

Table 2: Percentage inhibition of eggs of *A.suum*

Concentrations (mg/mL)		% inhibition of eggs of <i>A.suum</i>			
		10	20	40	80
<i>C. schweinfurthii</i> leaves	Hexane	95.20±0.58	96.30±0.33	98.00±0.00	100.00 ±0.33
	Chloroform	94.70±0.33	96.30±0.33	98.00±0.58	99.30±0.33
	Ethylaceate	95.20±0.58	97.70±0.33	98.70±0.67	99.00±0.00
	Methanol	92.70±0.33	94.70±0.88	97.70±0.33	97.70±1.50
<i>C. schweinfurthii</i> bark	Chloroform	92.70±0.15	95.50±0.15	96.0 0±0.10	98.20±0.12
	Ethylaceate	90.70±0.50	96.30±0.20	97.70±0.82	98.00±0.10
	Methanol	8.00±0.60	13.00±0.20	26.00±0.50	26.00±0.40
<i>M.pruriens</i>	Chloroform	76.00±2.00	86.00±1.50	98.30±0.67	98.70±0.88
	Ethylaceate	73.00±1.00	81.00±0.67	90.70±0.50	93.00±0.20
	Methanol	90.70±0.50	95.30±0.20	97.70±0.88	97.70±0.88
Albendazole	Positive control	96.10±0.20	97.50±0.30	98.00±0.20	100.00 ±0.33

Fig I: Effect of partitioned crude of CSL on unembryonated eggs of *A.suum*

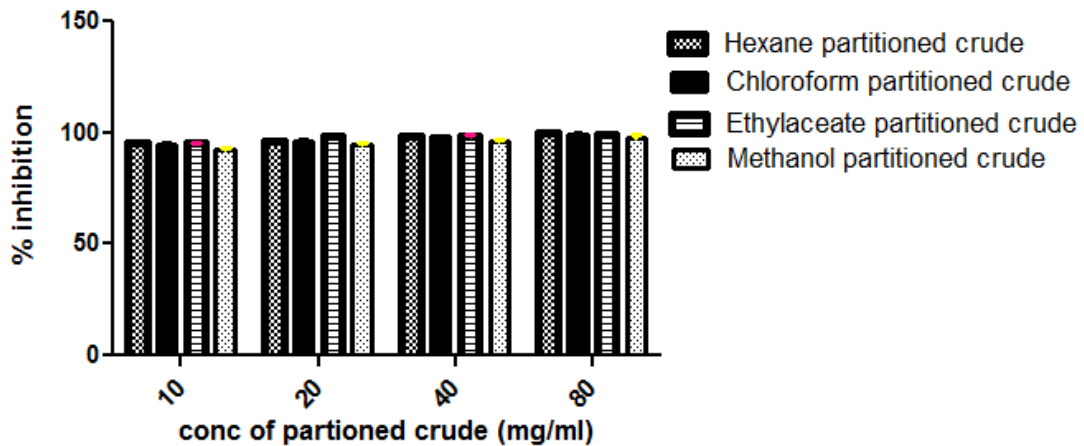
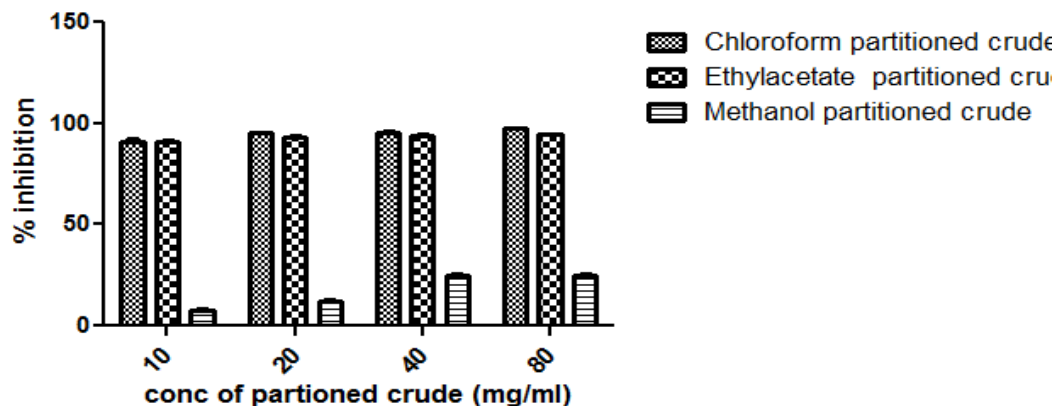


Fig II: Effect of partitioned crude of CSB on unembryonated eggs of *A.suum*



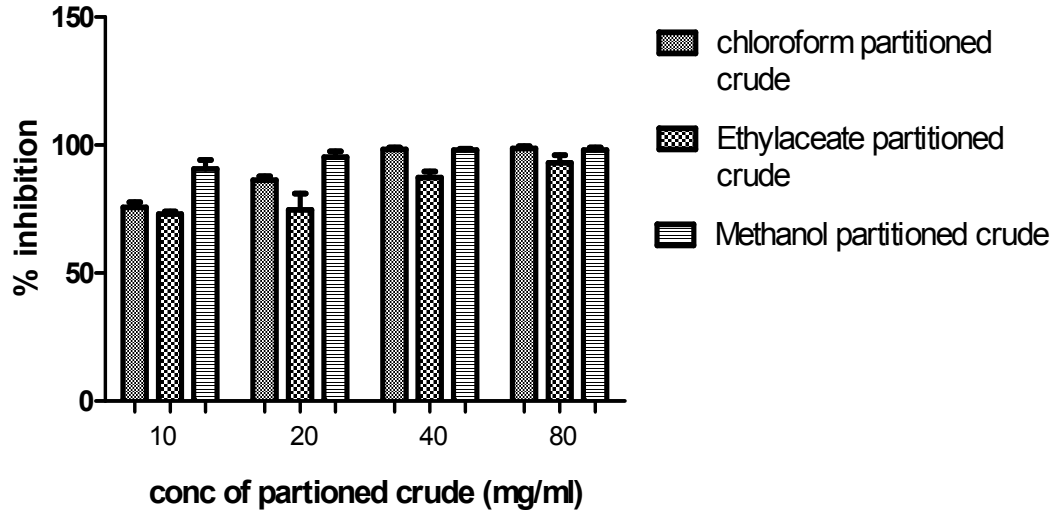
The high activities of the partitioned crude are due to the presence of potential antinematocidal as reported in the work of Athanasiadou *et al.* [18], which target the unique molecular and physiological pathways of parasites.

Effect of the extracts on the second stage (L2) of *A.suum*

The bioactivity accounts for 20.06% of the total variance at P value are < 0.0001. If bioactivity has no effect overall, there is a less than 0.01% chance of randomly observing an effect on the eclodibility. As the

concentration of the partitioned crude increases, it reduces the mean hatching rate. The increase concentration accounts for 77.65% of the total variance at P value is < 0.0001.

Fig III: Effect of partitioned crude of MP on unembryonated eggs of *A.suum*



The effect is considered extremely significant. At all dose the most potent partitioned crude of the leaves of *C. schweinfurthii* (Engl), bark of *C. schweinfurthii* (Engl) and leaves of *M.pruriens* (DC) are the hexane, chloroform and methanol crude (Fig IV-VI). The partitioned crude showed a concentration dependent activity (Fig IV-VI).

crudes showed a comparable potency with the reference drug, albendazole at all dose.

Fig IV: Effect of CSL on the eclodibility of L2 stage of *Acaris suum*

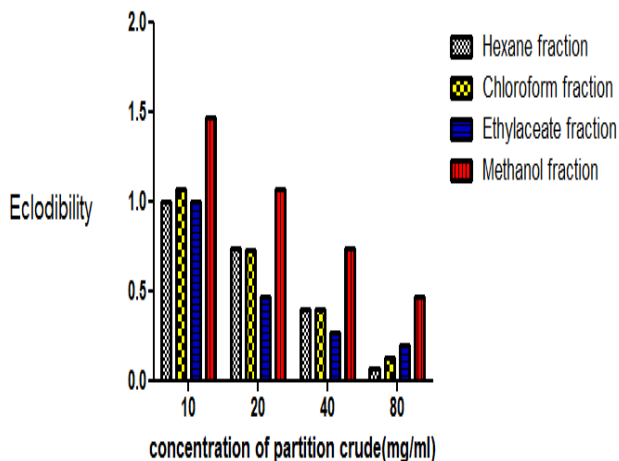
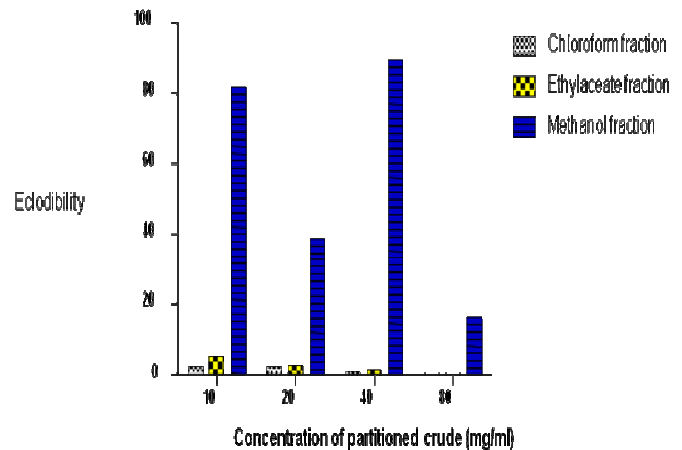


Fig V: Effect of CSB on the eclodibility of L2 stage of *A.suum*



For all the extracts, percentage eclodibility was lower than 10% at all concentrations except for methanol column fraction of *C. schweinfurthii* (Engl) bark with (Fig V). An increase in concentration was characterized by a decrease in eclodibility rate, and there was a significant difference ($P>0.05$) for the different concentrations tested. The most potent partitioned

Fig VI: Effect of MP on the Eclodibility of L2 stage of *Acaris suum*

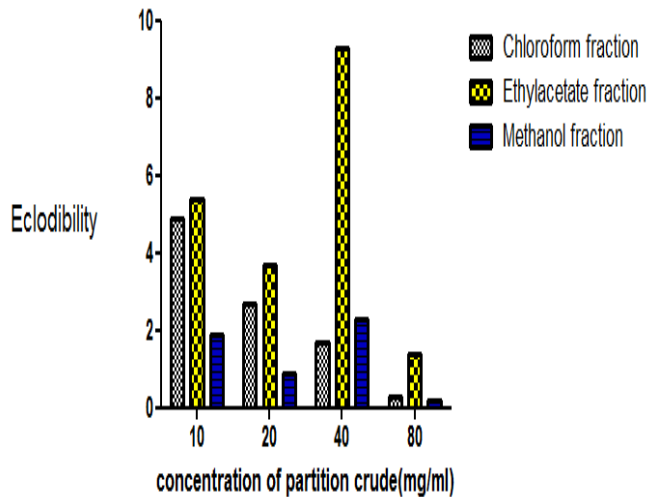
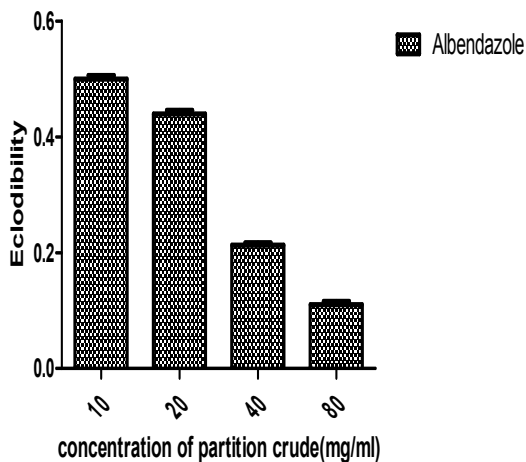


Fig VII: Effect of Albendazole on L2 stage of *Acaris suum*



CONCLUSION

Non standardized procedures of extraction may lead to the degradation of the phytochemicals present in the plants and may lead to variations thus leading to the lack of reproducibility (Table 1). This information can better equip entho-medicinal practitioners better their practice and reduce the huge medical bills incurred in the treatment of this tropical infection and hence, alleviate poverty .The unembryonated egg of *A.suum* is the non-infectious stage of the parasite; the objective is to prevent the unembryonated eggs from developing into infectious embryo of *A.suum* (L_1 stage). Overall, the column fractions of the *C. schweinfurthii* (Engl) and *Mucuna puriens* (DC) which were *in vitro* evaluated in the present study had ovicidal and larvicidal activities on *A. suum*, which are the stages of dissemination into the environment. The partitioned crudes were more ovicidal than the reference drug but showed similar

larvicidal potential with the reference drug. It is thought that these extracts penetrate the eggshell and stop the development of un-embryonated eggs in the same way as albendazole [19]. The present *in-vitro* results suggest that the extracts could affect the biology of the parasitic eggs and larvae. Nonetheless, further, experiments are still on to isolate and characterize these anthelmintic compounds.

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WEB-BASED DECISION SUPPORT SYSTEM FOR PRESCRIPTION IN HERBAL MEDICINE

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ABSTRACT

This paper presents an integrated method to develop a Web-based Decision Support Systems (DSS) for prescription in herbal medicine. Review of existing research works in herbal medicine revealed that the potential of web platforms was exploited to aid herbal medicine survival. In light of this, an architectural framework of the proposed system was developed. First, a pilot study, in which a number of personal unstructured interviews with health service providers and patients, was conducted. This was done to discuss the purpose of the research study. The framework was evaluated based on the users' assessment to determine the efficiency of the proposed system in terms of ease of usage, reliability and relevance of the system. The proposed system is self diagnostic and does not only have a role to play in enhancing decision making but also in the study of diagnostic protocol, self-assessment and quality control in the domain of herbal prescription

KEYWORDS: web based, herbal medicine, prescription, decision support system (DSS)

INTRODCUTION

Herbal medicine treats diseases and promotes health with plant material. For centuries herbal medicines were the primary methods to administer medicinally active compounds. Medication is an important aspect of human life which deals with the administration of ethical drugs on a health practitioner's advice. In Nigeria, today, the rate of poverty is so high that make impossible for people to afford modern medications (Owonubi, 1988). According WHO report (1996), the issues of fake drugs, drug abuse and excessive side effect of drugs are other major problems in modern medicine. In recent times, herbal medicine has found its way as an alternative to orthodox medicine, it is the oldest and still the most widely used system of medicine in the world today (Acharya and Shrivastava, 2008). It is mainly extracted exclusively from plant. It is used in all societies and is common to all cultures due to its affordability. Herbal medicine is increasingly being validated by scientific investigation which seeks to understand the active chemistry of the plant; many modern pharmaceuticals have been modeled on, or derived from chemicals found in plants (Dash and Sahu, 2007). The therapeutic activity of plant is due to its complex chemical nature with different part of the plant providing certain therapeutic effects (Zheng, et al, 2005). Ancient wisdom has always known the roles herbs have played in the intricate balance of well-being of the human species. They have little or no side effect as a result of their preparation from natural herbs (Ernst, 2007).

In Nigeria today, orthodox medicine has been widely accepted due to the fact that it is the mother of all medicine. Nevertheless, orthodox medicine has its own disadvantages, including issue of price of the medicine and the inability of people to afford it. The present economic situation has made it difficult for people to afford the cost of medication, leading to self medication. Self medication is the administration of ethical drugs by a lay-man without a health practitioner's advice (Adeniji, 2000).

In life, there is always an alternative to everything. The alternative to life itself is death. The alternative to orthodox medicine is herbal medicine, otherwise referred to as traditional medicine. Traditional medicine is practiced in every part of the globe, both developing and developed nations. The practice has reached various degrees of sophistication in response to level of development in different parts of the world. One of the most important components of alternative Medicine is herbal medicine (Astin, 1998).

The problem of herbal medication observed over the years was that their portions are not standardized, nor are they dispensed to patients in specific doses or in strictly regulated quantities. Inadequate information about the drugs and the herbalist may also die with the knowledge of the herbs which may lead to misinformation about the herbs in generations to come (Patterson, 1996). Sequel to this, this paper proposes a web-based decision support system for herbal medicine prescription (Ogirima, 2012). With the development of

the Internet, Web-based Decision Support Systems (DSS) have become a new trend in DSS research now provide us with the tools and knowledge that we need to improve health care, enabling solutions that benefit patients as well as healthcare professionals and institutions in both the private and public sectors worldwide (ITU, 2008), (Zhang and Goddard, 2007) and (Gregory and Rodney, 2002). According to Power in (2007) and (2002), he defined Web-based DSS as: “a computerized system that delivers decision support information or decision support tools to a manager or business analyst using a ‘thin-client’ Web browser like Netscape Navigator or Internet Explorer”. The developed system provides easier way to get herbal prescription without the intervention of herbal practitioners; it is self diagnostic and an alternative medication to orthodox medication (Ogirima, 2012)

REVIEW OF RELATED WORKS

Douglas et al and RAND Electronic Prescribing Expert Advisory Panel (2004) compared electronic prescribing systems. The authors argued that commercially available electronic prescribing systems may differ in their effects on patients’ health outcomes and on patients’ ability to manage costs. They convened experts’ panel to recommend specific features that would enable electronic prescribing systems to advance these goals. The panel authored sixty recommendations and rated each using a modified Delphi process. Ratings identified fifty-two recommendations as clearly positive for patient safety and health outcomes and forty-three recommendations as achievable in the average clinician’s office within three years. Overall, these recommendations offer a synthesis of evidence and expert opinion that can help guide the development of electronic prescribing policy.

According to the Medication Errors Panel (2005), they studied and reported on prescription for improving patient safety and how medication errors could be addressed. The panel suggested a system approach to managing medication errors resulting from prescriptions. After spending considerable time examining each part of the medication-use process – prescribing, dispensing, using administering/self-administering and monitoring – and the inter-relationships of each component, the panel identified four key medication-use systems/processes and three key stakeholder groups which served as the focus of its recommendations.

The four key processes which the Panel believes could be better designed to reduce and prevent medication errors are those related to the transcription and transmission of prescriptions (i.e. the methods prescribers use to document a prescription order and

communicate that order to the pharmacy where it will be filled); the education of the consumer regarding the purpose of the treatment, the effective use of the medication, and the monitoring of signs and symptoms that may indicate efficacy or toxicity; healthcare provider payments and incentives which can directly or indirectly influence providers to pursue behaviors designed to reduce medication errors and healthcare provider training and licensure which could foster a better understanding among providers about the seriousness of medication errors and the behaviors to adopt that will reduce them.

Nelson (2009) worked on E-Prescribing as a micro-organizational network in search of an analysis framework. He suggested that the organizational form of e-prescribing is a temporal ad-hoc micro-organizational network (MON) centred on the e-script (engineered artifact) transaction between a single prescriber and a single pharmacy. He claimed that each transaction requires a MON so the structural form of e-prescribing is a network of MONs. A synthesis approach was used to explore both the e-prescribing reference design and available theoretical frameworks to further understand the design of the network. He later concluded that studying the MON for e-prescribing as an organizational form is essential as future care coordination among healthcare organizations will become increasingly computer-mediated.

Arora and Sinha (2012) classified Web applications as the fastest growing classes of software systems today. Web applications are being used to support wide range of important activities: business transaction, scientific activities like information sharing, and medical systems such as expert system-based diagnoses. Web applications have been deployed at a fast pace and have helped in fast adoption but they have also decreased the quality of software.

As observed from existing research works on e-prescription, little or nothing has been done on the web-oriented prescription in herbal medicine which is the focus of this paper.

MATERIALS AND METHOD

The detail of the methodology and approach adopted are described as follow.

Architectural Framework of the Web-based DSS for Herbal Medicine Prescription

In this paper, an architectural framework for a web-based decision support system for herbal medicine prescription is developed and presented in Figure 1. The framework defines the components of the developed system together with the interactions between each component. During the design stage, the architecture of

the system was developed taking into account the available technology. constraints imposed by the user requirements and the

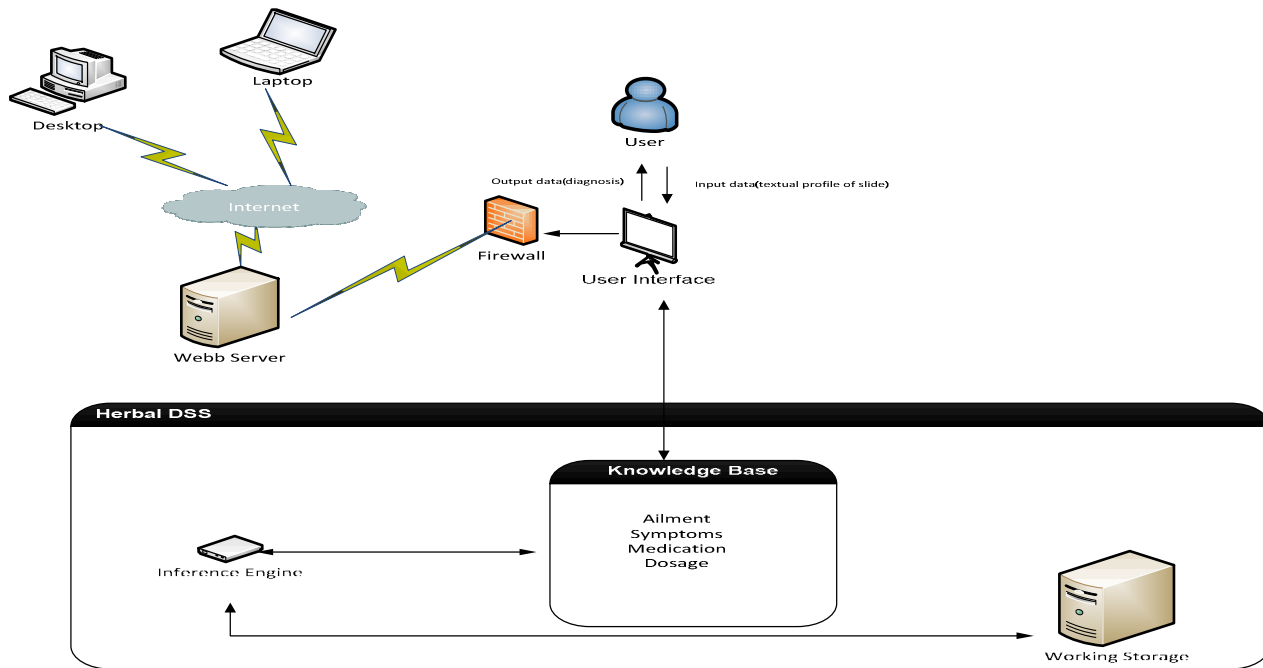


Figure 1: Architectural Framework of Web-based DSS for Prescription Herbal Medicine

The components of the Framework are explained as follows.

1. Internet terminal/Devices (Desktop, Laptop, PDAs)
2. User Interface for Herbal Medicine Prescription
3. Web server
4. Firewall
5. Herbal Medicine Knowledge base
6. Inference engine
7. Database

Internet Terminals / Devices: The user's desktop send message to the dedicated internet devices connected to the server where the application resides with the help of internet protocol provided by the internet operator. The information is got from the server by using the internet protocol; this enables the client to send information to the server and to be able to receive information back from the server.

User Interface: User input data (diagnosis request) through the user interface, which consequently calls the knowledge base, feeding the user input data, the knowledge base is being consulted then the inference engine comes to a final diagnosis, which is displayed by the user interface to the user.

Web Server: Is the gateway application that enables you and your applications to send/receive internet messages through internet devices to your computer. It has an easy to use user interface, and an excellent internal architecture.

Firewall: Firewall is software that checks information coming from the internet or a network, and then either blocks it or allows it to pass through to the attempted system depending on the firewall settings. Allowing information through the firewall, sometimes called unblocking, is when an exception is created to enable a particular program to send information back and forth through the firewall.

Knowledge Base: Knowledge base consists of some encoding of the domain of expertise for the system. This can be in the form of semantic nets, procedural representations, production rules, or frames. These rules occur in sequences and are examined by the inference engine; actions are executed if the information supplied by the user satisfies the conditions in the rules.

Inference Engine: Inference engine is the dialogue conducted by the user interface between the user and the system. The user provides information about the problem to be solved and the system then attempts to provide insights derived or inferred from the knowledge

base. These insights are provided by the inference engine after examining the knowledge base.

Database: The database is a fundamental part of the system. It is also called as the working storage and it works hand in hand with both the knowledge base and the inference engine as a means of storing data. It stores all important and detailed information of the Herbal and that of the administrator. Besides, it stores the detail set of prerecorded messages dropped by user, which are suitable for different guidance cases. In addition, the database server has both temporal validity and precise timing constrains which allow it to store the most recent data and effect instant changes as soon as they occur.

The DSS Design for the developed Herbal Medicine Prescription

The system design, Figure 2 depicts the sequential flowchart of activities of use and the actions that will be performed when an operation is being executed. Figures 3 show the structure knowledge of the database and the relational of the structure of the developed system. The sequence diagram (Figure 4) describes how the objects in the system interact over time. The objects identified in the system are the patients (users) and herbal practitioner using the system, user interface and the DSS. They interact in the sequence shown by passing messages across the timelines. These messages are the actions carried out by the objects in the system in a chronological order. The activity diagram (Figure 5) shown depicts the sequential flow of activities used to model actions that would be performed when an operation is being executed as well as the result of those actions. Figure 6 shows the pictorial design of how the

user and system administrator interact with the proposed system. The user interface displays the ailments, symptoms, medication and prescription for each corresponding ailment. The system is user friendly at this stage. The system administrator has interface that includes the buttons that is necessary for the updating of the database. The database stores the information about the new discovery ailment, and their likely symptoms and cure.

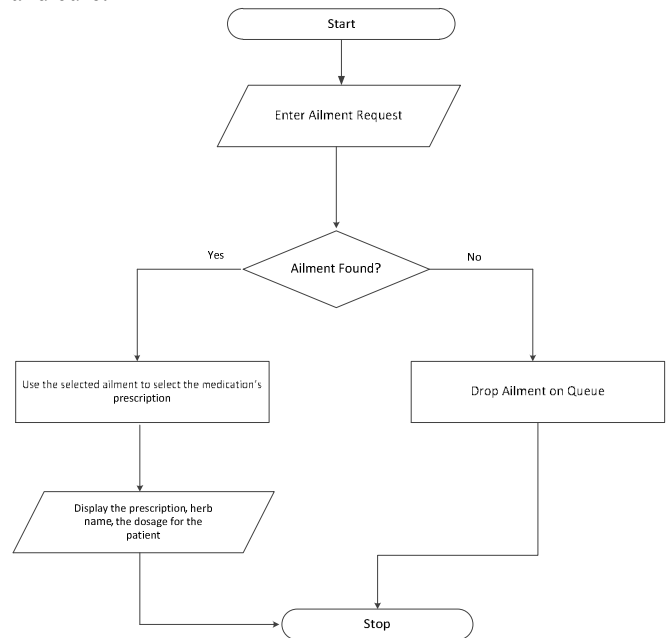


Figure 2: User Server of the developed system

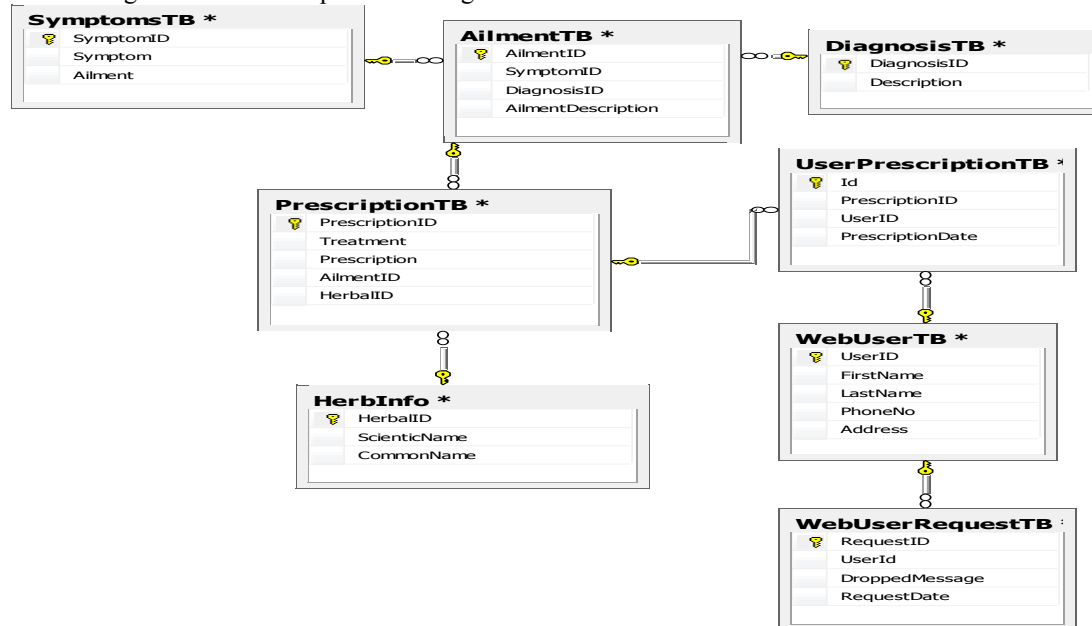


Figure 3: The structure knowledge of herbs database

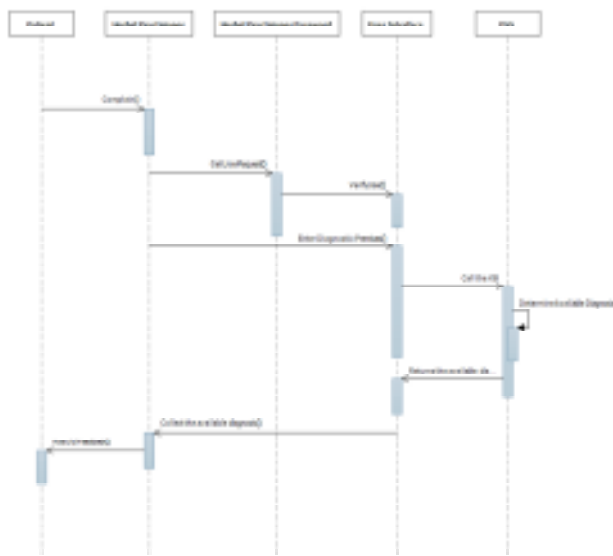


Figure 4: Sequence Diagram of the developed system

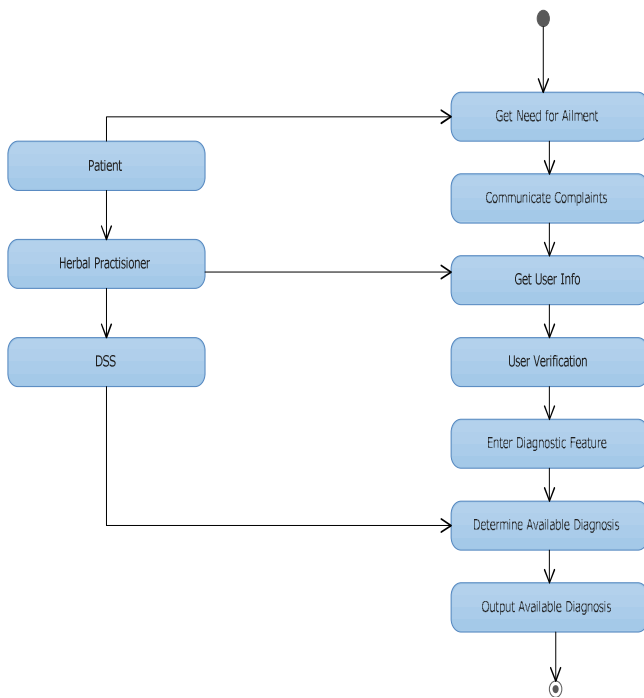


Figure 5: Activity Diagram of the developed system

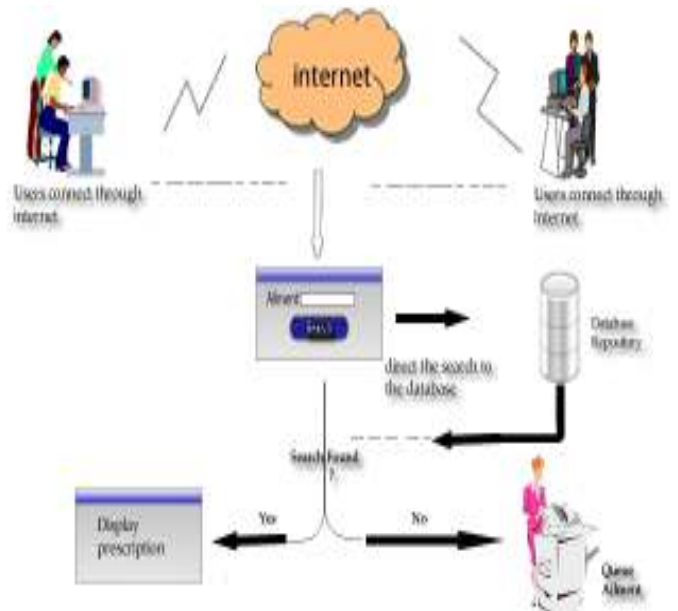


Figure 6: Client server operation of the developed system

Implementation Tools

The programming tool used to implement the design is C# using Microsoft Visual Studio 2008 integrated development environment (IDE). Visual Studio .NET is Microsoft's integrated development environment (IDE) for creating, running and debugging programs for the development of the designed system.

THE STUDY AREA AND SAMPLE SIZE

The population of the study comprises of the entire health service providers and patients at the LAUTECH teaching hospitals situated in Oyo and Osun States, Nigeria. The health service providers consist of Doctors, Nurses, Midwives, the hospital maids, attendants, nursing and medical students. Consequently, there was adoption of a purposive technique to determine those to be interviewed (sample size) because the population in the study area is large. Purposive sample is drawn to aid the ease of data collection or special features of the members of the sample. Therefore, the selection of the respondents was based on identification made by the health stakeholders in the study area of those who can serve the research purpose.

A total of one hundred (100) copies of questionnaire were distributed to these respondents from diverse educational background while ninety-five (95) copies were returned, representing a response rate of 95% as follows:

- i. Pharmacists = 22
- ii. Patients = 32
- iii. Nurses / Midwives = 9
- iv. Doctors = 11

- v. Others (Hospital Management staff, Nursing and Medical Students) = 21

The respondents were asked to indicate the factor (s), according to how strong each feels, that can significantly influence the choice of web to convectional face-to-face treatment by herbal practitioners.

DATA COLLECTION INSTRUMENT

A well-structured questionnaire and oral interviews were used to gather primary data for the study. The questionnaire was validated and tested for reliability. A Cronbach alpha reliability co-efficient of $\alpha = 0.72$ was achieved.

METHOD AND TOOLS FOR DATA ANALYSIS

Microsoft Excel was used to capture and analyze the data obtained from the duly-filled copies of questionnaire while frequency and percentage distributions were the descriptive techniques used. The descriptive survey was adopted to obtain the opinion of a representative sample of the target population so as to be able to infer the perception of the entire population.

RESULTS AND DISCUSSION

The evaluation carried out in this work was based on users' assessment to determine the efficacy of the proposed system in terms of ease of usage, reliability and relevance of the system. This is accomplished by administering a questionnaire developed on a 5-point Likert rating scale. A Likert rating scale is a psychometric scale commonly used in questionnaire, and is the most widely used scale in survey research (Mogey, 1999). When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement. The most common scale is 1 to 5. Often the scale will be 1 = strongly disagree, 2 = disagree, 3 = not sure, 4 = agree and 5 = strongly agree. Similarly Likert items were combined using the Likert summing analysis to formulate the three parameters used for the evaluation. One hundred (100) copies of the questionnaire were administered to collect user's assessment of the developed system. Ninety-five (95) out of one hundred (100) copies of the questionnaire were received from users of diverse educational backgrounds indicating a response rate of 95% and data retrieved from the duly-filled questionnaire were captured and analyzed using Microsoft Excel. The proposed system was tested using the statistical analysis of individual Likert items is presented in Table 1 and the bar chart representations of the analysis is presented in Figures 9. The Q1, Q2, Q3, Q6, Q7 and Q10 from the set questionnaire were not a Likert item, therefore it was not analyzed.

The assessment carried out in this work was based on users' preference between Web based and face to face herbal prescription in terms of security, cost, ease of usage, privacy and mobility of the system. In figure 7, the gender distribution of the respondents is presented; while 68% of the respondents are male, 32% are female.

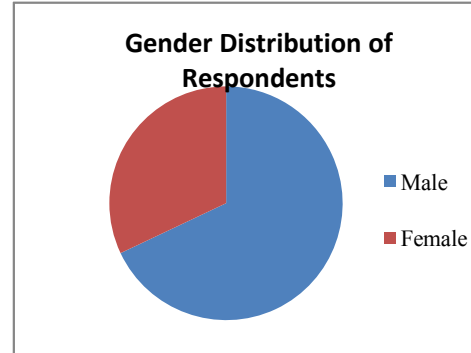


Figure 7: Gender Distribution of Respondents

However, figure 8 shows the distribution of occupation of the respondents in the study area. The degree of responsiveness of the respondents decreases from the patients, to the pharmacists, the others (management staff of the hospital, the nursing and medical students), the doctors and the nurses in that order.

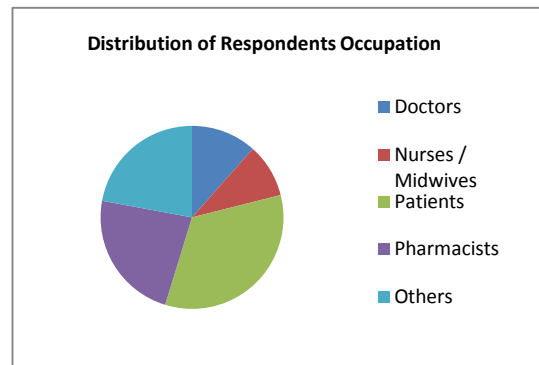


Figure 8: Distribution of Respondents Occupation

The results obtained from the analysis of the respondents' data revealed that the proposed system offers high degree of ease of usage and reliability. Most respondents ascertain that it has a highly efficient emergency system with high relevance to realize immediate response to health symptoms and challenges of individuals. The system's knowledge base was evaluated by some experts who tested the system to query the diseases and the corresponding medications. Based on the result obtained, the system is capable of assisting herbal practitioner to make an accurate and timely decision-taking, substantially eliminating error in wrong medication and thereby increasing the efficiency of diagnostic skills.

Table 1: Data Analysis of the Administered Questionnaire.

	Likert Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Response Mean	Response Mode
Q4	Would you agree that the developed herbal prescription system is a suitable alternative to orthodox medicine?	13	16	22	32	12	3.15	4
Q5	Would you agree that developed herbal system is better than orthodox medicine?	14	14	13	31	23	3.37	4
Q8	Would you agree that the ingredient for treatment prescribed by the developed herbal system for various ailments are readily available?	15	16	15	33	16	3.20	4
Q9	Would you agree that the developed system could be used for treatment of ailments considered terminal by orthodox medicine?	11	18	20	33	13	3.20	4

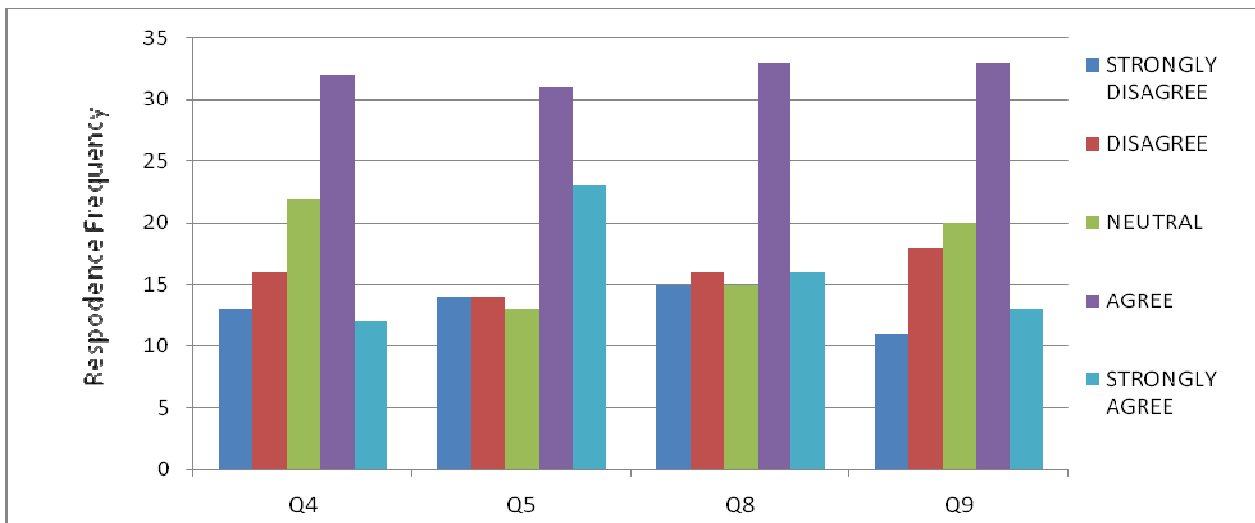


Figure 9: Bar Chart Representation of Numerical Frequency of Response of Table 1.

The symptoms interface (Figure 10) shows the diseases and their symptoms in which user or patient can check for the symptom of the ailment he or she is suffering from. If such symptom or ailment is not found then the patient drop request as shown in Figure 11. The client's prescription interface shown in Figure 11 gives the detailed herbal prescription entities (i.e. ailment, treatment herbs, and the dosage). Users of the application are free to choose from the ailment catalogue. Treatments show how the herbs are to be administered or used by the patient and the dosage to prevent the patient from taking excess. The users get feedback of herbal medication for the requested ailment

with the dosage prescription immediately if there is cure else the user need to drop a request as shown in Figure 13, pending the cure is found.

Herbal information list (Figure 12) provides the patient or the user information about the herbs needed for the treatments requested for (i.e. showing the botanical and their common name). Users can visit this site provided they are connected to the internet to see the available herbal plants. This will now aid the user or patient to check for the herbal plant within his/her locality.

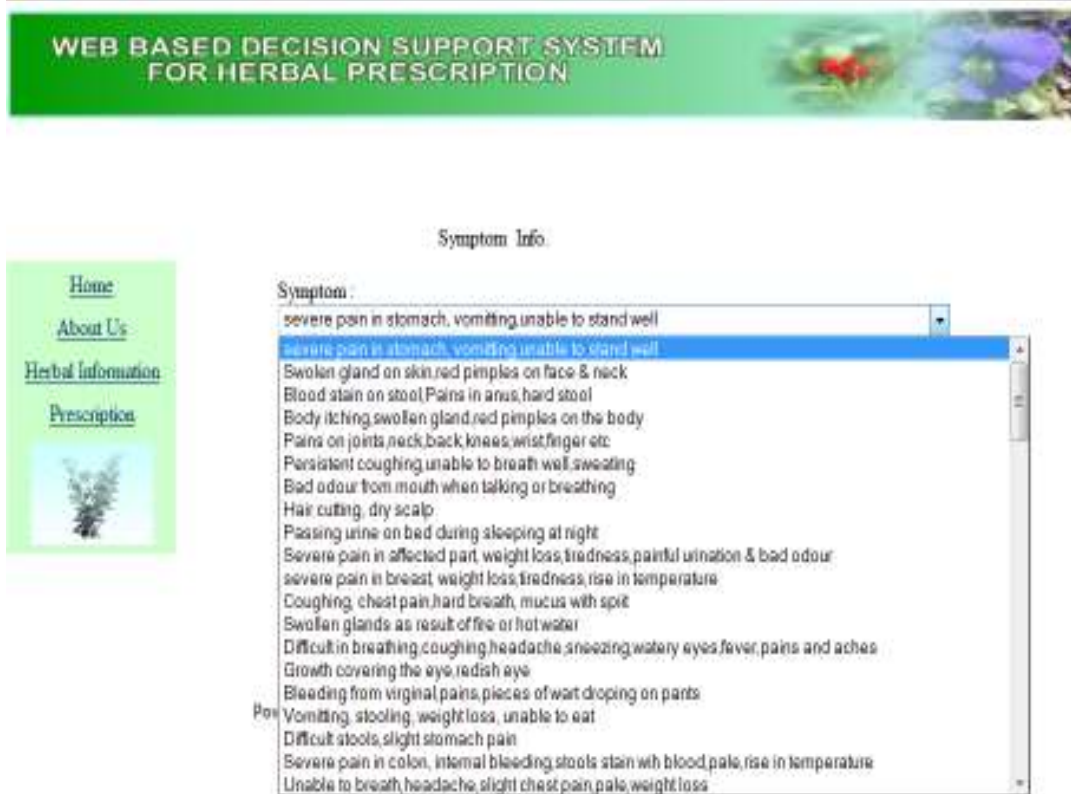


Figure 10: Ailment symptoms for user's request for medication



Figure 11: Clients Prescription screen



Figure 12: Herbal information list



Figure 13: Patient Ailment Request.

This system is developed for internet users. The users check the site where the application resides with the help of the site protocol provided by the internet operator and get the information from the server. This enables the client to send information to the server and to be able to receive information back from the server based on the action it performs and the information retrieved from the database.

CONCLUSION

For any sustainable environment good health is paramount to reduce death rate. Therefore this system is not

intended to replace orthodox medication but rather to pave way for the usage of herbal medication through the use of internet to reduce poverty level of those that cannot afford convention medication. The system attempts to enhance the effectiveness of herbal medication which has its information in the knowledge base that improves efficiency in decision making. Therefore, the diagnosis made by the user of the system are at least as good as those of human herbal practitioners', since at each point or step the user makes request for medication, the system gives a feedback cure for the ailment.

Also, DSS, such as this, does not only have a role to play in enhancing decision making but also in the study of diagnostic protocol, self-assessment and quality control in the domain of herbal prescription. It will also assist people in the remote area with internet facilities to use their PDA or palmtop to obtain herbal prescriptions on their relative health challenges. Hopefully, the proposed system would boost the courageous effort of pioneer health practitioner players like Oko Oloyun, OgiHerbs, Yoyo Bitters, Yemkem, Ayodele slimmer, etc based in Nigeria.

Therefore, for any National capacity building strategy for sustainability and poverty alleviation we need good health.

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**Conference On National Capacity Building Strategy For
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*Track Five: National Capacity Building Strategy in Engineering and
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ALLEVIATING RURAL POVERTY THROUGH FOUNDRY ENTREPRENEURSHIP AS CAPACITY BUILDING AND AN ECONOMIC FORCE IN RURAL DEVELOPMENT

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ABSTRACT

This paper has attempted to set out the key issues related to foundry entrepreneurship in the context of its relationship with rural development. The analysis is then broadened to understand the determinants of rural entrepreneurship and the environment conducive to its development. Consequently the policies that are necessary to make this environment favorable have been discussed in detail. The generic constraints that are faced by rural enterprises have been listed out. The conclusion is that to accelerate economic development in rural areas such as Idah, it is necessary to promote foundry entrepreneurship. Entrepreneurial orientation in rural areas is based on stimulating local entrepreneurial talent and subsequent growth of indigenous companies. This in turn would create jobs and add economic value to a region and at the same time will keep scarce resources within the community.

KEYWORDS: poverty, poverty alleviation, foundry, rural entrepreneurship, rural development

INTRODCUTION

More than 1.3 billion people in this world live in extreme poverty, that is, one in every five person. (United Nations Report, 1997 and 2000) As the world's economies become more interdependent, solving a problem as big and as difficult as poverty demands international alliances. According to the International Fund for Agricultural Development (IFAD), the Millennium Development Goals set forth by the United Nations are a guiding light for international cooperation for development, in particular the target to halve the proportion of hungry and extremely poor people by 2015. But the starting point to achieve this target must be the recognition that poverty is predominantly rural. Three quarters of the world's poor, about 900 million people, live in rural areas where they depend on agriculture and related activities for their livelihoods. The reality is that the Millennium poverty target cannot be met unless the world addresses rural poverty.

The World Bank's new strategy launched in 2002, called 'Reaching the Rural Poor' focuses on improving the lives of those living in rural areas. Ian Johnson, the Vice-President for Sustainable Development states that this strategy is contributing to the increase of productivity in rural areas, which will have a very positive impact on other sectors of the national economy. Petrin (1994) affirms that rural development is

now being linked more and more to entrepreneurship. Entrepreneurship stands as a vehicle to improve the quality of life for individuals, families and communities and to sustain a healthy economy and environment (Isibor, 2014).

PROBLEM STATEMENT

Poverty as an issue has become a global phenomenon ravaging the city and rural dwellers in different measures. The effect is more pronounced in the rural area than the urban centres where accessibility to modern infrastructure and urbanization had watered down its influence. However with the increasing awareness of entrepreneurship development as a panacea to this phenomenon, the employment of indigenous materials in foundry would not only engender capacity building but would in the long run maintain the local industries in a sustainable manner. Apart from creating employment opportunities and therefore empowering the inhabitants, the rural-urban drift which causes a strain on the cities would be considerably curtailed

Foundry Processing

Foundry is an establishment where ferrous and non-ferrous are first of all melted by the application of heat and made to solidify in the mould to yield solid mass.

Types of Foundries

There are many ways of classifying foundries:

- i Types of metal cast
 - a. Ferrous foundry- Ferrous metals such as iron and steel, cast iron. E.t.c.
 - b. Non-Ferrous foundry such as aluminum, lead, copper, magnesium and their alloys are cast.
- ii Types of Mould:
 - a. Sand casting- Sand mould
 - b. Die casting- Metal mould
 - c. Investment casting- Consumable mould
 - d. Centrifugal casting- Agitating mould.
- iii Types of production practiced:
 - a. Jobbing foundries producing purely on customer's request
 - b. Captive foundries- Producing for and serving as an integral part of a manufacturing establishment.

Small scale foundries require N1.480,000.00- N28,000,000.00 million. It could be a cottage industry run by members of the family. This type of foundry is highly recommended for rural area.

This paper deals with the following three issues.

- 1) **Firstly**, it sets out the reasons why promoting entrepreneurship as a force of economic change must take place if many rural communities are to survive.
- 2) **Secondly**, it deals with what policies are necessary in order to create an environment in rural areas conducive to entrepreneurship.
- 3) And **thirdly**, it considers the generic constraints that are faced by entrepreneurs in rural areas and the initiatives that can assist their development.

THE CONCEPT AND DETERMINANTS OF ENTREPRENEURSHIP

In order to understand the role played by entrepreneurs in developing an economy it is first important to understand the concept of entrepreneurship. (Petrin, 1992) While choosing a definition for entrepreneurship most appropriate to the rural area context, it is important to bear in mind the skills that will be needed to improve the quality of life for individuals, and to sustain a healthy economy and environment. Hence, the most appropriate definition is a combination of three, wherein, entrepreneurship can be defined as—A force that mobilizes other resources to meet unmet market demand. (Jones and Sakong, 1980); the ability to create and build something from practically nothing. (Timmons, 1989) the process of creating value by

pulling together a unique package of resources to exploit an opportunity. (Stevenson, et al, 1985)

The need to understand the determinants of entrepreneurship is as important as understanding its concept. The origins and determinants of entrepreneurship span a wide spectrum of theories and explanations (Brock and Evans, 1989). However, it is generally accepted that policy measures can influence the level of entrepreneurship (Storey, 1994).

Development of entrepreneurs and of entrepreneurship can be stimulated through a set of supporting institutions and through deliberate innovative action which stimulates changes and fully supports capable individuals or groups. Therefore, policies and programs designed specifically for entrepreneurship promotion can greatly affect the supply of entrepreneurs and thus indirectly represent an important source of entrepreneurship.

This view has important implications for entrepreneurship development in rural areas. If currently entrepreneurial activities in a given rural area are not thriving it does not mean that entrepreneurship is something inherently alien to rural areas. While this feeling could have some legacy due to the slower pace of changes occurring in rural areas compared to urban ones, proper action can make a lot of difference with respect to entrepreneurial behavior of people living in rural areas.

EXPECTED ROLE BY FOUNDRY ENTREPRENEURS IN RURAL DEVELOPMENT

Entrepreneurial activity and new firm formation are unquestionably considered engines of economic growth and innovation (Baumol, 1990). As such, they are among the ultimate determinants of the large regional differences in economic performance. The importance of new firm formation for growth has been recognized since Schumpeter (1934). According to the Global Entrepreneurship Monitor Report (2000), about 70 percent of an area's economic performance is dependent upon how entrepreneurial the area's economy is.

Foundry entrepreneurship in rural areas is based on stimulating local entrepreneurial talent and subsequent growth of indigenous companies. This in turn would create jobs and add economic value to a region, and at the same time it will keep scarce resources within the community. According to Petrin (1992), to accelerate economic development in rural areas, it is necessary to build up the critical mass of first generation entrepreneurs.

Lyson (1995) echoes the prospects of small-enterprise framework as a possible rural development strategy for economically disadvantaged communities and provides this description of the nature of small-scale flexibly specialized firms: "First, these businesses would provide products for local consumption that are not readily available in the mass market.. Second, small-scale technically sophisticated enterprises would be able to fill the niche markets in the national economy that are too small for mass producers. Third, small, craft-based, flexibly specialized enterprises can alter production quickly to exploit changing market conditions."

According to a study conducted in the United States it has been found that rural poverty has become as intense as that found in the inner cities, and has stubbornly resisted a variety of attempts at mitigation through economic development policies. The latest strategy for addressing this problem is the encouragement of emerging "home-grown" enterprises in rural communities. The expectation is that these new ventures-a) will provide jobs or at least self-employment; b) will remain in the areas where they were spawned as they grow; c) and will export their goods and services outside the community, attracting much-needed income. (Lyons, 2002)

It is important to stress here that rural entrepreneurship in its substance does not differ from entrepreneurship in urban areas. Entrepreneurship in rural areas is finding a unique blend of resources, either inside or outside of agriculture. The economic goals of an entrepreneur and the social goals of rural development are more strongly interlinked than in urban areas. For this reason entrepreneurship in rural areas is usually community based, has strong extended family linkages and a relatively large impact on a rural community.

POLICY IMPLICATIONS FOR RURAL FOUNDRY ENTREPRENEURSHIP

Studies have shown that SMEs in rural areas in the UK (particularly remote rural areas) have outperformed their urban counterparts in terms of employment growth (Keeble et al,1992,). Behind each of the success stories of rural entrepreneurship there is usually some sort of institutional support. Lu Rongsen(1998), in a study in Western Sichuan highlights the important factors responsible for the rapid development of enterprises in the area. These include- uniqueness of the products in so far as they are based on mountain-specific, local natural resources; development of infrastructure; strong and integrated policy support from government; and a well-planned marketing strategy and link-up with larger companies and organizations for marketing nation-wide and abroad.

According to Petrin (1994), the creation of such an environment starts at the national level with the foundation policies for macro-economic stability and for well-defined property rights as well as international orientation. The policies and programs targeted specifically to the development of entrepreneurship do not differ much with respect to location. In order to realize their entrepreneurial ideas or to grow and sustain in business, they all need access to capital, labor, markets and good management skills. What differs is the availability of markets for other inputs.

The inputs into an entrepreneurial process- capital, management, technology, buildings, communications and transportation infrastructure, distribution channels and skilled labor, tend to be easier to find in urban areas. Professional advice is also hard to come by. Consequently, entrepreneurial behavior, which is essentially the ability to spot unconventional market opportunities, is most lacking in those rural areas where it is most needed i.e., where the scarcity of 'these other inputs' is the highest.

Rural entrepreneurship is more likely to flourish in those rural areas where the two approaches to rural development, the 'bottom up' and the 'top down', complement each other. The 'top down' approach gains effectiveness when it is tailored to the local environment that it intends to support. The second prerequisite for the success of rural entrepreneurship, the 'bottom up' approach, is that, ownership of the initiative remains in the hands of members of the local community. The regional development agencies that fit both criteria can contribute much to rural development through entrepreneurship.

A study conducted by Smallbone and North (1997), reveals that firms that demonstrated the highest level of innovative behavior were growing in terms of sales and also generating employment, although it is important to stress that the relationship between innovation and growth is an inter-dependent and mutually reinforcing one, rather than a simple cause and effect relationship. Petrin (1994) maintains that policy implications for rural entrepreneurship development can be:

- 1) Sound national economic policy with respect to agriculture, including recognition of the vital contribution of entrepreneurship to rural economic development;
- 2) Policies and special programs for the development and channeling of entrepreneurial talent;
- 3) Entrepreneurial thinking about rural development, not only by farmers but also by everyone and every rural development organization.

5. PROBLEMS FACED BY RURAL ENTREPRENEURS

The following issues are the key constraints in the development of rural enterprise

- a) The issue of transport and accessibility in general, and of remoteness.
- b) The low skill base of many rural areas emerged as important.
- c) The lack of sufficient funding continues to be perceived as a major constraint.
- d) The low enterprise base in many rural areas is seen as a key issue, and there is a general feeling of being caught in a vicious circle where an existing lack of enterprise contributes to a low degree of enterprise potential.
- e) The absence of facilities and services both for enterprises and for their workforces emerged as important.
- f) Competition from larger centers was seen as crucial in a number of areas. In some cases it was suggested that the proximity to such areas

can to some extent be a disadvantage from this perspective.

- g) Issues of planning and zoning were seen in some areas as significant as was the fact that it may be more difficult to obtain planning permission for certain types of enterprises in rural areas.

Smallbone and North (1997) in a study in rural England have identified the specific areas of support needs that rural SMEs require: marketing, process innovation, improving access to specialized training and assistance in the use of internet.

UNDP's regional program for the Former Soviet Union (FSU) has summarized the problems faced by rural SMEs and the suggested initiatives which may be undertaken to solve these issues. Table 1 is illustrative of this:

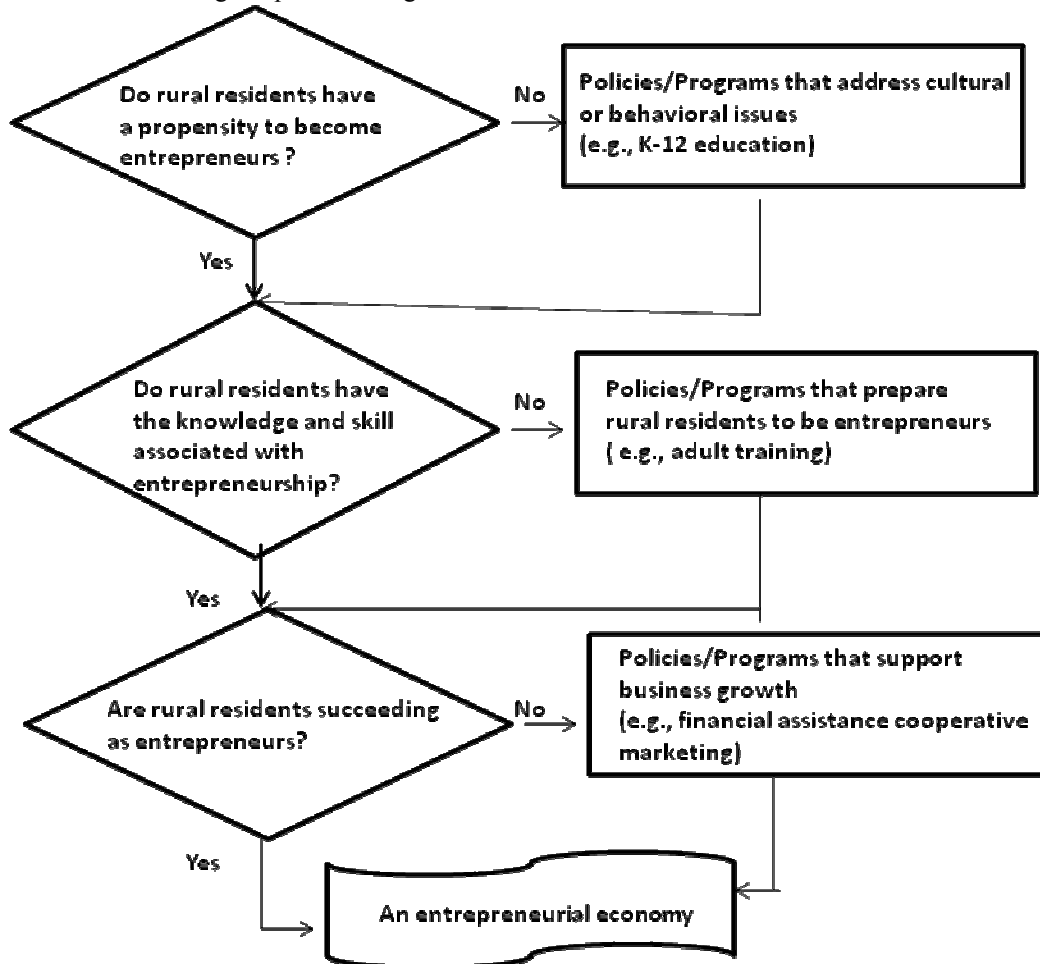
Table 1. Problem and suggested initiatives for SMEs

PROBLEMS	SUGGESTED INITIATIVES
<p>Technical Assistance:</p> <ul style="list-style-type: none"> . High costs . Few support institutions 	<ul style="list-style-type: none"> . Preparation and training of national trainers / counselors; . Application of successful experiences; . Promotion and development of institutions for support services of technical kind.
<p>Entrepreneurial Attitude:</p> <ul style="list-style-type: none"> . Tendency towards isolation . Lack of organization and integration. Little willingness to undertake associative entrepreneurial projects. 	<ul style="list-style-type: none"> . Entrepreneurial training and preparations; . Dissemination of successful associative experiences; . Support to, and co-operation with, existing business / entrepreneurial associations; . Training and preparation of enterprising young people.
<p>Financing:</p> <ul style="list-style-type: none"> . Limited access to financing, both for start-ups and expanding enterprises; . Lack of endorsement and guarantees. 	<ul style="list-style-type: none"> . Association – grouping; . Assistance in establishment of credit schemes targeting SMEs (mutual guarantee schemes etc).
<p>Policy and Enabling Environment:</p> <ul style="list-style-type: none"> . Excessive regulations and formalities; . Political and economic instability. 	<ul style="list-style-type: none"> . Identification of specific obstacles and bottlenecks; . Recommendations for change and improvement within these areas; . Adaptation and adjustment of legal framework.
<p>Gender Imbalances:</p> <ul style="list-style-type: none"> . Difficulties for women to start up businesses; . Difficulties for women entrepreneurs to get access to support and finance services. 	<ul style="list-style-type: none"> . Entrepreneurial training and preparation; . Sharing of experiences and best practices for women entrepreneurs; . Assistance in establishment of micro credit schemes geared towards women.
<p>Qualification of Human Resources:</p> <ul style="list-style-type: none"> . Little specialization and training; . Low level of productivity . Low valuation and encouragement to work 	<ul style="list-style-type: none"> . Skills training . Managerial training . Improvement of the work environment, organizational climate.
<p>Market:</p> <ul style="list-style-type: none"> . Low share in the domestic market and almost no share in external markets; . Problems in acquisition of inputs; . Lack of expertise in the area of domestic and external marketing; . Lack of insight into product differentiation and other competitiveness issues. 	<ul style="list-style-type: none"> . Entrepreneurial training and preparation; . Counseling and advisory services by qualified personnel; . Information links, regional and international networks; . Establishment of business / entrepreneur associations; . Vertical integration (possible labor specialization)

FRAMEWORK FOR ENCOURAGING RURAL ENTREPRENEURSHIP

Jay Kayne with the Kauffman Foundation (2000) created the following figure during the Second Minnesota Academy working session in Rochester, Minnesota. This figure provides a general framework

for encouraging rural entrepreneurship. In the final analysis, this framework provides the critical questions necessary to assessing the entrepreneurial opportunity in any rural place or state (Figure 1).



Source: Jay Kayne Center for Entrepreneurial Leadership. (2000)

Figure 1. Framework for encouraging rural entrepreneurship

CONCLUSION

World-wide the last three decades have seen major shifts in rural economies. Rural enterprises are important generators of employment and economic growth internationally. It is important to stress that rural entrepreneurship in its substance does not differ from entrepreneurship in urban areas. Entrepreneurship in rural areas is finding a unique blend of resources, either inside or outside of agriculture.

This paper has attempted to understand the role played by rural enterprises in economic development and how governing bodies can help to foster its growth. The promotion of foundry entrepreneurship and the

understanding where entrepreneurship comes from is as equally important as understanding the concept of entrepreneurship. The environment which is considered most favorable for their growth forms the basis for the development of policies for foundry entrepreneurship development. Policy implications for rural foundry entrepreneurship development can be summarized as: (a) Sound national economic policy with respect to foundry, including recognition of the vital contribution of entrepreneurship to rural economic development; (b) Policies and special programs for the development and channeling of foundry entrepreneurial talent; (c) Entrepreneurial thinking about rural development by everyone and every rural development organization;

d)And institutions supporting the development of rural entrepreneurship as well as strategic development alliances.

However, despite their phenomenal growth rural enterprises have common systemic constraints to their development. Governments and donors can help to address these constraints by facilitating efficient and unbiased financial markets; a suitable business environment; education, training, and competitive capacity; and access to information, networks and the global market place.

BIOGRAPHY

Short Biography of Apata Ayodeji Oluwatoyin. B.Eng, M.Eng, PhD, Reg. Eng, MNMS, MMNS, MTMS, MMSSA

Born 22nd December, 1970 in Ondo State, Nigeria. Attended Federal University of Technology Akure, Nigeria where he studied Metallurgical and Materials Engineering at Bachelor's and Master's levels respectively. He later proceeded to University of Witwatersrand Johannesburg South Africa where he obtained Doctor of Philosophy in Metallurgical and Materials Engineering. He joined Federal Polytechnic Idah Kogi State Nigeria in 1998 as lecturer III and currently a Principal lecturer in the Department of Metallurgical and Materials Engineering, Federal Polytechnic Idah. He is a professional member of:

- i Council for the Regulation of Engineering in Nigeria (COREN)
- ii Nigerian Metallurgical Society (NMS)
- iii Materials Society of Nigeria (MSN)
- iv Microscopy Society of Southern Africa (MSSA)
- v. The Minerals, Metal and Materials Society of United State of America (TMS)

Short Biography of Alani Ganiyu Oba. HND, MBA, ACA, ACITB.

Born 21ST January 1968 in Ekiti State, Nigeria. Attended Federal Polytechnic Ado Ekiti, Nigeria where he studied Accountancy. He studied Masters in Business Administration at Ekiti State University (formerly University of Ado-Ekiti). He joined Federal Polytechnic Idah Kogi State Nigeria in 2001 as lecturer I. He is currently a Principal lecturer in the Department of Accountancy, Federal Polytechnic Idah. He is a professional member of:

- i Institute of Chartered Accountant of Nigeria (ICAN).
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Short Biography of Bioku Joseph Olufemi. B.Sc, MPM AIRRV, ANIVS, RSV.

Born 3rd May, 1962 in Oyo State, Nigeria. Attended University of Lagos where he studied Estate Management and Project Management at Bachelor's

and Master's levels respectively. Worked in private establishments between 1987 and 2005 when he joined the service of Federal Polytechnic Idah Kogi State Nigeria as a Senior lecturer. He is currently a Principal lecturer in the Department of Estate Management and Valuation, Federal Polytechnic Idah. He is a professional member of both the Nigerian Institution of Estate Surveyors and Valuers and Estate Surveyors and Valuers Registration Board of Nigeria. He is married with three children.

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CONCRETE MIX CONSTRUCTION USING LOCAL MATERIALS IN KARAK AND TAFILA AREA

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ABSTRACT

Concrete construction is much common compared to steel or timber in Jordan. Locally, aggregates are available in two different types crushed and wadi (valley) rounded stones. The valley stone is not highly used as crushed stone is mined on surface in known sites (Karak and Tafila). Also fine materials are mined for other construction jobs such as plastering, tiling, and roofing surface (in Karak). The current research aims to introduce the use of round aggregates in concrete compared to crushed aggregate on concrete grades of 15, 20, and 25 Mpa. The Results on crushed and round aggregates are beneficial to have the variety in resources in aggregate and properties of concrete. The new employment of rounded valley aggregate is part of the sustainability in construction process and resources which is required essentially and has less dust evolution on environment, in addition to the opportunity in having new jobs for local people and improvement on their socio-economic levels of living.

KEYWORDS: concrete, crushed aggregate, round aggregate and concrete strength

INTRODCUTION

Strength of concrete is a major input of design of plain and reinforced concrete. Concrete compressive and tensile strength (splitting, and modulus of rupture) are significant parameters for design, and calculating of nominal strength of plain and reinforced concrete design and construction.

Many factors have an effect on concrete strength; cement type, w/c ratio, mixing water, additives and admixture. But the most effective ingredient is the aggregate type and properties. Aggregate occupies about 75% of the volume of concrete and it's the main factor for strength, stability of volume, and durability of construction (Neville and Brooks, 1994). Concrete strength increases with time and moisture. However, it is accepted that around 80% of the strength is reached at an age of 28 days and so this is the time period a concrete cube is stored, in controlled conditions before testing.

Table 1 represents the numerical description and classification for grade of concrete considering strength and density of concrete. Density of concrete is an important parameter in design of concrete mix and an indication of durability and strength.

Table 7 Strength and Density of Concrete (Hassoun and Al-Manaseer, 2008)

Type of Concrete	Density kg/m3 (lb/ft3)	Strength N/mm2 (psi)
Light-weight Concrete	1450 - 1842 (90-115)	17.24 - 34.5 (2500-5000)
Normal-weight Concrete	2323 (145)	---

Time is a major factor in developing of concrete strength, and should be highly considered in concrete loading especially in slabs, walls, and for repeated elevated slabs during construction. Table 2 represents the developing of strength for concrete with age in days.

Table 2: Concrete Compressive Strength with age According to the Design Standards (Neville and Brooks, 1994)

Age (days)	Minimum compressive strength					
	BS 12:1978 (mortar)		BS 12:1978 (concrete)		ASTM C 150-84 (concrete)	
	Ordinary Portland	Rapid-hardening	Ordinary Portland	Rapid-hardening	Type1	Type3
	Mpa psi	Mpa psi	Mpa psi	Mpa psi	Mpa psi	Mpa psi
1	-	-	-	-	-	12 1740
3	23 3300	29 4200	13 1900	18 2600	12 1740	24 3500
7	-	-	-	-	-	-
28	41 5900	46 6700	29 4200	33 4800	28 4060	-

Many factors have the effect on concrete strength and density; w/c ratio, aggregate properties (specific gravity, grade/size distribution, maximum size, abrasion and absorption, and curing of concrete. These factors are

highly affecting in properties of fresh concrete and hardened concrete. Figure 1 represents the effect of w/c ratio on concrete compressive strength with age in days.

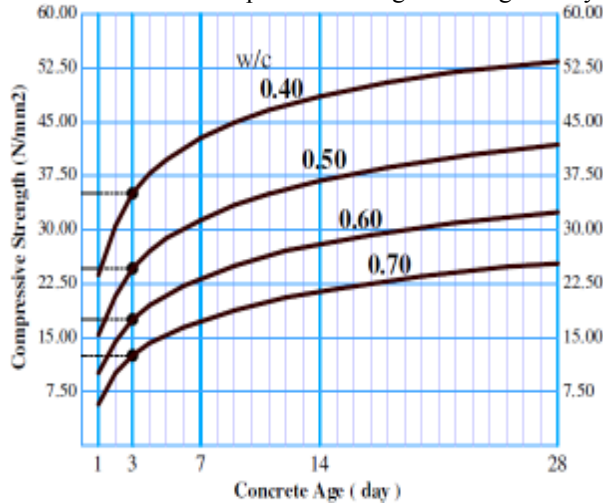


Figure 1 The Effect of w/c Ratio on Concrete Compressive Strength (Alilou and Teshenhab, 2007)

Also the use of admixtures such as Fly Ash can affect the early strength of concrete. Figure 2 represents the effect on using fly ash on concrete strength considering the percentage of adding the fly ash to the mix.

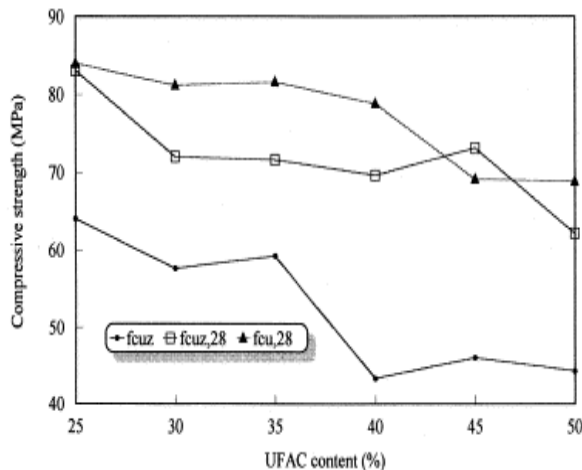


Figure 2 The Effect of the Fly Ash Admixture on Concrete Early Strength (Baoju, et. al., 2001)

Also Figure 3 represents the relation of concrete compressive and tensile strength on w/c ratio.

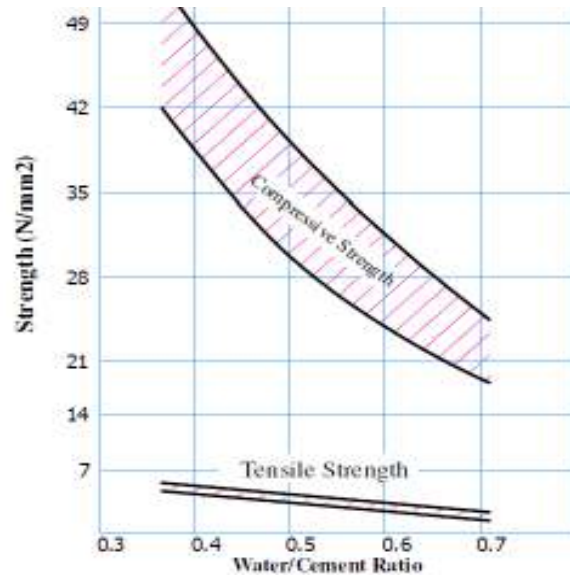


Figure 3 Compressive and Tensile Strength of Concrete vs. W/C Ratio (Alilou and Teshenhab, 2007)

The current research is aiming to use the round (valley) aggregate from new local material resources in concrete production, and to enhance sustainability of construction materials and resources. Also, to introduce the new opportunities for employing people in the new local industrial construction sector. Current NCBSSDPA 2015 is mostly the suitable in time and place to show the current research, especially as NCBSSDPA 2015 is directed to sustainable development and poverty alleviation.

Data Sampling and Testing

The current research aims to test the strength of concrete considering the available types of aggregate (crushed limestone, and valley rounded aggregate) as the main resources available locally. The properties of the parent rocks will affect the properties of aggregate and so the properties of fresh and hardened concrete. Data collection and analysis started by testing the raw local materials; including specific gravity (bulk, SSD, and apparent specific gravity) and absorption of crushed and round aggregate. Table 3 and Table 4 present the physical properties of crushed and round aggregate including specific gravity and absorption. Specific gravity and absorption are applied in accordance with the ASTM C 127-84 Test for Specific Gravity and Absorption of Coarse Aggregate and BS 812: Part 3: 1975 for mechanical properties of an aggregate. For mixing and fresh concrete sampling, BS 1881: Part 3: 1970 was applied. While BS 1881: Part 115 and 116: 1983 were used for compression strength test of concrete. Also BS 1881: Part 117 and 118: 1983 were used to determine the tensile and flexure strength of concrete respectively.

Table 8 Specific Gravity and Absorption of Round Aggregate

Sample	Bulk sp.gr	SSD	App Sp.Gr.	Absorption (%)
1	2.568	2.619	2.704	1.96
2	2.574	2.623	2.71	1.90

Table 9 Specific Gravity and Absorption of Crushed Aggregate

sample	Bulk sp.gr	SSD	App Sp.Gr.	Absorption (%)
1	2.575	2.635	2.74	2.34

Also the analysis and design of concrete mix includes the testing of slump for both concrete mixes and the results presented in Table 5. Slump test was applied in accordance with the BS 1881: Part 102: 1983 and BS EN 12350 2-2000, slump test.

Table 10 Slump Value for Concrete Mixes

Mix Type and Grade	15 Mpa	20 Mpa	25 Mpa
Crushed Agg. Mix	150	140	155
Round Agg. Mix	180	160	175

And continuing concrete tests were finished by the testing of density and compressive strength, splitting strength, and modulus of rupture for concrete mixes using crushed and round aggregate. Table 6 presents the properties of concrete mix for 15 Mpa concrete grade considering density and strength parameters on the ages 7, 14, and 28 days.

Table 11 Density and Strength Parameters for 15 Mpa Concrete Mixes

Course Aggregate Type	Age (days)	Mass (Kg)	Density (Kg/m ³)	Compression Stress (Kn/m ²)
Round Aggregate for 15 Mpa	7	12.11	2284	11160
	7	11.99	2262	11063
	7	12.14	2290	10967
	Average		2279	11063
	14	12.16	2294	13950
	14	12.14	2290	14430
	14	11.91	2247	14334
	Average		2277	14238
	28	12.07	2277	15600
	28	12.2	2301	15861
	28	12.08	2279	15774
	Average		2286	15745
	Total Average		2281	
Crushed Aggregate for 15 Mpa	7	12.23	2307	12375
	7	12.24	2309	12462
	7	12.23	2307	12636
	Average		2308	12491
	14	12.3	2320	15076
	14	12.23	2307	15251
	14	12.13	2288	15338
	Average		2305	15222
	28	12.2	2301	17704
	28	12.09	2281	17408
	28	12.16	2294	17185
	Average		2292	17432
	Total Average		2302	

Table 7 presents the density and strength parameters of 20 Mpa concrete mixes using crushed and round aggregate.

Table 12 Density and Strength Parameters of 20 Mpa Concrete Mixes

Course Aggregate Type	Age (days)	Mass (Kg)	Density (Kg/m ³)	Compression Stress (Kn/m ²)
Round Aggregate for 20 Mpa	7	8.14	2411.9	13333
	7	8.11	2403.0	13512
	7	8.02	2376.3	13689
	Average		2397.04	13511
	14	7.91	2343.7	17422
	14	8.21	2432.6	17600
	14	7.85	2325.9	17333
	Average		2367.4	17452
	28	8.17	2420.7	21333
	28	7.9	2341.0	21156
	28	7.88	2334.8	20978
	Average		2365.6	21156
	Total Average		2376.6	
	Crushed Aggregate for 20 Mpa	7	8.02	2376.3
7		8.1	2400	16089
7		7.69	2278.5	16356
Average		2351.6	16208	
14		7.69	2278.5	21096
14		7.92	2346.7	20890
14		7.84	2323	21078
Average		2334	21078	
28		8.11	2402.963	24890
28		8.08	2394.074	25245
28		8.13	2408.889	24866
Average		2402	25000	
Total Average		2361.5		

Figure 4 presents the strength of concrete mixes using crushed and round aggregate, it shows that concrete mix using crushed aggregate shows larger concrete strength on specified 15, 20, and 25 Mpa grades.

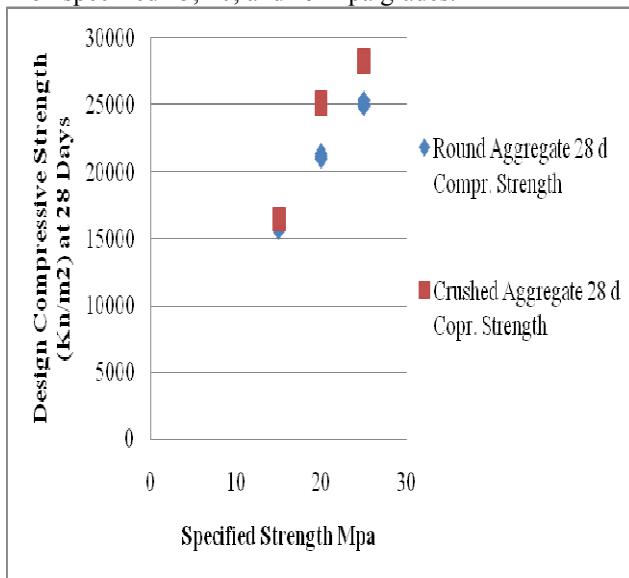


Figure 4 Design Compressive Strength (28 Days) vs. Specified Strength for Crushed and Round Aggregate

Also in Figure 5, it is clear that concrete tensile strength is larger using crushed aggregate than in using round aggregate for the specified 15, 20, and 25 Mpa grades.

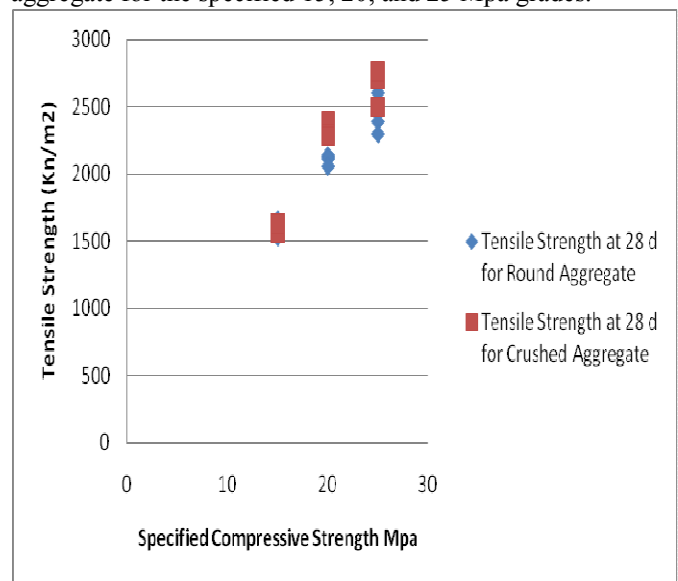


Figure 5 Tensile Strength vs. Specified Strength for Crushed and Round Aggregate

Table 13 Density and Strength Parameters of 25 Mpa Concrete Mixes

Course Aggregate Type	Age (days)	Mass (Kg)	Density (Kg/m ³)	Compression Stress (Kn/m ²)
Round Aggregate for 25 Mpa	7	7.86	2328.889	18222
	7	8.16	2417.778	18133
	7	8.08	2394.074	18489
	Average		2380.3	18281
	14	7.81	2314.074	21780
	14	7.83	2320	21692
	14	8.22	2435.556	21600
	Average		2356.5	21691
	28	7.8	2311.111	24712
	28	8.03	2379.259	24894
	28	7.92	2346.667	24986
	Average		2345.7	24864
	Total Average		2360.8	
	Crushed Aggregate for 25 Mpa	7	8.09	2397.037
7		7.75	2296.296	20892
7		7.74	2293.333	21165
Average		2329	21132	
14		7.88	2334.815	25780
14		8.02	2376.296	26225
14		7.97	2361.481	26045
Average		2357.5	26017	
28		7.99	2367.407	28464
28		8.05	2385.185	28000
28		8.06	2388.148	28182
Average		2380.3	28215	
Total Average		2355.6		

Table 8 presents the density and strength of 25 Mpa concrete strength using crushed and round aggregate in concrete mixes

Figure 7 presents the values for density of concrete (kg/m³) for concrete mixes using crushed and round aggregate.

The modulus of rupture is shown in Figure 6 and it is obvious that values of modulus of rupture is larger by using crushed aggregate in concrete mix rather than that by using round aggregate in concrete mix at the specified 15, 20, and 25 Mpa.

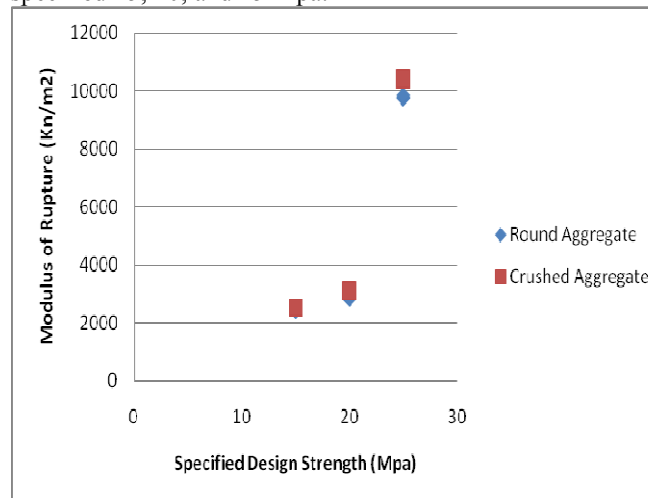


Figure 6 Modulus of Rupture for Crushed and Round Aggregate (Kn/m²)

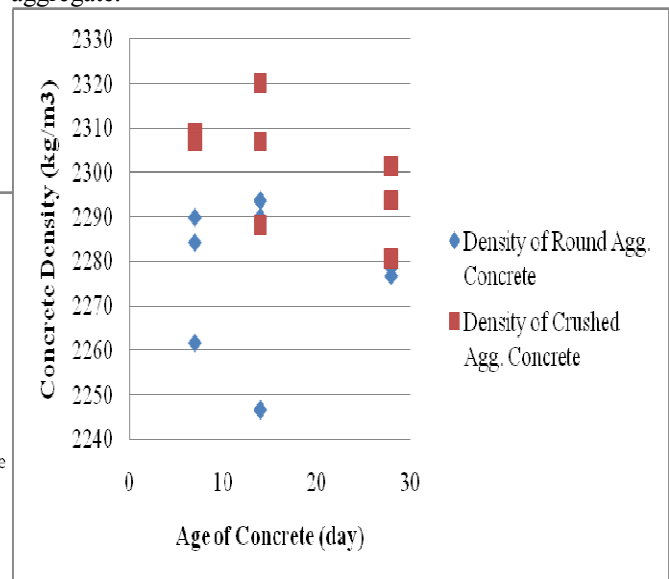


Figure 7 Density of Concrete (kg/m³) for Crushed and Round Aggregate at 15 Mpa Design Grade

Figure 8 presents the density of concrete at 20 Mpa design grade using crushed and round aggregate concrete mixes.

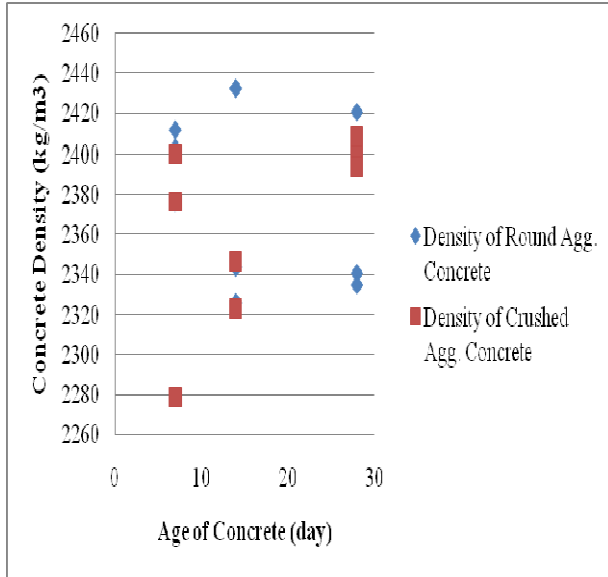


Figure 8 Density of Concrete (kg/m^3) for Crushed and Round Aggregate at 20 Mpa Design Grade

Figure 9 presents the density of concrete at 25 Mpa design grade using crushed and concrete aggregate in concrete mix.

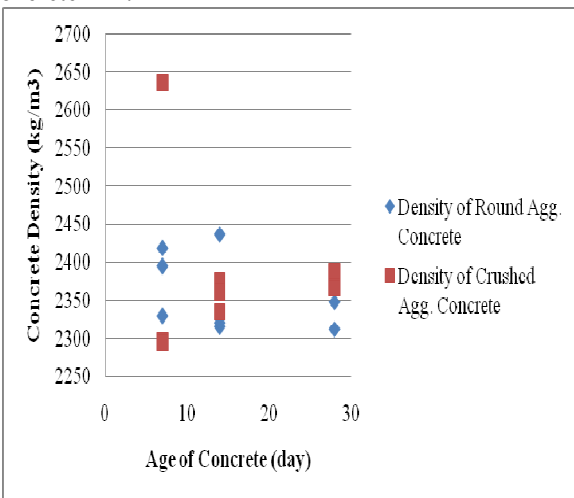


Figure 9 Density of Concrete (kg/m^3) Mix at 25 Mpa Design Grade for Crushed and Round Aggregate

Figure 10 presents the density of concrete vs. specified design strength (15, 20, and 25 Mpa) of concrete mixes using crushed and round aggregate.

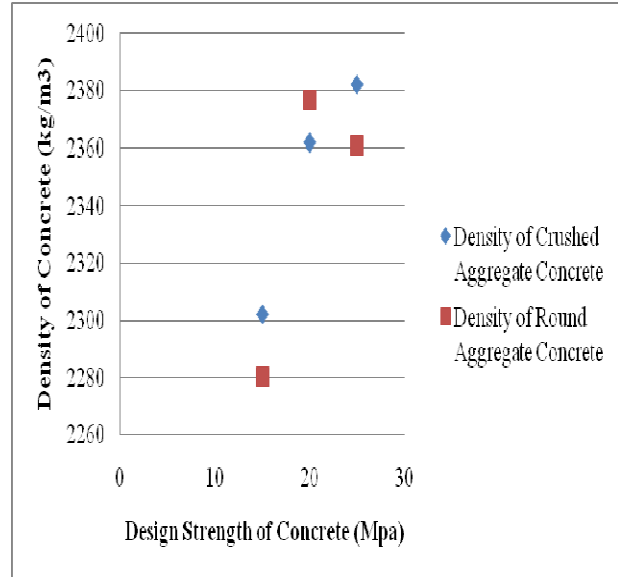


Figure 10 Density of Concrete (kg/m^3) vs. Specified Design Strength

CONCLUSIONS

It is required to have variety in resources in order to have more choices in materials and production in construction. And it is preferable to use local materials such as limestone rocks (crushed aggregate) and valley aggregate and stone (round aggregate). Valley stone or round aggregate has an advantage against limestone that its mining and production has less out coming dust during production and less production cost because it exists on surface at the valley shores and banks usually with the required sizes. Even though, that Valley aggregate (round aggregate) has lower specific gravity than crushed aggregate, but it has less absorption rates for water that gives real mix design. And according to the tests applied the results were promising for the round aggregate in terms of density of concrete and strength parameters:

- At 15 Mpa design strength, the density of round aggregate ranges from 2245-2292 kg/m^3 , while the density of crushed aggregate ranges from 2280-2320 kg/m^3 .
- At the 20 Mpa design strength, the density of round aggregate ranges from 2330-2420 kg/m^3 , and the density of crushed aggregate ranges from 2280-2430 kg/m^3 .
- And at the design strength 25 Mpa, the density of round aggregate has the range of 2340-2447 kg/m^3 , while the range for crushed aggregate is 2320-2650 kg/m^3 .
- Concrete made by crushed aggregate exhibits higher values for density and this is due to the shape and formation of aggregate interlocking and voids in bulk volume.

- Crushed aggregate exhibits higher values in compressive strength than round aggregate but both have achieved the required design strength 15, 20, and 25 Mpa.
- Also crushed aggregate has exhibited higher values on tensile splitting test and modulus of rupture tests than those exhibited by concrete made by round aggregate.
Even the tests are showing the ability of using both aggregate resources (crushed and round aggregate), but the need for further tests is required. The current research doesn't cover the next step for testing pulse electric velocity of concrete, thermal conductivity, and for example the permeability of concrete. Such these tests will be covered in future research on concrete mix. The data were collected and analyzed are useful for contractors, consultants, and engineers in mix design and materials.

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LIMITATIONS OF THE CURRENT STUDY

The current study has the following limitations:

- Sample collected should cover all locations in Karak and Tafila governorates.
- The concrete density and crushing strength tests were conducted using the ordinary Portland cement, but further results are needed using other types of cement.
- Concrete results were addressed the fresh (sensible workability or slump) and short-term (density and strength) concrete state at 7, 14, and 28 days. Further long-term study is needed on concrete strength gain and concrete performance.

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UNIT COMMITMENT USING ADVANCED THREE STAGE APPROACH

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ABSTRACT

Daily generation scheduling is a critical task in the modern energy management system. The main task of unit commitment (UC) problem involves scheduling the ON /OFF status of units, as well as the real power output of thermal units to meet the forecasted demand over a short-term period, meeting all kinds of system and unit constraints to minimize the overall production cost. Optimum scheduling of units save significant amount of production cost per year. In this paper, an advanced three-stage (ATHS) approach for solving unit commitment problem is presented. In the proposed approach, the first stage is utilized to get the solution in a feasible duration of time by producing a primal scheduling of unit, based on predefined priority. In the second stage, a pseudo-inspired algorithm is applied to the crazy particle swarm optimization (CPSO) for the economic dispatch of operating units. In spite of the acceptable solutions obtained by these two stages, proposed approach may take another stage called improved solution modification process (ISMP) to reach an optimal solution. The simulation results of the proposed algorithm have been compared with the results of various existing methods. The obtained results show the effectiveness of proposed approach

KEYWORDS: priority list, unit commitment, economic dispatch, improved solution modification process, crazy particle swarm optimization

INTRODUCTION

Unit commitment plays an important role in power system optimal operation. The primary objective of the UC is to ensure that the demands of the users are met at least cost. This objective explicitly specifies an optimization problem with a cost function to be minimized with various constraints, describing the operating limits (Shahidehpour, et al., 2002). The UC problem is formulated as a nonlinear, large scale, mixed-integer combinatorial problem. The literature on application of optimization methods for generation scheduling problem is vast. Several methods have been proposed to solve the UC problem such as priority list (PL), it is simple and fast, but quality solution is not guaranteed (Senjyu, et al., 2003), dynamic programming (DP) which is based on priority lists, it is flexible but computationally expensive (Ouyang and Shahidehpour, 1991), and lagrangian relaxation (LR) approach provides a fast solution, but it may suffer from numerical convergence and solution quality problem (Sriyanyong and Song, 2005). These methods are known as classical or numerical optimization techniques.

To mitigate the above limitations, many stochastic search techniques have been proposed by researchers such as genetic algorithm (GA), due to random operation of genetic operator's infeasible solution may be generated. GA requires excessive computational time (Senjyu, et.al, 2003). The evolutionary programming (EP) is similar to GA, but the structure of the optimization

program is fixed, while its numerical parameters are allowed to evolve. One disadvantage of EP, in solving some of the high dimensional problems is its slow convergence to a good near-optimum (Juste, et al., 1999). In the Bacteria foraging (BF), due to random generation of tumble angles, useful information can't be shared between bacteria. Secondly, the step size in BF is a constant. If the step size is large at the end stage, it is hard to converge to an optimal point (Passino, 2002; Eslamian, et al., 2009). In the integer-coded genetic algorithm (ICGA), integer coding of chromosome improves execution time and robustness of algorithm, but suffers from the curse of dimensionality (Damousis, et al., 2004). Compared to other evolutionary techniques, the characteristic of the particle swarm optimization (PSO) is simple to implement to find a number of high quality solutions, and has stable convergence characteristics. PSO is widely used in power systems. A survey of its applications in power systems is presented by Al-Rashidi, et al., 2009. In the past few years, several new improvements such as adaptive particle swarm optimization (APSO), (Pappala, et al., 2008), improved particle swarm optimization (IPSO) (Zhao, et al., 2006), and binary clustered particle swarm optimization (BCPSO), (Gaing, 2003) etc., have been suggested for getting the better and faster solutions.

Later, efforts have been made to develop hybrid techniques, such as GA based on unit characteristic classification (GA-UC) to obtain a higher quality of UC solution in a shorter time with the help of new genetic operator which is based on characteristic classification of unit and intelligent method for generating initial populations (Senjyu, et al., 2002). Enhanced adaptive lagrangian relaxation (ELR), consisting of adaptive LR (ALR), and heuristic search algorithms was introduced (Ongsakul and Petcharaks, 2004). Three-stage (THS) method involves three different steps, with hybrid serial algorithm of artificial intelligence (AI) including PSO and nelder-mead (NM) algorithm are applied (Khanmohammdi et al. 2010). But these hybrid techniques fail to resolve the problem.

CONCEPT AND MOTIVATION OF THE STUDY

The concept of unit commitment has been part of the focus of international discussion since 60s. According to (Kerr, et al. 1966), unit commitment depends on many variables including the characteristics of the generating units, magnitude of load, and amount of interchange etc. Generally, two basic decisions are involved in solving the UC problem, i.e. the “unit commitment” decision and “economic dispatch (ED)” decision. The UC in a power system involves determining a start-up and shut-down schedule of units to meet the forecasted demand, over a short-term period. In the economic load dispatch, the generator’s real and reactive power is allowed to vary within certain limits, so as to meet a particular load demand including the reserves such that the total system operational cost over the scheduled horizon is minimized, subjected to system and generator operational constraints (Wood, et al., 1984). Over the past few years, due to rapid industrialization and domestic consumer needs, power demand (load) has been increasing globally. Major problem to power system operators is load variation during a scheduling interval. For a particular load pattern, system exhibits large difference between maximum and minimum demands. To ensure that the system remains secure and that power is reliably delivered requires optimum and careful planning. Optimum scheduling of units can save millions of dollars per year and it enables the system operators to evaluate these savings against intangibles such as system reliability.

In this paper, advanced three-stage (ATHS) algorithm is developed for unit commitment problem. The proposed approach utilizes three advanced stage. In the first stage, primal configuration of all units is obtained based on a predefined priority. In the second stage, a pseudo-inspired algorithm is applied to the crazy particle swarm optimization (CPSO) for the economic dispatch of operating units. In CPSO, velocity of particles is randomized with certain probability to mend the

premature convergence of PSO. In spite of the acceptable solutions obtained by these two stages, the presented approach takes another step called the improved solution modification process (ISMP), to optimize the solution within the reasonable time. The simulation results obtained from proposed ATHS approach provide much better results compared to THS proposed by Khanmohammdi et al. (2010) and with other existing methods.

PROBLEM FORMULATION

The objective of the UC problem is to minimize the total operating cost subjected to a set of system and unit constraints over given scheduling interval. The problem does not consider system configuration and line impedances. To do this, the study period is divided into T time intervals and the short-term generation scheduling problem is formulated as follows:

$$\text{Min } TOC_T = \sum_{t=1}^T \sum_{i=1}^N [F_i(P_i(t)) + (1-U_i(t-1)) \times STC_i(t)] \times (1) \quad)$$

The fuel cost function for the unit i , at any given time interval, is assumed as quadratic function of the generator power output, $P_i(t)$:

$$F_i(P_i(t)) = \alpha_i \times (P_i(t))^2 + \beta_i \times P_i(t) + \lambda_i \quad (2)$$

subjected to the following constraints:

Power balance constraint

$$\sum_{i=1}^N U_i(t) \times P_i(t) = D_L(t) + P_{Loss}(t) \quad (3)$$

Assumed network power losses $P_{Loss}(t) = 0$.

Thermal constraints

Generator limit constraint

$$P_{min,i}(t) \times U_i(t) \leq P_i(t) \leq P_{max,i}(t) \times U_i(t) \quad (4)$$

Spinning reserve constraint

$$\sum_{i=1}^{NT} U_i(t) \times P_i(t) \geq D_L(t) + P_{Loss}(t) + R(t) \quad (5)$$

Minimum up and down time constraint

$$[t_{on,i}(t-1) - T_{ON,i}] \times [U_i(t-1) - U_i(t)] \geq 0$$

$$[t_{off,i}(t-1) - T_{OFF,i}] \times [U_i(t) - U_i(t-1)] \geq 0 \quad (6)$$

(7)

Startup cost

$$STC_{i,t} = \begin{cases} HSC_i & T_{OFF,i} \leq t_{off,i}(t) \leq T_{OFF,i} + CSC_i \\ CSC_i & t_{off,i}(t) > T_{OFF,i} + CSC_i \end{cases} \quad (8)$$

GENERATION SCHEDULING USING PROPOSED APPROACH

The time horizon is divided into smaller time stages of one hour each. The proposed advanced three stage algorithm for thermal scheduling is explained as follows:

Stage 1: Primary Scheduling of units

Priority list

The priority list is created on the basis of maximum power output and minimum per unit cost. The best per unit cost of units is a function of fuel cost coefficients (2). The per unit fuel cost of an i^{th} unit is derived as follows:

$$\frac{F_i}{P_i} = \alpha_i P_i + \beta_i + \frac{\lambda_i}{P_i}$$

For minimum per unit cost, first derivative of (9) is equated to zero. Hence,

From (9) and (10), the minimum per unit cost would be,

$$= 2\sqrt{\lambda_i \alpha_i} + \beta_i \quad (11)$$

Therefore, Priority list

$$= 2\sqrt{\lambda_i \alpha_i} + \beta_i / P_{max,i} \quad (12)$$

Primal configuration of all units is decided on a rule that, till the spinning reserve has not been satisfied, all the allowable units for any hour of scheduling are turned ON according to predefined priority given by (12). The obtained unit schedule may not always satisfy the minimum up and down time constraints. To address any violations of these constraints, a heuristic search algorithm is applied.

Stage 2: PSO Module for Economic Dispatch

A PSO given by Kennedy et al. (1995) is a population-based meta-heuristic search algorithm which is inspired by the movement of a flock of birds searching for food. In PSO, swarm of particles are represented as potential solutions, and each particle i is associated with two vectors, i.e. velocity vector $V_i=(v_{i1}, v_{i2}, \dots, v_{ix})$ and the position vector $P_i=(p_{i1}, p_{i2}, \dots, p_{ix})$, where, x stand for dimension of the search space. The velocity and the position of each particle are initialized by random vectors within the corresponding ranges. During the evolutionary process, the velocity and position of i^{th} particle on dimension x are updated as:

$$v_{ix}^{k+1} = w \times v_{ix}^k + c_1 \times rand_1 \times (PB_{ix} - p_{ix}^k) + c_2 \times rand_2 \times (GB_{gx} - p_{ix}^k) \quad (13)$$

$$p_{ix}^{k+1} = p_{ix}^k + v_{ix}^{k+1} \quad (14)$$

where, c_1, c_2 are acceleration coefficients (cognitive and social), w is the inertia weight parameter, which controls the global and local exploration capabilities of the particle. In (13), PB_{ix} is the position with the best fitness found so far for i^{th} particle, and GB_{gx} is the best position in the neighborhood. Inertia weight (w) is varied according to the following equation

$$w = (w_{max} - w_{min}) \times \frac{iter_{max} - iter}{iter_{max}} + w_{min} \quad (15)$$

where, $iter$ is current iteration number and $iter_{max}$ is maximum iteration number.

One of the main drawbacks of the PSO is its premature convergence, especially while handling problems with more local optima and large/complex constraints. To overcome this problem, crazy particle swarm optimization (CPSO) was introduced. The idea was to randomize the velocities of some of the particles, referred to as ‘‘crazy particles’’, selected by applying a certain probability. The probability of craziness ζ is defined as a function of inertia weight by Aruldoss et al., 2005; Chaturvedi et al., 2009.

$$\zeta = w_{min} - \exp\left(-\frac{w}{w_{max}}\right) \quad (16)$$

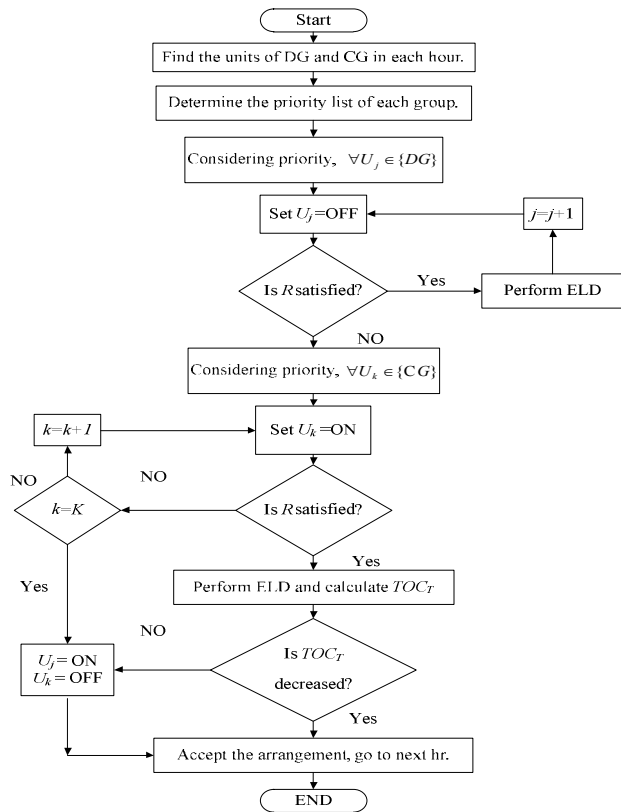
The, velocities of particles are randomized as per the following logic

Stage 3: Improved Solution Modification Process (ISMP)

The solution obtained from previous two stages may not be optimal, so this stage introduces a modification process that yields a more precise solution by acting on the produced solution. The proposed ISMP decrease the cost by saving the total shape of solution while satisfying time constraints (6) and (7). The steps for ISMP are as follows:

1. Determine all the units in each hour which are allowed to be turned OFF as the decommitment group (DG).
2. In the same hour, determine the commitment group (CG) with units that are allowed to be ON, instead of the units belongs to DG.
3. In this step, it is needed to replace the units belonging to the DG with units belonging to the CG. After doing ELD on the new arrangement, if the total operating cost of this hour has been decreased, it will be preferred to be the final arrangement.

The priority of the units for committing and decommitting action in the two groups, CG and DG respectively, are decided using (11). The units with larger value of per unit cost (11) are decommitted first in the DG and the units with smaller value of per unit cost (11) are committed first in the CG. Figure 1 describes the ISMP in more detail. Three modifications have been done on primary configuration of ten units system. In 22nd hour, 3rd unit and 4th unit are decommitted from DG. Similarly in 23rd hour, 5th unit from DG is decommitted and 6th unit from CG is committed as shown in Figure 2. Rectangular and oval boxes present the units of DG and CG, respectively



Hour\ Units	1	2	3	4	5	6	7	8	9	10
1	455	245	0	0	0	0	0	0	0	0
2	455	295	0	0	0	0	0	0	0	0
3	455	370	0	0	25	0	0	0	0	0
4	455	455	0	0	40	0	0	0	0	0
5	455	390	0	130	25	0	0	0	0	0
6	455	360	130	130	25	0	0	0	0	0
7	455	410	130	130	25	0	0	0	0	0
8	455	455	130	130	30	0	0	0	0	0
9	455	455	130	130	85	20	25	0	0	0
10	455	455	130	130	162	33	25	10	0	0
11	455	455	130	130	162	73	25	10	10	0
12	455	455	130	130	162	80	25	43	10	10
13	455	455	130	130	162	33	25	10	0	0
14	455	455	130	130	85	20	25	0	0	0
15	455	455	130	130	30	0	0	0	0	0
16	455	310	130	130	25	0	0	0	0	0
17	455	260	130	130	25	0	0	0	0	0
18	455	360	130	130	25	0	0	0	0	0
19	455	455	130	130	30	0	0	0	0	0
20	455	455	130	130	162	33	25	10	0	0
21	455	455	130	130	85	20	25	0	0	0
22	455	455	<u>0</u>	<u>0</u>	145	20	25	0	0	0
23	455	425	0	0	<u>0</u>	<u>20</u>	0	0	0	0
24	455	345	0	0	0	0	0	0	0	0

Figure 2. Improved Solution Modification Process (ISMP) on a 10 unit system with 10% spinning reserve

TESTING RESULTS

To test the efficiency of the proposed approach, it is simulated on four units system, ten units system and twenty units system. Results of the proposed method have two parts: Simulation results before ISMP (BISMP) and after ISMP (AISMP). Four different studies are conducted, which are as follows:

Study-1: This system contains four thermal units. Load demand data, unit characteristics and cost coefficients are taken from Khanmohammdi et al. (2010). Here, system is tested for 10% of spinning reserve. Results after ISMP are compared with other existing methods as shown in Table 1. The convergence characteristic of the study-1 is shown in Figure 3. It can be observed from Table 1 that proposed ATHS provides better results than the existing methods.

Table 1. Cost comparison for study-1

Method	Total Cost (\$)	Time (Sec)
LR	75,232	-
PSO-LR	74,808	-
THS	74,812	-
ATHS	74,525	1.72

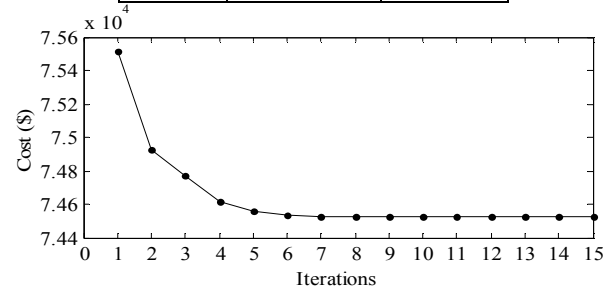


Figure 3. Convergence characteristics of study-1.

Study-2: This system contains ten thermal generating units. The data of the ten units system and its load are taken from Khanmohammdi et al. (2010). The system is simulated with 5% of spinning reserve. Results after ISMP are compared with other existing methods as shown in Table 2 and the corresponding convergence characteristic is shown in Figure 4. It can be observed from Table 2 that proposed ATHS provides better results than the existing methods. No modification has been done to reach to an optimum solution as compared to THS method where five modifications are needed to reach to an optimal solution, i.e. results are same before ISMP (BISMP) and after ISMP (AISMP). Unit status from proposed ATHS and THS (Khanmohammdi et al., (2010)) is shown in Table 3. The units which are not highlighted are common for both the methods. Light grey underline unit status is only for proposed ATHS and dark grey is for only THS method.

Table 2. Cost comparison for study-2

Methods	Total Cost (\$)	Time (sec)
GA	570,781	62.29
BP	565,450	-
BPSO	565,804	168.73
THS	557,677	-
ATHS	557,128	11.05

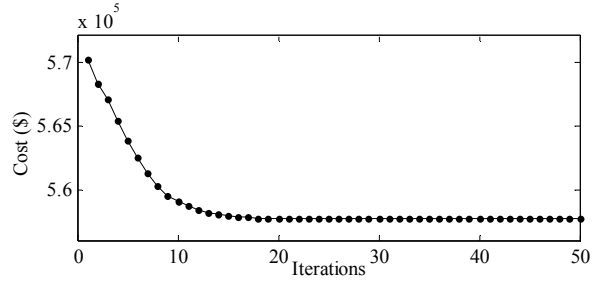


Figure 4. Convergence characteristics of study-2.

Table 3. Unit Status

Units	Hours (1-24)																			
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	1	1
	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1
	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Study-3: Same units mentioned in study-2 are performed with 10% of spinning reserve. Cost comparison with other existing methods is shown in Table 4 with execution time in second. It can be observed from Table 4 that proposed ATHS provides better results than the existing methods. Convergence characteristic is shown in Figure 5.

By duplicating the data of ten units system, it is possible to define a new UC problem with 20 units system. Here, the system is simulated with 10% of spinning reserve. Comparison of cost with other existing methods is shown in Table 5 with execution time in second and convergence curve is shown in Figure 6. It can be observed from Table 5 that proposed ATHS provides better results than the existing methods.

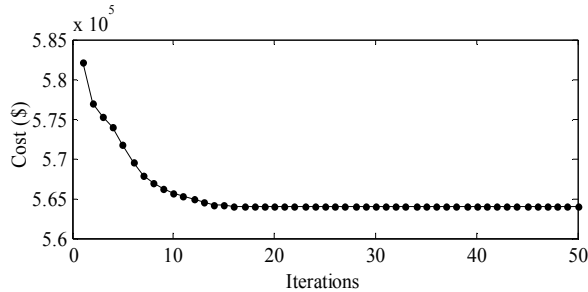


Figure 5. Convergence characteristics of study-3.

Table 4. Cost comparison for study-3

Methods	Total Cost (\$)	Time (sec)
EP	564,551	100
GA	565,825	221
GA-UC	563,977	85
BF	565,872	80
ICGA	566,404	7
ALR	565,508	3.2
ELR	563,977	4
THS	BSMP 564,018 ASMP 563,938	- -
ATHS	BSMP 564,796 ASMP 563,938	8.13 11.82

Table 5. Cost comparison for study-4

Methods	Total Cost (\$)	Time (sec)
EP	1,125,494	340
GA	1,126,243	733
GA-UC	1,125,516	225
BF	1,128,112	210
ICGA	1,127,244	22
ALR	1,126,720	12
ELR	1,123,297	16
THS	BSMP 1,124,838 ASMP 1,124,490	- -
ATHS	BSMP 1,124,848 ASMP 1,123,297	32.31 47.38

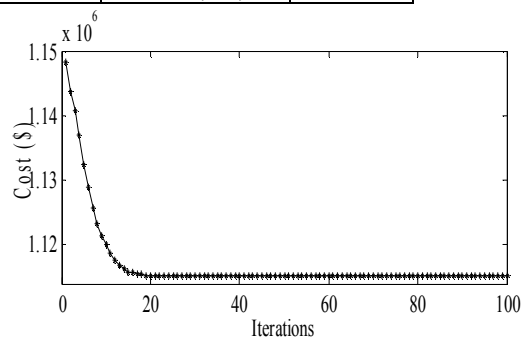


Figure 6. Convergence characteristics of study-4

The result of the generation scheduling from proposed approach for study-3 is shown in Table 6. Figure 7 shows the comparison of execution time for the two different studies. From the numerical results, it is found that proposed ATHS can find more qualified solutions with much lower execution times compared to the EP, GA, GA-UC, and BF methods. Although, ATHS

requires more execution time in comparison with ICGA, ALR, and ELR, but the quality of the final results is much better than the results obtained using ICGA, ALR, and ELR. Sign (-) means that no values has been reported. Some values may have round off error

Table 6. Operation cost and generation scheduling for 24 hour.

Hours	Power generation of units (MW)										Available Reserve (%)	Generation cost (\$)	Start-up Cost (\$)	Modification Rate (\$)
	1	2	3	4	5	6	7	8	9	10				
1	455	245	0	0	0	0	0	0	0	0	30.00	13683.13	0	0.00
2	455	295	0	0	0	0	0	0	0	0	21.33	14554.50	0	0.00
3	455	370	0	0	25	0	0	0	0	0	26.12	16809.45	900	0.00
4	455	455	0	0	40	0	0	0	0	0	12.84	18597.67	0	0.00
5	455	390	0	130	25	0	0	0	0	0	20.20	20020.02	560	0.00
6	455	360	130	130	25	0	0	0	0	0	21.09	22387.04	1100	0.00
7	455	410	130	130	25	0	0	0	0	0	15.83	23261.98	0	0.00
8	455	455	130	130	30	0	0	0	0	0	11.00	24150.34	0	0.00
9	455	455	130	130	85	20	25	0	0	0	15.15	27251.06	860	0.00
10	455	455	130	130	162	33	25	10	0	0	10.86	30057.55	60	0.00
11	455	455	130	130	162	73	25	10	10	0	10.83	31916.06	60	0.00
12	455	455	130	130	162	80	25	43	10	10	10.80	33890.16	60	0.00
13	455	455	130	130	162	33	25	10	0	0	10.86	30057.55	0	0.00
14	455	455	130	130	85	20	25	0	0	0	15.15	27251.06	0	0.00
15	455	455	130	130	30	0	0	0	0	0	11.00	24150.34	0	0.00
16	455	310	130	130	25	0	0	0	0	0	26.86	21513.66	0	0.00
17	455	260	130	130	25	0	0	0	0	0	33.20	20641.82	0	0.00
18	455	360	130	130	25	0	0	0	0	0	21.09	22387.04	0	0.00
19	455	455	130	130	30	0	0	0	0	0	11.00	24150.34	0	0.00
20	455	455	130	130	162	33	25	10	0	0	10.86	30057.55	490	0.00
21	455	455	130	130	85	20	25	0	0	0	15.15	27251.06	0	0.00
22	455	455	0	0	145	20	25	0	0	0	12.45	22735.52	0	857.45
23	455	425	0	0	0	20	0	0	0	0	10.00	17645.36	0	39.33
24	455	345	0	0	0	0	0	0	0	0	13.75	15427.42	0	0.00
Total											559847.69	4090	896.77	

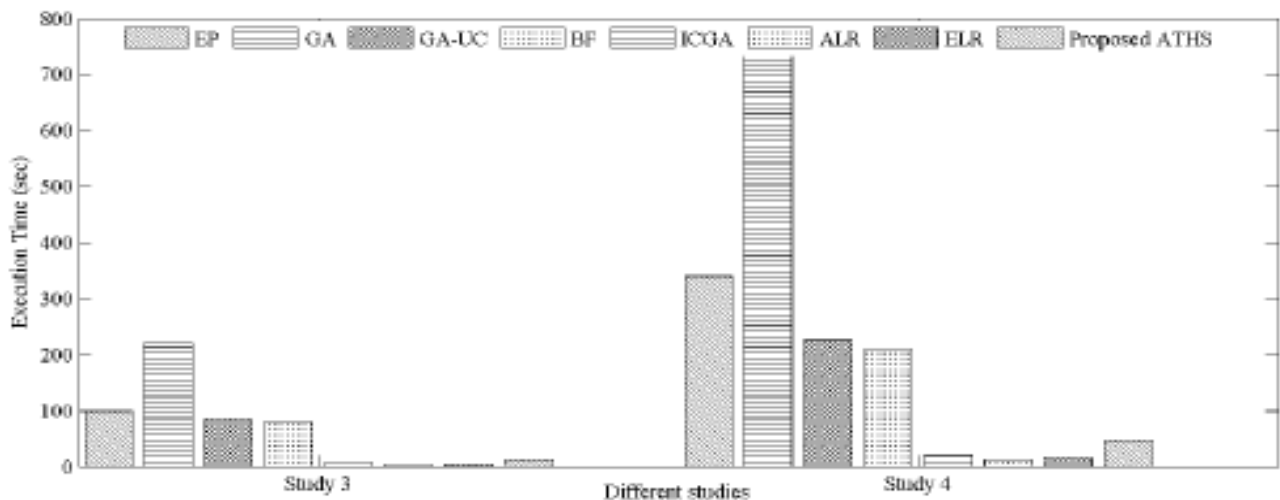


Figure 7. Execution time comparison for different studies.

CONCLUSION

In this paper, advanced three-stage approach for solving unit commitment problem is proposed using crazy particle swarm optimization technique with pseudo-algorithm to handle equality constraint as compared to other existing

methods. The proposed method gains from some logical and simple stages combined with meta-heuristics approach. The results obtained by the proposed ATHS are compared with the results of some earlier methods and it is found that proposed method provides better results than other existing methods within a reasonable time. For future

studies, the author will try to explore the potential of proposed method in optimizing the problem considering large-scale power systems.

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SUSTAINABLE INFRASTRUCTURE DEVELOPMENT STRATEGIES THROUGH TECHNOLOGICAL INNOVATION OF SMART MATERIALS

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ABSTRACT

Over the last decades there has been a tremendous growth of built environment to meet higher standards of living with growing industrialization and urbanization. The replacement and rehabilitation of aging and deteriorating existing infrastructures are the challenges of the 21st century. Development of new environmentally friendly building materials can lead to lower greenhouse gas emission, consumption of wastes, durable construction, sustainability in construction industry and minimize worldwide infrastructure problems. The paper addresses critical infrastructure needs and focuses on the strategies for the development of sustainable infrastructure based on technological innovation of smart materials and rehabilitation technologies. In the strategy of smart infrastructure materials, emphasis is placed on the deterioration (degradation) process of traditional construction materials and on the development of new generation of advanced materials. The strategy area of rehabilitation techniques focusses on renewing, modifying, and upgrading constructed facilities, through integrating smart materials and new design approaches. This paper also presents the development of new generation of advanced materials and their contributions to infrastructure sustainability based on structural capacity enhancement, service life and economy through illustrating case studies.

KEYWORDS: sustainable infrastructure, smart materials, technological innovation, rehabilitation, greenhouse gas emission

INTRODCUTION

The definition of sustainability emphasizes the importance of ensuring the satisfaction of present need without compromising the ability of future generations to meet their own requirements. Sustainable development achieves social, economic and environmental objectives in parallel (Howard 2000). For the construction industry, sustainability means: progress that meets the needs of the society, economic development, preservation of environment and efficient use of resources. A simplistic illustration (Fig. 1) of sustainability in construction is the cradle to the grave material flow (Somerville 1990).

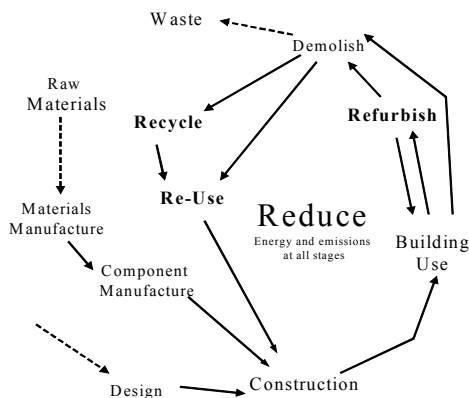


Fig.1: Material flows: cradle to grave

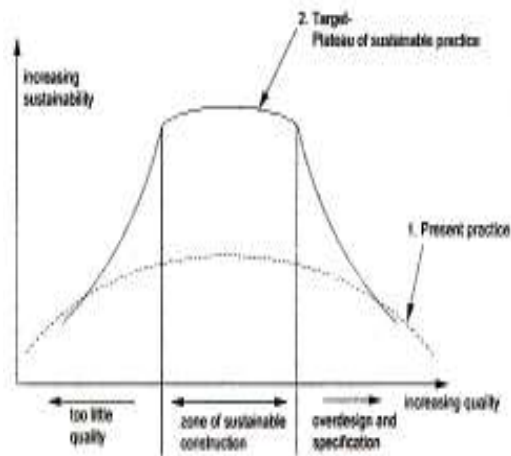


Fig. 2: Plateau of sustainable practice

A total plan for sustainability requires: reduction of emission of greenhouse gases (GHG), efficient use of resources, constructive reuse of waste, reduction of harmful effects from construction activities and building occupation, reduced environmental impact, and improved levels of energy use throughout the life of the built product. Development of new

materials/construction technologies and their implementation to sustainable infrastructure development is vital to protect the environment. Significant opportunity exists to reduce GHG emissions through the development of energy conscious construction materials.

Author remains a promoter of sustainable infrastructure development through the strategy of technological innovation of smart materials and structural systems. Author's major achievements in recent years include the development of novel "ecological" construction materials using waste products and natural pozzolans. Over the last twelve years, author's research team at Ryerson University has developed sustainable green high performance concrete (HPC) materials (including self-consolidating concrete 'SCC', fiber reinforced SCC, engineered cementitious composite 'ECC', ultra-high performance/strength concrete 'UHPC/UHSC') and innovative structural systems/construction technologies (Hossain, 2003, 2004, 2014; Hossain and Lachemi, 2004a,b; Hossain et al. 2012; Issani and Hossain 2013, Lachemi et al. 2003, Sahmaran et al. 2009; Ozbay et al. 2012; Rafiei et al. 2013; Issani et al. 2013). This paper presents critical infrastructure needs, the development of new generation of sustainable materials/technologies and their contributions (illustrated by case studies and cost benefit analyses) to foster sustainable infrastructure development/rehabilitation as strategies.

SUSTAINABLE INFRASTRUCTURE AND PERFORMANCE BASED DESIGN

In the context of durability and design life, a more relevant sustainability diagram is shown in Fig. 2, which plots 'sustainability' against 'quality', where quality is representative of a desired achievement in design compared with required performance in service (Somerville 1999). This suggests to move from curve 1 towards curve 2, thus creating a zone of sustainable construction with a definite plateau. If on one hand, too little quality is put into the structure, and it fails to meet the owner's in-service performance requirements, then this constitutes 'failure', in sustainability terms. On the other hand, it is equally bad to over-design or over-specify, since this wastes scarce resources. The only solution to this dilemma is to get as close as we can in design, to an exact fit with clearly defined performance requirements. Fig. 2 gives the element of strategy, towards a performance based design approach, consistent with greater sustainability. Essential to this is the establishment of limiting performance criteria and this has to be at two levels: (i) a requirement which deals with the in-service time factor-possibly a target, expressed in terms of 'life' and (ii) a requirement which

directly relates to a minimum acceptable technical performance, over that life.

Most cities have buildings dating from the last century. Few will be found to be exactly the same due to changes in use, upgrading and replacements in whole or in part. Obsolescence, and changes in use, is therefore an issue. The situation is similar, for civil engineering structures, especially for highway structures. In 2012, one in nine of the USA bridges were classified as structurally deficient. Over two hundred million trips are taken daily across deficient bridges. The average age of 607,380 bridges is currently 42 years. Federal Highway Administration (FHWA) estimates that to eliminate the nation's bridge deficient backlog by 2028, \$20.5 billion annually is to be invested (FHWA 2012). Every year, in Canada alone, hundreds of millions of dollars are spent in bridge rehabilitation.

Owners of modern infrastructure are now more conscious of the need for regular inspection and good maintenance. Further, if structural changes have to be made, they wish the disruption to the operation of the structure to be kept to a minimum. This needs the development of a systematic and economical plan which involves whole life costing methods with the objective of minimizing total cost and maximizing the operational use of the structure. The sustainability argument implicit in Fig. 2 makes it clear that the performance based criteria should be used in design. To appreciate this, it is necessary to resort to feedback from in-service performance of structures. Fig. 3 shows deterioration mechanisms for bridges, buildings, car parks and marine structures (BCA 1997). Easily the most dominant mechanism is corrosion, from various causes. Table 1 shows an analysis of factors contributing to the deterioration and failure of infrastructures (BCA 1997). 'Environment' (natural or man-made) is the biggest single factor. However, low cover, poor concrete quality, poor design detailing and poor workmanship are added together then, collectively, they are of the same magnitude as for Environment. This feedback strongly suggests that, if durability design for sustainability is to be significantly improved, two essential elements must be dealt with: (i) identification and quantification of critical aggressive actions and (ii) improving, or otherwise dealing with, quality of construction.

This reflects the importance of the development of durable infrastructure materials and rehabilitation technologies to address critical infrastructure needs for sustainable development. A British Standard 'BSI HB 1041' exists, which simultaneously encourages the development of materials and components on a targeted service life basis. Current research and numerous researches in the past focus on the development of

durable and environmentally friendly building materials to ensure sustainability in the construction industry and infrastructures worldwide.

Table 1: Deterioration mechanism of structures

Factors contributing to deterioration	No. of cases	No. of cases (%)
Low cover	47	11.6
Environment	156	38.5
Poor quality concrete	64	15.8
Poor design detailing	29	7.2
Poor workmanship	17	4.2
Wrong specification	6	1.5
Failure of joint/waterproofing	31	7.7
Inadequate conceptual design	2	0.5
Wrong material selection	53	13
Total no. of cases	405	100

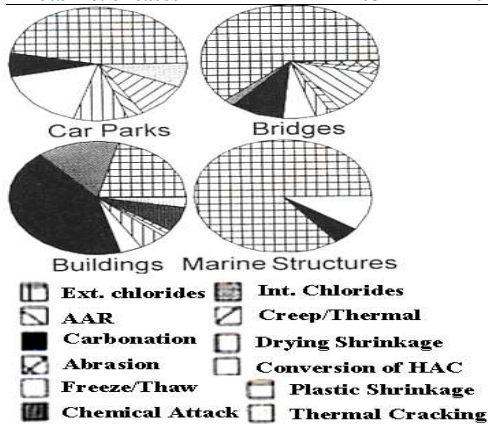


Fig. 3: Deterioration mechanisms

Sustainable Smart Materials And Construction/Rehabilitation Technology Development Strategies

New materials and construction technologies should be developed and used as a part of the holistic approach to reduce the harmful effects of the construction industry on our environment and to promote sustainable development. In this section, focus will be provided on the development of construction materials and technologies related to promoting infrastructure sustainability.

Development of Energy Conscious Cement

The production of cement has increased within the last century from less than 2 Mt in 1880 to more than 4.0 billion in 2013 worldwide. The production of Portland cement (PC) accounts for 7% of CO₂ produced around the world. Reduction of the CO₂ burden can be achieved by modifying the cement or the concrete (Hossain 2003).

Use of supplementary cementing materials (SCM) in blended cement: The use SCM such as fly ash (FA), slag, silica fume (SF), rice husks, volcanic ash (VA), finely ground pumice, metakaolin, limestone filler and

other industrial or natural by-products in PC is thoroughly researched. Wide spread use of these materials have been almost universal for several decades. For every tonne of PC produced, cement plants generate approximately one tonne of CO₂. As a result, one cubic meter of concrete, made with 320 kg/m³ PC only, will generate 0.41 tonnes of CO₂, emitted to the atmosphere. If 30% of PC is replaced with SCM, this figure is reduced to 0.29 tonnes of CO₂ that is approximately 30% reduction of GHG emissions. The energy content of PC is 4.2 GJ/tonne, for Portland fly ash cement it is 3.6 GJ/ton, and for blast-furnace cement it is 2.5 GJ/ton. Very reactive, highly pozzolanic and ultra fine SCM will allow much higher PC replacement without reduction of concrete strength. By optimizing the composition of blended cements and proper curing methods, it can be possible to reduce CO₂ emissions to less than 0.1 tonne/m³ of concrete.

Use of waste derived fuels in the cement manufacture:

Use of waste-derived fuels in place of fossil fuels will also reduce energy consumption in PC manufacturing. Instead of natural gas, coke oven, pyrolysis and land fill gases are being used. Mineral, hydraulic, industrial oils, distillation residues and halogen-free spend solvents are also viable alternative liquid fuels. Pulverized coal can be supplemented and in some cases possibly replaced with tar, petroleum coke, saw dust, dried sewage sludge, some selected plastics, agricultural residue, and car tyres. Steel-belted tyres in some cases may assist in the iron deficiency or a raw feed (Samarin 1995).

Use of industrial wastes in the manufacturing of cements:

Industrial wastes can be used as a raw feed in manufacturing new types of energy conscious cements, resulting in the reduction of energy required for clinker formation, and thus in the lower CO₂ emissions. Since the late 1950's new types of binders, produced by chemical or mechano-chemical activation of natural siliceous materials or industrial siliceous wastes were developed in several European countries. Chemical activation with caustic alkalis and with salts of alkaline metals produced so called 'soilcement'. Sodium metasilicates or water glass was used to obtain new hydraulic cements. The hardening/strength gaining processes in these binders can be enhanced and accelerated by a heat treatment, with the best results reported in the range of between 900°C and 1000°C (Samarin 1995). As this process requires no calcinations and low processing temperature, compared to the Portland clinker formation, which is of the order of 1400°C, it results in more than 50% reduction in CO₂ emission compared to modern PC plants.

Slag-alkaline cements are widely used in European countries (Krivenko 1996; Dravidovits 1994). Another

family of inorganic binders is geopolymers produced by blending three ingredients - calcined aluminosilicates, alkali-disilicates and granulated blast furnace slag or FA. Geopolymeric concretes were reported to reach compressive strengths of 20 MPa in 4 hours, and up to 100 MPa in one month. As geopolymers do not use CaCO₃ as a raw feed component, and also because chemical reaction of formation of aluminosilicates takes place at temperatures of approximately 750°C, it results in between 0.1 tonne and 0.2 tonnes of CO₂, emitted for every tonne of this mineral binder (Dravidovits 1994). Another alternative to PC are the new types of binders produced by mechano-chemical activation of inert siliceous materials, such as FA or silica sand know as “silica-water-suspension-binders”. This process requires no calcinations of clinker, and also no high temperatures for binder formation, and thus produces no CO₂ from either the combustion of fuel, or from the conversion of CaCO₃. The best results were obtained when concrete based on silica-water-suspension-binders were cured at temperatures of between 40 and 120°C. Up to 90% reduction of CO₂ emissions, as compared with PC production, can be achieved with these binders (Samarin 1995).

Development of Sustainable Concrete

Concrete is definitely the most commonly used construction material. Concrete product manufacture requires little energy and produces little harmful substances. Concrete wastes that place a load on the environment are formwork moulds, formwork oil, insulation and packings. The moulds and packing can be reused and can be made with recycled materials. Formwork removal agents contain additives, harmful to the environment and are responsible for 15% of the hydrocarbon emissions (Hendriks and Jensen 1999). The development of decomposable synthetic products and the replacement of environmentally damaging solvents by oil-in-water emulsions in recent years reduced harmful effects on environment. Vegetable oil-based formwork removal agents are also commercially available.

Use of wastes as continuous fibre reinforcement and additives for concrete: Bamboo is the most common and one of the oldest organic reinforcing materials used in concrete. Bamboo waste and specially harvested plants have been used as concrete reinforcement in many developing countries. It is recommended, that bamboo main reinforcement in PC concrete should be in the range of between 3.5 and 4.5%. To enhance long term durability, bamboo is often pre-treated (Fang and Fay 1978). Many organic fibres, including wastes, broadly classified as natural (either of vegetable or animal origin) or synthetic are used as concrete reinforcement. Most natural or even synthetic fibres of

organic origin have relatively low modulus of elasticity and the most common use for these fibres is to restrain plastic shrinkage cracking of fresh concrete. In the hardened concrete, the strain in these fibres is usually too big to effectively control drying shrinkage, thermal and creep induced cracking. There are still, some natural fibres of reasonably high elastic modulus, such as coir (4 to 6 GPa), jute (17 to 18 GPa), and sisal (35 to 60 GPa). However, in many developing countries, bagasse fibre, coconut husk fibre and other natural organic fibres have been successfully used (Sarja 1996). Industrial wastes such as short steel wire off-cuts (free of harmful impurities) can be used in structural concrete, in place of steel fibre.

Wastes as additives and binders in concrete: Wood lignins were successfully used as extenders of bitumen, and lignins as well as waste oils as binders for the wearing courses in the low cost and temporary pavements. The blend containing lignin (30% by weight of bitumen) showed higher resistance to the fatigue failure, with the resistance to moisture and freeze-thaw damage virtually unchanged (Samarin 1999). A blend of epoxy resins, coal tar and phenol was also used as a binder for special application concrete. In Canada and several other countries, period of considerable over supply of sulphur leads to the development and widespread use of sulphur concrete (Malhotra 1980).

Wastes as aggregate in concrete: A wide range of unprocessed waste, with variable degrees of success has been used as aggregate in concrete. Most widely researched is the use of blast furnace slag aggregate. Less widely used is steel slag, although several steel slag aggregates performed well in PC concrete. Assessment of ferro-chromium and silica-manganese slags in concrete was also carried out. The use of crushed brick or a mixture of crushed brick and concrete rubble as an aggregate in structural concrete was reported to be promising. Crushed glass, can be used as fine aggregate in concrete. It is important to have sufficient content of either ultra fine glass particles, or of fly ash or other good quality pozzolans, to prevent alkali-aggregate expansion in large glass particles.

Lightweight concretes can be produced with unprocessed wastes, such as expanded polystyrene granules. There are several patented lightweight construction systems incorporating expanded polystyrene concrete panels. A classical example is “Strake Ges.m.b.h system” in Vienna. This system made with lightweight concrete with polyster aggregate of between 300 and 350 kg/m³ is used as a permanent formwork in buildings, providing excellent thermal and acoustic properties (Samarin 1999). Cork granules are used in place of expanded polystyrene chips. Saw dust

is used as aggregate for concrete. Typical saw dust concrete has a strength of 15 MPa and a density of approx. 1000 kg/m³. Use of shredded rubber as an aggregate was not very successful due to considerable concrete strength reduction. However, use of rubber aggregate in semi-rigid concrete can be quite promising. Unprocessed wastes such as cane bagasse, wood ash, china clay waste, paper waste, etc. have potential to be used as aggregate in concrete, particularly for either temporary or low cost housing (Bijen 1996). 'Lytag', a sintered lightweight aggregate is used to manufacture concrete with an air dry density of about 1800 kg/m³ and with a compressive strength of up to 70 MPa. Attempts have been made to convert household and industrial garbage into concrete aggregate. Australian company, "Neutralysis" spent 12 million Dollars over a period of six years developing technology of manufacturing concrete aggregate from a blend of household and industrial waste. A process, which converts the residue from incinerated toxic waste into pellets, was developed by a Singapore company "Miltox". Miltox, a Singaporean, Malaysian and Australian joint venture built a pilot plant with an output of approx. 400 kg/hour in 1994. However, long term durability and environmental effects of such products are to be studied before they can be safely used in building and construction materials.

Recycled construction and demolition (C&D) wastes in concrete: Significant opportunity exists to reduce GHG emissions through the development of energy conscious construction materials by maximizing the use of C&D wastes, now merely used as landfill. The advantages of using C&D wastes are two folds: reduction of the use of virgin natural resources and creation of a safe, effective and environmentally friendly means of disposal of wastes. About 200 Mt of C&D wastes are produced in European countries every year and significant portions are land filled. Only Netherlands, Belgium and Denmark recycle more than 80% of C&D wastes (Hossain and Lachemi 2004a). In the US, building demolition accounted for 48% of the national C&D wastes, while renovations accounted for 44% and new construction for 8%. C&D waste comprises approximately 25% of national landfill content. Construction, renovation, and demolition industries produce between 25% and 33% of the waste stream in Canada. An impressive volume of research is conducted worldwide on the use of recycled materials especially on aggregates (Pacheco-Torgal et al. 2013).

Development of High Performance Concrete for Sustainable Development

Very high strength cement matrices with a 28 day compressive strength of 276 MPa were developed in 1930. In 1980, a new material called DSP (Densified

with Small Particles) with a compressive strength of up to 250 MPa was developed (Hjorth 1983). Another material of strength around 400 MPa was MDF (Macro-Defect Free Paste) where rheology of fresh mix was modified by the addition of water soluble polymer. The general application of superplasticizers created a new kind of concrete called HSC (High Strength Concrete) in the late 1980's. Using better quality of aggregates, careful selection of aggregate gradation and low water/cement ratio resulted in a HSC exceeding a 28 day compressive strength of 60 MPa. With addition of SF, HSC of over 100 MPa is produced. Next a different concept was introduced to develop HPC characterized by excellent fresh workability, high density, high early strength and higher long term strength and durability (Zhou et al. 1995). New types of HPC have been developed by replacing a high percentage of cement by SCM derived from recyclable industrial by-products or natural pozzolans (Neville and Aitcin 1998; Lachemi et al. 2003). The use of SCM can ensure high fluidity and good cohesiveness of the mix and enhance durability of HPC. Roller compacted concrete (RCC) is special technology which provide considerable economics in time and cost together with high strength and long term durability (Richard and Cheyrezy 1995). Researches are conducted to develop HPCs and blended cements with volcanic materials (Hossain 2003, 2004).

Two other concrete technologies have been developed in the last decades are self-cured concrete and SCC. Self-cured concrete where special compounds with polymers and oils are included into fresh mix. SCC is one of the newest forms of HPC that can spread readily into place and self-consolidate under its own weight without exhibiting any significant separation of constituents (Khayat et al. 1997, Yurugi 1998). SCC technology incorporating natural and industrial wastes offers limitless advantages from the standpoint of energy and materials conservation, durability, cost efficiency, job site productivity, and overall sustainable construction. Research leads to the development of SCCs incorporating volcanic materials and industrial wastes (Hossain and Lachemi 2004b, Lachemi et al. 2003).

During the last decades, tremendous progress has been made on the HPC and the modern day concrete frontiers can be defined by "high strength and high tensile ductility" characteristics. Such HPC technology involves the family of highly durable fibre reinforced ECC and UHSC/UHPC. UHSC/UHPC is characterized by high strength with moderate ductility while ECC materials have high ductility, tight crack width and low to high strength (Ranade et al. 2013; Li 2003). ECC strain hardens after first cracking, like a ductile metal, and demonstrates a strain capacity 300 to 500 times greater than conventional concrete. Even at large

deformation, crack widths of ECC remain less than 60 μm . With intrinsically tight crack width associated with self-healing potential and high tensile ductility, ECC is the material of future which offers significant potential to resolve durability problems of RC structures. Over the last twelve years, research at Ryerson University has developed sustainable HPCs and innovative structural systems/construction technologies. Ryerson research team has developed “Ryerson UHPC” through evaluation of mechanical/durability properties and structural performance in bridge deck joints (Hossain 2014). Team has also pioneered the development of green cost-effective ECC incorporating locally available aggregates/industrial wastes (Sahmaran et al. 2009; Ozbay et al. 2012) and their potential applications in ‘joint-free bridge deck with link slab’, ‘composite framed shear wall system’ and ‘coupling slab in shear wall structures’ (Hossain 2014; Rafiei et al. 2013; Issani and Hossain 2013). Team has made first attempt to incorporate local sand into ECC instead of expensive micro-silica sand.

Materials and Technology for Repair and Rehabilitation of Infrastructures

The preventive measures, methods of diagnosis and modeling of deterioration process of concrete infrastructures are the object of intensive research in many countries (Swamy 1994). Outstanding progress has been made in repair methods with the development of new HPC materials and technologies. Application of composite materials: fibre reinforced concrete (FRC), slurry infiltrated concretes, polymer concretes and ECC allows to overcome most factors that endangers durability. Recent developments concern steel micro-

fibres, polypropylene/poly vinyl alcohol fibres, carbon fibres and new techniques in improvement of durability of alkali-resistant (AR) glass fibres in cement paste. The use of such fibres increases the toughness and controls opening and propagation of micro-cracks. Carbon fibres are excellent reinforcement of thin elements and are resistant to all types of chemical attack and to high temperature (Van Gamert 1996). Numerous methods have evolved to increase the durability of concrete including: mineral and chemical admixtures, epoxy-coated and/or stainless-steel reinforcement, fiber reinforced polymer (FRP) bar, protective surface sealers, and cathodic protection. Extensive research has been conducted on the strengthening and rehabilitation of structures (Van Gamert 1996; Hollaway and Leeming 1999; [Belarbi](#) 2013). Retrofitting techniques have been developed for adhesive bonded steel or fibre reinforced polymer (FRP) plates to strengthen concrete infrastructures. These techniques are also applied to retrofit steel, timber and masonry structures.

Sustainable Infrastructures - Case Studies And Cost Benefit-Energy Consumption Analyses

The construction phase for the *California Franchise Tax Board’s State Offices* at Butterfield Way, Sacramento, CA, realized tremendous financial benefits from recycling C & D debris. 69% of C & D wastes (over 15,000 tons) was recycled, and reutilized on-site saving \$104,000 (Table 2). This saving was resulted from eliminated tipping fees, and reduction in road-base/landscape materials the project would have needed to purchase.

Table 2: Details of recycling efforts and savings

Description	Wood/Green waste	Concrete	Asphalt concrete	Misc.	Total
C&D waste, cubic yards	1,200	2,500	8,200	364	12,264
Recycled on-site, %	100	20	84	0	69.2
Recycled off-site, %	0	80	16	0	30.4
Total recycling (savings), US\$	8,800	20,411	75,252	0	104,543



(a) Danish strait bridge (b) Akashi-Kaikyo bridge (c) Trade tower (d) Adelaide bridge
Fig. 4: Typical structures (Case study)

The *Solaire home* in New York is a green residential high-rise building. A concrete structural system is at the core of the environmentally engineered and sustainable

building. The US\$120-million Solaire stands 27 stories tall with 293 rental units. The building is designed to consume 35 percent less energy. To help meet recycled

content standards, a concrete mix with 3 to 4 percent fly ash was used. About 50% of the total building material was recycled content, and nearly 50% of all material was manufactured within 500 miles of the job site. The 3-story **C. K. Choi Building** for the Institute of Asian Research, Vancouver, BC, Canada showcases innovative uses of natural ventilation, daylighting, salvaged materials, composting toilets, etc. Resource conservation, embodied energy, operations over time, and human health/productivity were main concerns in this project.

Energy Resource Center (ERC), Southern California Gas Company, is a shining example of energy efficiency and sustainable design. 60% of the demolition materials were reused or recycled. The ERC's energy efficiency exceeds California Building Code requirements by 45%. Energy-efficient lighting facility that uses 1 watt/ft² compared to 1.5 watts for most buildings saves 21,000 to \$30,000 annually in electricity. Outstanding bridges and tunnels in **Danish Straits** (Fig. 4a) demonstrate the advancement in technology that will be required for sustainable development of the next millennium.

Japan has used SCC in bridge, building and tunnel construction since the early 1990's (Yurugi 1998). A 50 MPa SCC using FA (20%) was used in precast, prestressed T-girders of the **Higashi-Oozu Viaduct** instead of conventional concrete to form better surface and to avoid complaints associated with noise and vibration. Material cost was increased by 4% but labor cost and total cost were decreased by 33% and 7%, respectively. Around 433000 m³ of SCC have been placed in the anchorage of **Akashi-Kaikyo Bridge** - World's longest suspension bridge. The use of SCC reduced the time of construction- up to 1900 m³ of SCC was placed per day (Fig. 4b). In the last few years, a number of SCC bridges have been constructed in

Europe and use of SCC in North America is also increasing.

Restoration Authority of Rabaul city of Papua New Guinea utilized volcanic ash and pumice based cement and concrete for the infrastructure rehabilitation after the destruction of volcanic eruption in 1992 (Hossain 2004). The 73-story **World Trade Tower** in downtown Los Angeles was built using over one million cubic yards of "Vac-Lite" structural lightweight pumice concrete (Fig. 4c). The adhesively bonded plate technique has been applied extensively worldwide, for example, the strengthening of the **Port Wakefield Bridge** in South Australia. The technology of carbon fibre reinforcing was used to improve the structural integrity of Adelaide bridge (Fig. 4d), built in the 1930's.

For cost benefit-energy consumption Analyses, typical ground floor column of the 42 storey (162 m high) "Post Tower" building of the German Mail in Bonn is analyzed with different column types. The columns have to carry the same design load of 30,000 kN with a column diameter of 762 mm and a buckling length of 15.65 m. The use of reinforced concrete column with a 100 MPa HSC would have resulted in a reinforcement ratio of 17%, which is practically impossible and well above the allowable limit of Canadian/American Codes. Four alternative designs are considered for the columns (Fig. 5) - **HSC-100** column having a mixed reinforcement with an additional inner steel core (totalling 17%), **UHSC/UHPC-160** (160 MPa) column with reinforcement (8%), **composite column-NC-45** (45 MPa normal concrete) (consisting of a 10 mm thick steel tube, a 38 x 38 cm inner steel core and reinforced concrete with a reinforcement ratio of 4%) and an equivalent square steel column. Table 5 shows column/concrete types and assumed unit prices with the accumulated energy demand (CED) of the used materials and formwork. The CED-values are considered according to Empelmann et al. (2008).

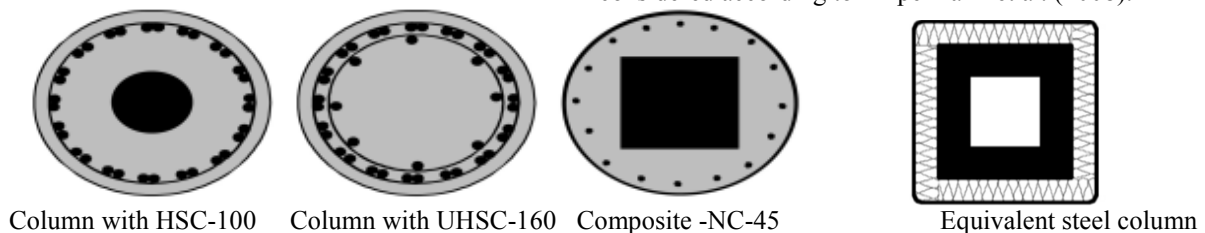


Fig. 5: Design alternatives for column

Table 5 also compares the total price and the CED per meter length for four different column options. UHSC/UHPC-160 column option is found to be more economical compared to composite column (44% lower) and steel column (52% lower). On the other

hand, the energy consumption is also significantly lower (58% and 64% lower compared to composite and steel column, respectively). HSC-100 and UHSC column options are quite close based on both cost and CED. The benefits of UHSC/UHPC columns in sustainable infrastructure development is illustrated based on lower

costs and energy demand besides enhanced durability and service life.

Table 5: Cost benefit-energy consumption Analyses of UHSC/UHPC columns

Steel materials	Price US\$/t	CED MJ/t	Concrete type	Price US\$/m ³	CED MJ/m ³	Column type	Costs US\$/m	CED MJ/m
Steel reinforcement	1500	13700	HSC-100	563	2600	C100	1375	9600
Steel sections/tube	1750	13700	NC- 45	163	1200	UHPC/UHSC	1463	8500
Formwork	100	50	UHPC/UHSC-160	1500	6900	Composite	2588	20500
						Steel	3054	23575

CONCLUSIONS

This paper describes strategies for the development of sustainable infrastructures in the next millennium. As part of the strategy, a comprehensive description on the development of energy conscious smart construction materials and technologies is provided with their contributions to the reduction of greenhouse gas emission and sustainable infrastructure development. Case studies and relevant cost-benefit and energy consumption analyses demonstrate that significant contribution can be made to attain infrastructure sustainability through strategies based on the development of high performance energy conscious smart concrete materials and novel construction technologies. Every country should include these strategies in the overall national capacity building strategy to promote sustainable development and hence poverty alleviation in the long run through smart use of resources.

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Dr. Khandaker M.A. Hossain is an Associate Professor in the Department of Civil Engineering at Ryerson University, Canada. He has over 25 years of professional engineering experience. He is a member of ACI Committee 213 and 232. His research interests include sustainable construction, high performance concrete, use of wastes in concrete, smart self-healing materials, steel-concrete composite building systems, life-cycle analysis, finite element modelling and expert system development. Dr. Hossain has published extensively with over 350 publications including over 150 journal papers.

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DEVELOPMENT OF BODY DIMENSIONS OF NIGERIAN POLYTECHNIC STUDENTS: APPLICATIONS AND IMPLICATIONS IN MACHINERY DESIGN

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ABSTRACT

This study was undertaken to develop anthropometric body dimensions among students of four Nigeria polytechnics, i.e., Auchi, Ogwashiukwu, Ozoro, and Bori in Edo, Delta, and Rivers states respectively which could be applied to machinery design. To achieve these objectives, 600(300 male and 300 female) students within the age of 18 – 30 years were randomly selected and enrolled to 18 standard anthropometric measurements that were considered as the design requirement of this study. The data generated were analyzed using SPSS to determine the descriptive statistics. A further statistical simple T-test comparison between the mean dimensions of the students were performed to determine their differences at (P<0.05) significant. A simple comparison of the dimensions of present study with other four ethnic populations of the world was also performed to determine their differences. The results of the T- test showed significant differences (P<0.05) in hip breath (sitting), elbow to elbow breath and waist breath between the subjects. The results of comparison between the dimensions of the present study and other four ethnic populations indicated similarities in mean values of stature and eye height standing with differences in other sitting postures among other populations for both genders. To obtain maximum human comfort and high work output in machine designs, differences in the mean body dimensions must be considered.

KEYWORDS: anthropometric dimensions, equipment, male and female, polytechnic students, ethnic population

INTRODCUTION

The rate of economic growth and technological advancement in the present era needed technical approach in solving human problems in many aspects of lives using anthropometric dimensions. Over the years, many engineers, artisans, craftsmen and technologists in higher institutions, industrial sectors and research institutes especially in developing countries such as Nigeria have been designing and fabricating machines and human facilities arbitrarily for different uses without first considering the ergonomic applications and implications of these machines to the final consumers (target users) thereafter.

Anthropometric data of users population of machines, facilities and work area is sine-qua non for optimum work performance and users' comfort. Apart from low output productivity, one of the greatest consequences of neglecting physical and human capabilities of the populations (subjects) when designing any product or work area for their use is that the product or the work area designed will automatically turn out to be ergonomically hazard to the users (Lewis, 1969; Ashby, 1978; Haslegrave 1986).

According to Pheasant and Haslegrave (2006); Bolstad et al., (2001) and Del Prado (2007), anthropometric data are used for proper design of work station, equipment, furniture and so on in order to decrease awkward postures and stresses on human body due to improper design. Complicated health problems in human body such as musculoskeletal disorders, concentration deficit, mental disorder and the likes may occur as a result of variance existing between anthropometric dimensions and consumer products (Bendix, 1987). Anthropometric dimensions differ among ages, genders, races and ethnic groups (Jeong and Park, 1990). These dimensional differences may be attributed to nutritional status, socio-economic situation and geographical factors.

Mirmohammadi et al; (2001) studied the anthropometric dimensions of Iranian University students and discovered significant differences in body dimensions within and across other university students of the globe. They suggested that there should be a repeated measurement of Iranian people's anthropometric dimensions after a period of time to update these dimensions. Therefore, there is a need to update the measurement of anthropometric dimensions of any country after a period of ten years.

Pheasant (1996) suggested that the variations of body dimensions of different groups can be observed in terms of overall body size and bodily proportions. The mean anthropometric dimensions (stature and sitting height) are the most typical distinctions among ethnic group. The anthropometric differences among geopolitical zones are greater than ethnic groups (Onuoha et al; 2012). Different geopolitical zone of the same country may also have variance in body sizes and bodily size due to differences in social and economic environment. In terms of geopolitical zone, many students in the region of South South Nigeria (Edo, Delta, Rivers and Bayelsa) belong to almost same tribe and are highly associated historically.

Human body dimensions are needed in the design of engineering infrastructures as a way of national capacity building for sustainable development and poverty alleviation strategies. These data for Nigeria is woefully scanty (Onuoha et al; 2013). It is important to note that any country without human database is in doom and cannot make any meaningful progress in capacity building for sustainable development and poverty alleviation. National capacity building strategy for sustainable Development and poverty alleviation can only be greatly achieved when equipment and machinery are designed with due consideration to anthropometric dimensions of target users/operators.

One of the main reasons of low development in capacity building in Nigeria is due to lack of reliable anthropometric data for machinery design. Despite the various approach to modern Technology on machinery/equipment design, a lot of human drudgery in infrastructure development and operations have not yet been arrested to barest minimal in Nigeria especially in the polytechnic tertiary institutions.

As necessary as the anthropometric data is, Nigerian government has no database not to talk of specific regulatory standard for design and definition of appropriate implements and machinery to be used by her citizens unlike some developed counties like USA and Japan. These data for Nigeria is woefully scanty (Onuoha et al; 2013). Among the few reported anthropometric data include, the work of Okunribido (2000) which surveyed the hand anthropometry for female rural agricultural workers in Ibadan, Western Nigeria. Oguntona and Kalu (2000) reported some anthropometric data on height, weight, upper arm, hip and waist circumference. Also Igboanugo et al (2002) reported the anthropometric data of Nigeria adult working class to serve as a database for designers of domestic and industrial population.

Ayodeji et al (2008) gathered anthropometric data of Nigeria paraplegias. Similarly, Ismaila (2008) obtained the anthropometric data of the foot of Nigeria University Students. Onuoha et al (2012) carried out study on anthropometry of South Eastern Nigeria Agricultural workers. More so, Nkakini et al (2006) carried out research on development of anthropometric database for local production of simple agricultural machinery. Nkakini et al (2008) also studied ergonomics of tractor operation control for comfort in Nigeria. Ismaila (2009) obtained anthropometric data of hand, foot and ear of University students in Nigeria.

Furthermore, Ismaila et al (2007) reported anthropometric survey and appraisal of furniture for Nigeria primary school pupils. Ismaila et al (2010) also carried out research on ergonomics assessment of passengers seats in buses in South Western Nigeria; Onuoha et al (2013) carried out research on Foot and Head of 18-30 years old Nigerian Polytechnic Students; Onuoha et el (2013) also conducted research on hand anthropometry of agricultural workers in Ebonyi State Central Zone of Nigeria and finally Onuoha et al (2014) investigated anthropometric consideration of hand tools design for Nigerian polytechnic students.

In western countries, large amounts of anthropometric data are available for reference. The anthropometric data bank, assembled and maintained by Aerospace Medical Research Laboratories, Dayton, Ohio, is the largest and most comprehensive data in the world (NASA, 1978). However, it does not contain any data on the Nigeria (West Africa) population. Thus, the anthropometric data of Nigeria polytechnic students are not considered in the design of equipment and machinery and yet most of these machines been used are imported from Western countries.

Most of these machines (infrastructures) create discomfort and at times break down easily due to various discrepancies in ergonomic principles with respect to Nigeria polytechnic student using them. Various factors such as gender, age, race, nutritional station, body dimensions, nature of work among others vary widely across every region, state and country (Yadav et al, 1996, Agrawal et al, 2010, Onuoha et al, 2012). This implies that there must be considerable difference between the anthropometric data of Nigeria and Western countries.

To this effect, if reliable anthropometric data is generated for Nigerian population and particularly polytechnic students, other countries of the world including indigenous engineers that may be interested in machinery, equipment and other human fittings used in Nigeria may use them when designing. This study was

designed to measure important anthropometric body dimensions of Nigeria polytechnic students to serve as database for product design; and to compare the data generated among other ethnic populations of the world in order to predict their anthropometric differences in order to develop human infrastructures for sustainability and poverty alleviation.

MATERIALS AND METHODS

Sample

A group of 600 students (300 males and 300 females) with the age range of 18 – 30 years among students of Nigerian polytechnics (Auchi, Ogwashi-uku, Ozoro and

Bori) in Edo, Delta and Rivers states were randomly selected and enrolled in this study.

Body Dimensions

Design of machines, facilities and fittings require over 300 dimensions to obtain a complete human body dimensions (Hu et al., 2007; Pheasant, 1986; Roebuck et al., 1975). Considering the design requirements of this study, a total of 18 body dimensions of male and female students related to weight, standing and sitting postures were identified for inclusion as shown in Fig.1 to meet the set objectives.

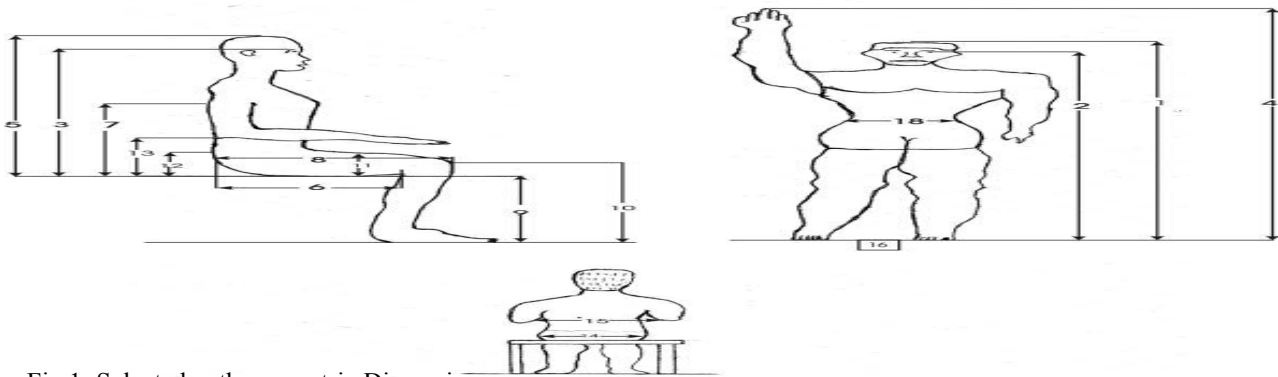


Fig.1: Selected anthropometric Dimensions

Equipment

There are many available methods for anthropometry measurements which range from highly sophisticated equipment such as 3-D scanner to traditional tools. But due to the financial limitations, the traditional anthropometric tools which are simple, less expensive and accurate were used in this study. Two sets of Harpenden standard anthropometer was used to measure the body dimensions.

Anthropometric Survey Team

The survey team consists of thirty-six students (26 males and 10 females) who carried out the whole data collection are students from the department of agricultural and Bio-environmental Engineering Technology Auchi polytechnic, Auchi, Edo state, Nigeria. The male and female observers were given enough practice to measure all the dimensions in a good posture and in a precise manner. The subjects were acclimatized with the experimental protocols for proper and correct measurement. Each measurement was taken three (3) times and the mean value was recorded.

Data Analysis

Data generated was analyzed using SPSS (Version 18.0) to determine the descriptive statistics (mean, standard deviation, standard error of mean, minimum, maximum, 5th, 50th and 95 percentiles) in order to

achieve the first objective of this study which is to generate the anthropometric dimensions of the study subjects.

In order to achieve the remaining objectives, a further statistical simple T-test comparison between the mean dimensions of the males and females of the present study was performed to determine the level of their differences at $P < 0.05$ significant. A simple comparison of dimensions of present study with other four (4) ethnic populations of the world was also performed to determine the level of their differences.

RESULTS AND DISCUSSION

The results of anthropometric dimensions for male and female students of Nigeria Polytechnic are presented in Table 1 and 2.

Table 1: Anthropometric Data of Nigerian male Polytechnic students

Body dimension	Mean	Std.Error of Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						5 th	50 th	95 th
Standing height (Stature)	167.3	6.5	18.3	124.7	180.1	124.7	171.9	180.1
Eye height (standing)	157.2	6.0	16.9	130.1	179.3	130.1	157.2	179.3
Eye height (Sitting)	75.5	3.5	10.0	56.9	90.1	56.9	73.7	90.1
Overhead Reach	210.3	4.7	20.9	166.2	241.1	166.5	211.6	240.6
Sitting Height	84.8	0.9	3.9	75	88.9	75.1	85.1	88.9
Buttock Popliteal Length (sitting)	51.7	2.1	9.2	36.9	70.2	37.0	50.5	69.9
Shoulder Height (sitting)	53.2	1.4	6.3	43.9	61.9	44.0	51.0	61.9
Buttock Knee Length (sitting)	52.5	2.0	9.0	43.0	79.2	43.0	50.8	78.3
Popliteal Height(sitting)	48.2	1.3	5.8	35.3	63.5	35.6	47.9	63.2
Knee height	56.2	1.2	3.3	49.6	60.9	49.6	56.8	60.9
Thigh Clearance	14.5	0.4	1.2	12.9	16.2	12.9	14.6	16.2
Waist depth	17.2	0.4	1.0	15.3	18.7	15.3	17.3	18.7
Elbow Rest Height (sitting)	17.9	0.4	1.6	14.9	21.7	15.0	17.6	21.7
Hip Breadth(sitting)	35.9	0.8	3.6	28.5	43.2	28.5	36.2	43.1
Elbow-To-Elbow Breadth	31.4	1.3	5.8	22.4	44.5	22.5	31.3	44.3
Body Weight(kg)	66.7	2.1	9.6	50.0	88.0	50.2	67.0	87.6
Waist Circumference	77.3	1.5	6.6	65.2	91.4	65.3	78.1	91.1
Waist breadth	22.8	0.2	0.5	21.9	23.6	21.9	22.9	23.6

Table 2 :Anthropometric Data of Nigerian Female Polytechnic Students

Body dimension	Mean	Std.Error of Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						5 th	50 th	95 th
Standing height (Stature)	157	8.2	23.3	128	185	128.0	150.8	185
Eye height (standing)	150.8	5.3	15.1	117	164.4	117.0	153.5	164.4
Eye height (Sitting)	72.4	2.5	7.2	58.7	78.3	58.7	76.2	78.3
Overhead Reach	208	3.5	15.8	160.2	226.3	161.7	210.1	226.2
Sitting Height	83.4	1.1	4.8	64.4	87.6	65.1	84.8	87.5
Buttock Popliteal Length (sitting)	49.8	1.2	5.2	40.6	58.4	40.7	49.3	58.4
Shoulder Height (sitting)	55.6	0.8	3.6	47.3	60.6	47.4	56.7	60.6
Buttock Knee Length (sitting)	48.2	1.3	5.8	35.3	63.5	35.6	47.9	63.2
Popliteal Height (sitting)	45.6	2	9.1	24.8	60.9	25.2	44.8	60.8
Knee height	53.7	1.8	5.1	46.2	58.6	46.2	55.6	58.6
Thigh Clearance	14.8	0.6	1.6	11.7	17.1	11.7	15.0	17.1
Waist depth	16.9	0.4	1.2	14.6	18.0	14.6	17.4	18.0
Elbow Rest Height (sitting)	17.4	0.3	1.2	14.8	19.5	14.8	17.5	19.5
Hip Breadth (sitting)	38.4	0.7	3.1	30.2	43.2	30.4	39.1	43.2
Elbow-To-Elbow Breadth	33.8	2.3	10.2	25.0	53.3	25.0	27.9	53.2
Body Weight(kg)	62.7	1.6	7.4	53.0	75.0	53.1	64.5	74.9
Waist Circumference	80.1	2.4	10.5	60.9	96.8	61.0	81.8	96.8
Waist breadth	21.9	0.4	1.3	20.5	24.1	20.5	21.8	24.1

The Tables highlighted descriptive analysis of anthropometric measurements which include the mean, standard deviation, standard error of mean, minimum, maximum, 5th, 50th and 95th percentiles for male and female of the two subjects. The data obtained can be used to determine the proportion of the population or genders who fall within a specific range of value for a given body dimension. These values may also be used for comparison with those published for other ethnic groups.

Table 3 shows the anthropometric mean dimensions and the comparison of them between the two genders at P< 0.05 significant. The T-test results indicate that there are three (3) mean dimensions which are significantly different (P<0.05) between the males and females counterpart. The significant differences were observed in hip breadth (sitting), elbow to elbow breadth and waist breadth.

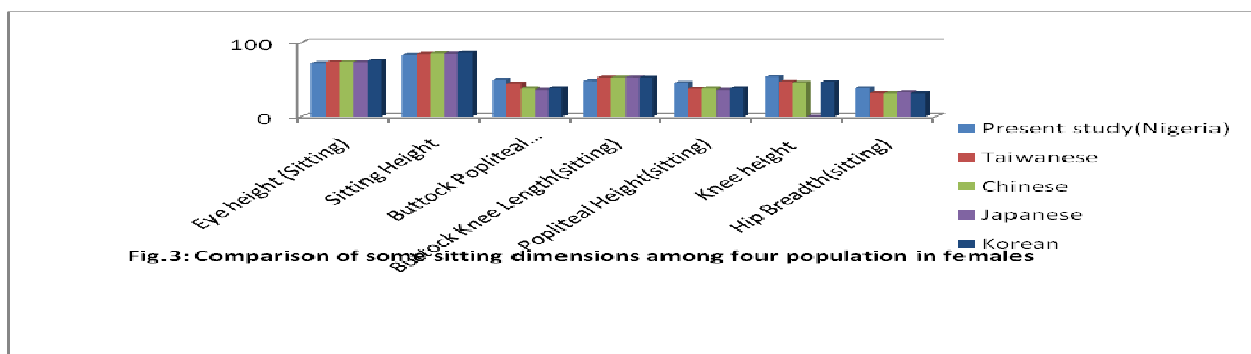
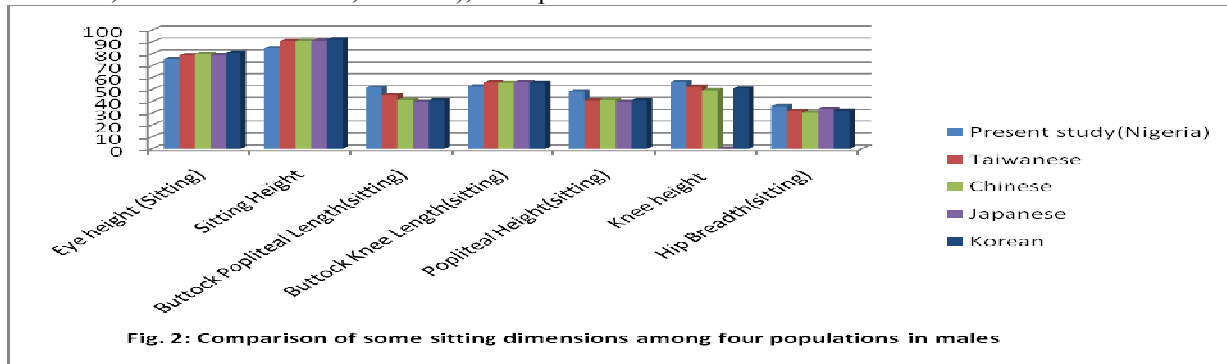
Table 3: T-Test analysis of Male and Female Anthropometric Data of Nigerian Polytechnic Students

Body Dimensions	Mean Male	Mean Female	N	Tcal	Df	Sig. (2-tailed)	Decision p< 0.05
Standing Height(stature)	167.3	157.0	600	0.840	599	0.42	NS
Eye Height(standing)	157.2	150.8	600	0.670	599	0.524	NS
Eye Height(sitting)	75.5	72.4	600	0.841	599	0.428	NS
Overhead Reach	210.3	208.0	600	0.371	599	0.715	NS
Sitting Height	84.8	83.4	600	1.379	599	0.184	NS
Buttock Popliteal Length(sitting)	51.7	49.8	600	0.829	599	0.417	NS
Shoulder Height(sitting)	53.2	55.6	600	-1.459	599	0.161	NS
Buttock Knee Length(sitting)	52.5	48.2	600	-1.864	599	0.078	NS
Popliteal Height(sitting)	48.2	45.6	600	1.493	599	0.152	NS
Knee Height(sitting)	56.2	53.8	600	0.939	599	0.379	NS
Thigh Clearance(sitting)	14.5	14.8	600	-0.577	599	0.582	NS
Waist Depth	17.2	16.9	600	0.474	599	0.650	NS
Elbow Rest Height(sitting)	17.9	17.4	600	0.904	599	0.377	NS
Hip Breadth(sitting)	35.9	38.4	600	-2.305	599	0.033	S
Elbow-To-Elbow Breadth	31.4	33.8	600	-16.172	599	0.0	S
Body Weight(kg)	66.7	62.7	600	1.344	599	0.195	NS
Waist Circumference	77.3	80.1	600	-0.865	599	0.398	NS
Waist Breadth	21.8	22.8	600	2.517	599	0.040	S

S and NS means Significant and Not significant respectively.

The female students have larger mean values in these three dimensions mentioned above except in the remaining dimensions (Table 3). These suggest that mean breadths characteristics between the two genders are dissimilar. Therefore, there is likelihood of experiencing discomfort due to mismatch if the same machine, facilities or fittings are designed to be used by the two genders without using the breadth dimension gotten for each of them. We compared the results of our study with the results of four (4) other populations from Taiwanese (Wang et al., 1999, 2001), Chinese (China Standards, GB/T10000-1988, 1988), Japanese

(Research Institute of Human Engineering for quality life, 1994) and Korean (Lee, 2000). Figs. 2 and 3 compare some sitting dimensions (Eye height sitting, sitting height, buttock popliteal length sitting, popliteal height sitting, knee height sitting, hip breadth sitting) between two genders, and Figs 4 and 5 compare some standing dimensions (standing height (stature), Eye height standing and body weight between two genders. In comparison with other countries we found some differences between the dimensions of our study and people in other countries.



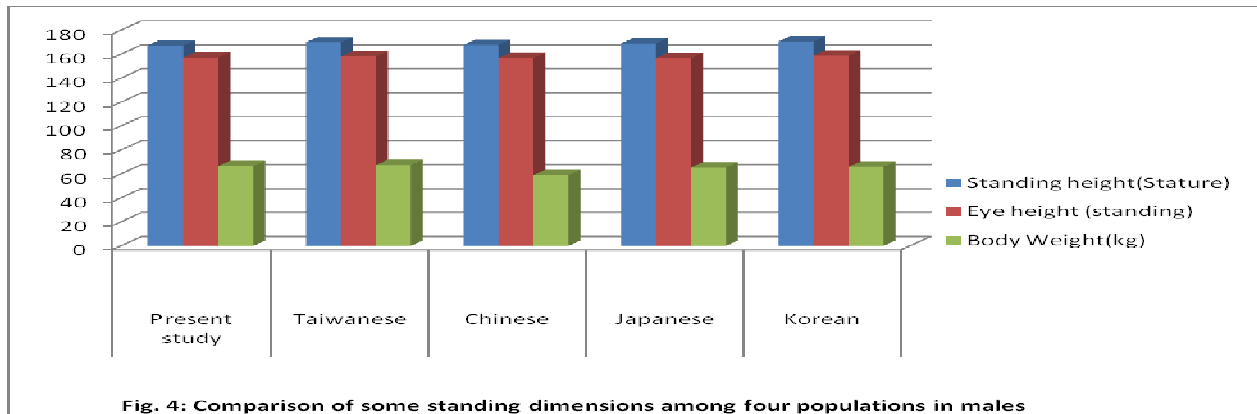


Fig. 4: Comparison of some standing dimensions among four populations in males

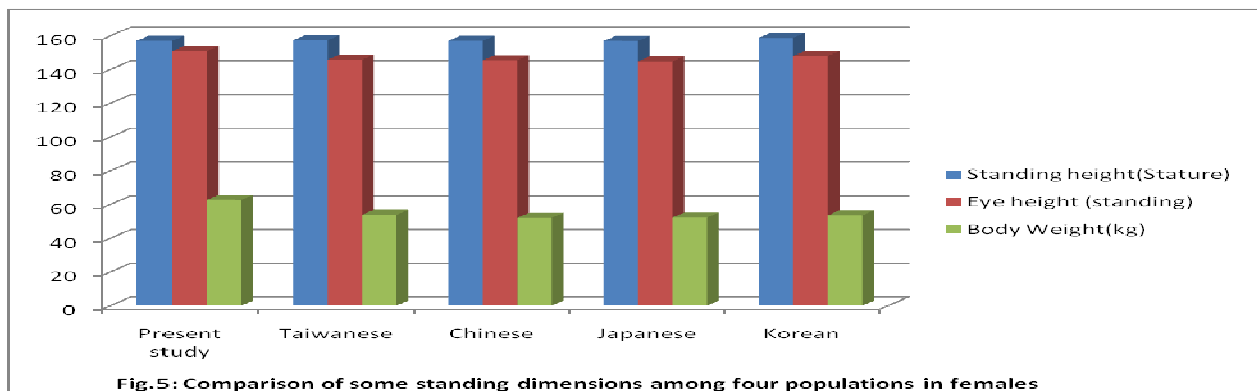


Fig.5: Comparison of some standing dimensions among four populations in females

Our data was most similar to the four populations in standing height (stature), and eye height standing with differences in body weight, buttock popliteal length sitting, popliteal height sitting, knee height sitting and hip breadth sitting where the Nigeria (present study) were significantly highest among other four populations for both genders. Furthermore, the results of the comparison also indicated that the present study recorded lowest mean dimensions in eye height sitting, sitting height and buttock knee length sitting among other populations for both genders. These results suggest that there are various body dimension differences among ethnic populations of the world. Therefore, the principles of ergonomics and anthropometrics should become a necessity when it involves the designing of products and workplaces (Hanson et al., 2009; Klamklaya et al., 2008; Wichansky, 2000; Pentikis et al., 2002) for this type of population.

CONCLUSION AND RECOMMENDATIONS

The study presented descriptive analysis of anthropometric measurements of male and female of some Nigerian polytechnic students that could be used as a guide to determine the proportion of the population or genders who fall within a specific range of value for a given body dimension.

T-test results indicate that there are significant differences ($P < 0.05$) between males and females subjects. Female students have larger mean values in hip breadth sitting, elbow to elbow breadth and waist breadth. These suggest that mean breadths characteristics between the two genders are dissimilar. Therefore, there is likelihood of experiencing discomfort due to mismatch if the same machines, facilities or fittings are designed to be used by both genders without using the breadth dimensions gotten from each gender.

Furthermore, data obtained from the present study was most similar in standing dimensions with differences in weight and sitting dimensions where Nigeria (present study) were partly significantly highest and lowest respectively when compared to other three ethnic populations for both genders. These results indicated dimensional differences among ethnic populations of the world. This calls for the need to consider the principles of ergonomics and anthropometric characteristics of people when designing products, workstations and fittings for their use.

BIOGRAPHY

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OPTION ELECTRICITY MARKET DESIGN UNDER UI MECHANISM IN INDIA

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ABSTRACT

This paper addresses profit risk of a Genco in electricity market, and explores several ways of managing such risks. It focuses on introduction of option contracts in Indian electricity market. The existing unscheduled interchange (UI) mechanism is used to control frequency deviation, thereby maintaining the security of the system in real time. The work applies conceptual option market framework to hedge the profit risk against price fluctuation in Indian spot market from a power generators' prospective. These options instruments are then used to hedge against price fluctuation because of UI mechanism, in order to maximize producers expected utility. The aim here is to find the optimal option prices with the known UI price and forecasted unbalanced real time amount. The model described here considers a fixed number of put options for every time block of a day. Stochastic programming technique is being used to solve the expected profit maximization problem. The effectiveness of this approach is tested for power producers in Indian electricity market. A numerical example of a generating station is being illustrated to show the revenue maximization problem. Further, with known option prices, the paper proposes an optimal allocation problem for option market to hedge against spot price variation. The proposal addresses some of the major issues such as involvement of gaming through over injection by generating stations. This way both Genco and consumer can make benefit of holding option contracts to limit their losses in case of electricity price variation.

KEYWORDS: electricity market, unscedule interchange (ui), option contracts, profit maximization, optimal allocation

INTRODCUTION

The power companies worldwide are undergoing restructuring to pave the way for competitive markets. With the restructured environment both the power producers and consumers are having the options of choosing the competitive market models which will provide greater incentives for short and long term efficiencies and provide better economic regulation. However, developing economies like India, the electricity industry is progressively evolving with major reforms and restructuring to make them cost competitive. The power sector has grown significantly since the enactment of the Electricity Act in 2003 (Acts and Notifications, available online), introduction of Availability Based Tariff (ABT) (Bhusan B., 2005), and establishment of independent regulatory commissions. ABT is one of the key drivers for the generating utilities to operate in a competitive manner.

The deregulation in electricity markets has led to more competitive prices but also higher uncertainties in the future electricity price development. Most markets exhibit high volatilities and occasional price spikes, which results in demand for derivative products to protect the holder against higher prices. Day Ahead market with reference to Indian electricity industry is exposed to risk uncertainty on account of market

clearing price (MCP) and market clearing volume (MCV). The variability of profit of power producers caused by volatility of the electricity price is referred as price risk. Risk factor such as varying electricity and fuel price, variation in UI price, affects the profit of a power producer participating in trading market. The major driving forces for price volatility are load uncertainty, unplanned outage and congestion. Through proper hedging process this risk can be minimized in all or in parts. Therefore the real time balancing is a necessary task for the stable operation of a power system.

With the advent of new competitive environment in electricity industry, the procurement of reserves and the choice of real time market is the fundamental responsibility of system operator. As usual, in power systems, because of load variation, the average value of actual power generation is smaller than the required production capacity. In case of unexpectedly high demand and any failure in generation and transmission lines, there is need of having reserve market. However, the amount of reserve the system required to carry must be based on risk involved and economy decision making. Therefore these reserve markets can be

replaced by price signals provided through value of options for real time balancing.

Since the financial markets of electric power systems differs from traditional financial markets in certain important aspects, pricing and trading in “electricity options” is challenging. Ghosh, et al., 1997, discusses the development of option market in electricity trading. Pflug et al., 2009, considers the pricing of electricity swing options that hedge the electricity price risk and also partly the risks in the option owner’s load pattern. Also Hjalmarsson. E., 2003 tries to use Black and Scholes formulation for electricity option pricing. Given that many of the existing options on electricity contracts are, in fact, options on electricity forwards rather than on the actual spot price, this involves modelling both electricity spot and forward prices (Hjalmarsson. E., 2003). In (Rashidinejad, et al., 2000) the option price of spinning reserve is studied using the Black and Scholes formula. Selling electricity through a forward contract at a fixed price to hedge against price spikes in pool market is discussed in (Conejo, et al., 2008). A technique for price-quantity hedging through power options in Colombian spot market is framed in (Gabriel, et al., 2011). Additionally some relevant literatures that study real options in electricity are given in (Denton, et al., 2003). However, no study about a day a-head option model has been proposed in the literature. This is essential for electricity market like India, to avoid gaming with the existing unscheduled interchange mechanism. Also the studies mentioned above consider transaction between demand and supply and none of those were concern about the profit profile of generation companies. Since there is no reliable option pricing methodology available in literature, the most dependable way to analyze option pricing on electricity contracts is to estimate models from the existing underlying assets and, from these, derive the corresponding option prices.

The frequency control functionality of the UI mechanism is explained in (Parida, et al., 2009). Paper Channa, et al., 2010, describes implementation of UI charges in ABT regime to co-ordinate the optimum day a-head declaration. Soonee, et al., 2006, explains techno-economical and socio-political burdens for implementation of various real-time adjustments to price real time demand. A work on stochastic model for day a-head declaration of power in ABT regime was published in (Vaitheeswaran, et al., 2006). The effect of scarcity, spot volatility and skewness are significant in Indian electricity market, owing to the fact that demand is increasing. These are consistent in propositions on the positive effects of risk aversion. It can be anticipated from existing literature that, the value of generating unit depends on the generating unit’s efficiency and on

market price, which is very uncertain in a restructured power market. The paper has discussed the concept of option to value generation profitability from trading point of view in Indian power market. It aims to examine the conditions of electricity market for establishment of option market along with existing real time market (UI mechanism). The analysis is mainly based on spot price evolution and in the evaluation of equivalent option contract. Thus, can predict replacement of gaming in existing UI mechanism and reflect explicitly the manner of price hedging. The outcomes to some extent can give answers to the following issues:

- a) Is the electricity market functioning of India is compatible with option market.
- b) If the options were introduced, how would present trades appear in value terms.
- c) How to measure the hedging cost of existing UI and proposed option contracts.

Prevailing UI Mechanism

India has opened up a competitive power market in 2003 after the enactment of Electricity Act. With that the sector has experienced participation of private players, mainly in generation and distribution. Aiming at proper scheduling and real time operations, power exchanges are created. Result to this, now there are three major markets exist covering generation, distribution, and retail trading: 1) Day-ahead spot market which determines the efficient dispatch of generating sources considering the offers submitted by loads a day ahead of actual dispatch: 2) Bilateral market with a long trajectory covering contracts of more than a year: 3) Frequency actuated power transaction through UI for real time balancing market.

ABT provides a frequency based incentives/penalties to beneficiaries (e.g., Gencos). It has three part tariff calculation; they are a) capacity charges: payment of fixed charge of the plant, b) energy charges: payment of fuel cost for schedule generation and c) UI charges: payment for deviation from schedule at a rate dependent on system frequency. The UI charge is for supply and consumption of energy in variation from the pre-committed daily schedule. This charge varies inversely with the system frequency prevailing at the time of supply/consumption. All these three components are calculated in 15 min time block for total 96 blocks of a day. UI charges are stochastic in nature as it varies with the change in frequency as shown in fig 1. The price of power from UI follows the ABT rate which is associated with the frequency of the grid.

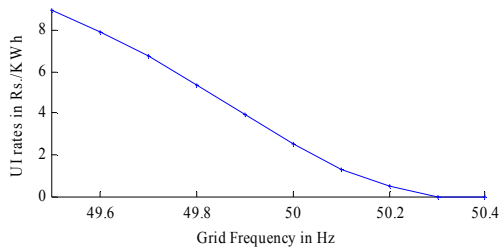


Figure. 1 UI charge variation with respect to grid frequency

As discussed above, the real time adjustment of power reference set is carried out by means of a frequency linked UI price mechanism (M. Lively., 2005). However, the generator droop control is managed under regulatory supervision. This provision is to generate extra in real time scenario to maintain generation and load balance. The real time adjustment of power reference set is carried out by means of a frequency linked unscheduled interchange price mechanism (Rules and regulations, available online). The UI mechanism is quite similar to the price based real time balancing mechanism. Under UI mechanism, all the real time deviations are settled according to a predefined price curve. The UI price is monotonically decreasing function of system frequency. That is, higher the frequency lower is the price. This in turn provides incentive to the generator to increase power generation when the system frequency is lower and for decreasing power injections when the frequency is rising. The ability to make load and generating entities to participate in real time balancing is one of the key features of the UI mechanism. However the purpose of UI mechanism is to tighten the frequency band of the system to increase reliability. Recent studies shows involvement of gaming through over injection by generating stations in excess of 105% generator's declared capacity with an intention to make profit under UI mechanism. This 5% increment from declared capacity depends on generator droop characteristics. The production level adjustment through droop control is known as regulation service. The regulation services are procured through energy-reserve co-optimization in the day-ahead or real time market (Wu T., et al., 2004) (Zheng T., et al., 2006).

According to the recent findings on Indian power market, the UI mechanism faces lack of liquidity affecting the reliability of the system both from technical and economic aspects. No consideration is made in the UI pricing for system congestion i.e., because of excess demand in real time. Therefore, in real time there can be overloading in the lines. This can

be one possible reason for the recent black out in India. To avoid such a situation, the UI mechanism should be complemented with some other financial instruments like options.

Also Cramton P., et al, 1998, in 'A Review of ISO New England's Proposed Market Rules' say, "*Reliance on penalties is highly inefficient and problematic in its workings and is unworkable on a sustained basis in a civilized and competitive market. The whole idea of relying on administered penalties is inefficient, subject to disputes and subject to continual pressure to seek modifications and exceptions. Non-compliance can also be justified by claiming an operating problem, etc.*" Therefore the concept of option market design is being proposed in this work. This could help in straightening up the prevailing spot price signal in India.

UI As An Option Contract: Model

For a Genco in spot market, the extra power generated would be such that it will maximize the profit in the prevailing option price. With UI mechanism being commercially gambled, the idea of making UI as an option service can be modeled with two type of market; balancing energy market (UI mechanism) and reserve capacity market (Option contracts). The aim here is to analyze alternative design options for these balancing markets. A theoretical model can be developed linking the above two markets.

Nowadays there is no future market for electricity in India. However, if for analytical purposes option prices must be evaluated, then some future prices or some kind of adjustment on the spot prices should be estimated. The method applied in this paper was the introduction of the adjustment of spot prices at the beginning. As the option market aims at replacing the UI mechanism, so design of a day-ahead option is proposed here. Fig.1 gives a timeline diagram for the proposed market model.

The analysis considers a contractual arrangement between a seller and a buyer for trading one unit of electrical energy at some future time. The same unit of energy is being traded both in option and spot market. As per the marginal cost theory the Genco's will get more profit if $\lambda_p > \lambda_{UI}$. Here λ_{UI} refers to the UI price. It would be beneficial if the generator sells from the available options. Figure 3 below explains the theoretical model with choices of both option and UI.

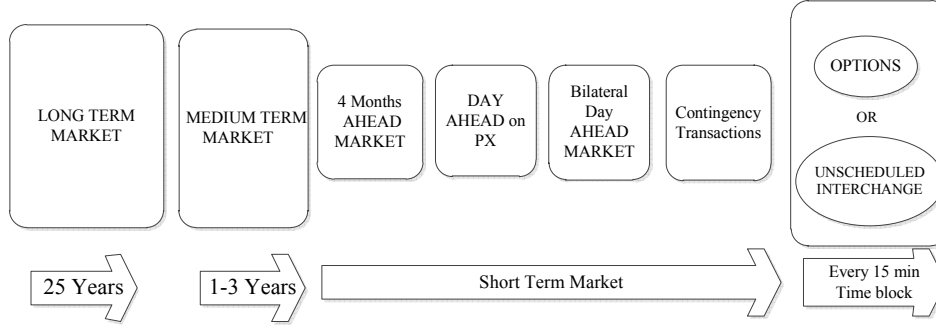


Figure 2. Timeline diagram of proposed option market model

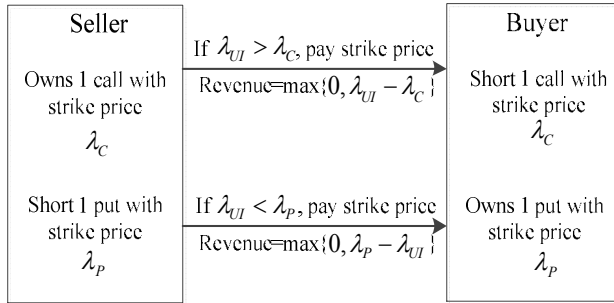


Figure 3. Theoretical model with choices for options and UI

Thus, it is clear from the above model that, a buyer who owns the call option is guaranteed to receive the assigned MW amount from the seller at time T, at a strike price λ_c , when the UI charge turns out to be greater than λ_c . This way it receives a profit of $(\lambda_{UI} - \lambda_c)$. Similarly, when λ_{UI} charges are turned out to be low, the seller exercises the put option and receives a profit of $(\lambda_p - \lambda_{UI})$. Here the author aims only Genco's prospective of participating in option market with objective of maximizing its profit.

To evaluate how a put option is used to hedge against price risk faced by a power producer, consider that generator unit does not fail. Also assume that the realization of high/low pool prices prior to the option exercising time will lead to high/low pool prices during the delivery time. In that case, if electricity prices become high before the expiration time, producer decides not to exercise option so as to sell its production in pool market with higher price. On the other side, falling pool prices between the purchase and the exercising time of the option would encourage the power producer to exercise the put option to sell

$$R_p = \sum_0^t \{ \lambda_s(t) \cdot Q_s(t) + \lambda_{UI}(t) \cdot Q_{UI}(t) \} \quad (1)$$

electricity at a pre-defined strike price. In this way, the

put option allows the power producer to hedge the risk corresponding to high volatility of prices.

The following simplifying assumptions are considered to formulate the stochastic model of option pricing.

- The generating units owned by the power producer are dispatchable thermal units, whose cost is modeled by a piecewise linear function.
- The Genco can sell its production both in pool market, or through option.
- Gencos behave as a price taker and assume to be risk averse. Therefore, it only considers sell of put options.

Problem Formulation

For analyzing profit maximization function of a generator participating in a spot market, the forecasted spot market price is to be known. Therefore, forecasting the spot market prices is the first step to solve the risk constrained problem. Several machine learning methods such as artificial neural networks have been successfully implemented for market price forecasting (Gao, et al., 2000) (Rodriguez, et al., 2004). The work presented here, considers probability distribution of past data.

From the ACP and ACV data collected from Indian Energy Exchange (IEX) for the northern region, the correlation coefficient is estimated to be 0.37 and 0.71 in the year of 2013 and 2014 respectively. This shows a steeply rising value of both load and generation dependency on spot prices. Therefore the author aims to develop an economically convenient model for Genco's to maximize their pay off in the electricity spot market. In the following a detailed procedure is presented.

Calculation of Option Strike Price

Under Indian electricity market regime, the day a-head market is cleared at market clearing price (MCP). Any deviation of real time market from day ahead is awarded through UI mechanism. So the revenue of a generating unit in real time market can be given by the following equation

where, $Q_{UI}(t)$ is the unbalanced real time amount in

MWh. With the aim to develop a stochastic model to maximize Genco's revenue in the option contract framework, the UI term has to be subsidized. Instead, assume a Genco, signs a contract of quantity Q_P and awarded price λ_P in the spot market. Each option contract comes with a premium price. The option premium value (λ_0) is kept constant i.e., Rs.1.5 per option unit. Any deviation of real time market from the day a-head market is awarded in the option market at strike price. Therefore, the revenue of a Gencos unit is

$$TR_p = \sum_0^t \{ \lambda_s(t) \cdot Q_s(t) + \lambda_p(t) \cdot (Q_G(t) - Q_S(t)) \} - \lambda_0 \cdot (Q_G(t) - Q_S(t)) \quad (2)$$

The pricing of the option contract is calculated solving the above objective function for maximizing generator profit, using option price cap as the maximum value of unscheduled interchange rate. Considering all technical and financial risk constraints of day a-head market, Genco's profit can be formulated as

$$\pi = TR - TC \quad (3)$$

By taking the operating cost into account, the expected profit thus is calculated as

$$E\pi_G = \left[\sum_0^t \lambda_s(t) \cdot Q_s(t) + \lambda_p(t) \cdot (Q_G(t) - Q_S(t)) \right] - \lambda_0 \cdot (Q_G) - C_i(Q_{g,sh}) - C_i(Q_{g,sh} + \Delta Q_g) \quad (4)$$

Subjected to following constraints

1) Generation level constraint

$$Q_G^{\min} \leq Q_G \leq Q_G^{\max} \quad (5a)$$

2) Option contract limit constraint

$$\lambda_{UI}^{\min} \leq \lambda_P \leq \lambda_{UI}^{\max} \quad (5b)$$

3) Power balance constraint

$$Q_G = Q_S + Q_P \quad (5c)$$

So option price cap will be the highest value of UI price for that corresponding time block. This value can be calculated taking probability distribution of past UI data for each time block.

With the stiffed regulatory and financial bounds in Indian electricity market, it's difficult to replace the prevailing UI mechanism altogether with the option market. A comparative analysis between option and UI can be made, with increasing market transparency. Thus, the option market will operate in the shadow of UI mechanism. Therefore, from the prospective of profit maximization, a Genco has choices of selling power either in option or through UI, whichever has maximum value. Thus payoff for each time block can be calculated as per the following equation,

$$TR = \sum_0^t \max \{ \lambda_p(t), \lambda_{UI}(t) \} \cdot Q_p + \lambda_s(t) \cdot Q_s(t) - \lambda_0 \cdot Q_p - C_i(Q_g) - C_i(Q_g + \Delta Q_g) \quad (6)$$

Subject to constraint (5a)-(5c)

Option Allocation Problem With Risk Mitigation

With option contract, the uncertain spot prices in real time can be considered as stochastic time variables $\lambda_p(t)$. After getting the optimal value of option prices, now the Genco has to determine the optimal hedging position of the option contract and best amount of generation asset to bid in the option market. It can be formulated as a minimization of mean variance function. For the purpose of this study, r value has been set within [0.1-0.5].

$$\min_{Q_C(t)} r\sigma(\pi) - (1-r)\varepsilon(\pi) \quad (7)$$

From (4) and (7)

$$\begin{aligned} \min_{Q_C(t)} r\sigma(\pi) - (1-r)\varepsilon(\pi) \\ = r \left\{ \sum_{ref} Q_p(t)^2 \sigma[\lambda_p(t)] + \sum_{ref} Q_s(t)^2 \sigma[\lambda_s(t)] \right\} \\ - (1-r) \left\{ \sum_{ref} Q_s(t) \sigma[\lambda_s(t)] + \varepsilon[\lambda_p(t)] \cdot (Q_p(t) - C_i(Q_g) - C_i(Q_g + \Delta Q_g)) \right\} \end{aligned} \quad (8)$$

Subject to (5a)-(5c)

Numerical Test Results

Here, the application of the methodology described in the prior section is performed with the available information of the Indian power market from January 2014 to October 2014. Block wise spot prices are analysed. It is being observed that, on peak periods are hour 12, 13, 14, 15 and off peak periods are remaining hours. Corresponding UI price profiles are drawn. Using Anderson-darling goodness of fit tests, the log normal probability distribution plot is drawn over the UI price values on a monthly basis, expecting to implement options in the market. Table 1 below present values of pdf corresponds to maximum and minimum UI value occurrence over a period of 60 days.

Thus, the sample follows a normal distribution profile with a mean & standard deviation of 811.9017 and 50.5719 for maximum values of UI and 10.2025 and 41.5767 for minimum values of UI. The work considers the min and max values of UI with the corresponding pdf values as lower and upper limit for expected option price calculation. Figure 4 below shows pdf values following a normal distribution of UI over the month of September 2014.

Table 1. PDF values of UI prices

UI_max (Paise/kWh)	pdf	UI_min (Paise/kWh)	pdf
428.08	2.448E-15	0	0.009311
636.48	1.92E-05	35.6	0.007962
678.16	0.000239	106.8	.000646
719.84	0.001505	178	2.79E-06
761.52	0.004803	303.04	1.62E-13

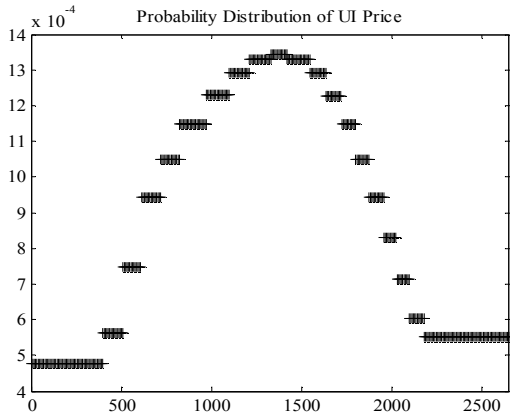


Figure 4. Probability distribution plot of UI prices over the month of study.

The aim here is to illustrate how put options can reduce the price risk faced by a Genco. In order to highlight the major features of an option as a mechanism to hedge against price risk, consider the following two cases.

The producer does not sell electricity through UI mechanism during the period of transaction, in which the pool price happens to be lower than its marginal cost for the extra production.

The Genco will have the choice of selling imbalanced power, either in option or through UI, whichever have higher value.

According to historical information, it is expected that the UI price here follows a log-normal pdf with $\log UI \sim N(427.95, 297.12^2)$. All the price components are in paise/kWh. General result of obtained strike prices are presented in Figure 5 below.

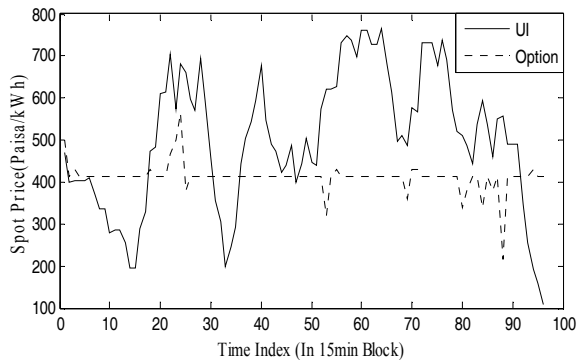


Figure 5. Option (strike price) and UI price.

It can be seen that, with option prices a hedging profiles for peak and off peak hours are being incurred. Thus helping in suppressing effects of market gaming. It can be observe from Figure 6 below that, Genco's profit are reducing with options as compared to UI, this is because that with increasing UI price, the possibility to exercise the put option will be relatively large, which makes the

put option contract price act more like a real time market price. This effect becomes more obvious when the put option volume increases. However, with both UI and option, from profit maximization prospective, Genco will bid with the highest available price bid. So Profit will have an increasing trend as shown below.

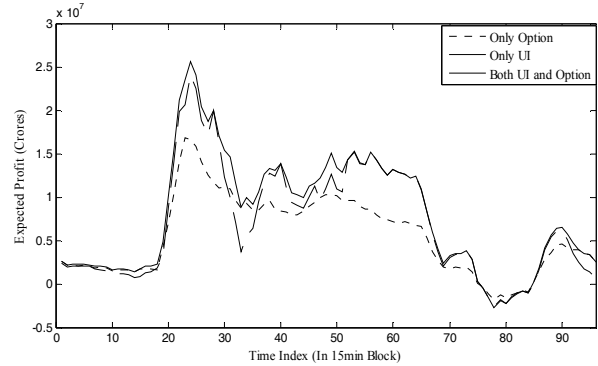


Figure 6. Comparison of profit profiles of Genco.

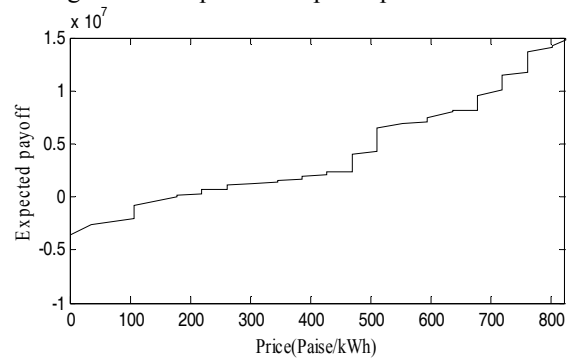


Figure 7. Expected payoff functions of UI.

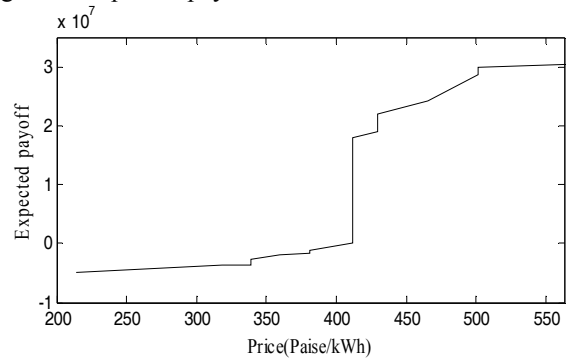


Figure 8. Expected payoff functions of Option

Figure 7 illustrates the expected payoff function for UI as a real time market pricing. Similar way Figure 8 illustrates the expected payoff for option prices. Considering 1000 scenarios of Monte Carlo simulations the profit distributions are plotted for before and after price hedging cases. It can be observed from Figure 9(a) and 9(b) that, for Gencos; the profit's mean slightly rises when following the price hedging strategy thus satisfying the objective taken.

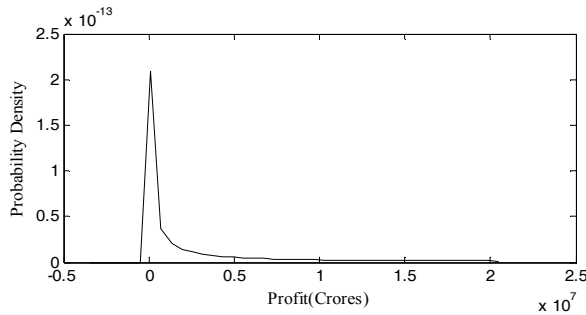


Figure 9(a). Profit distribution before hedging

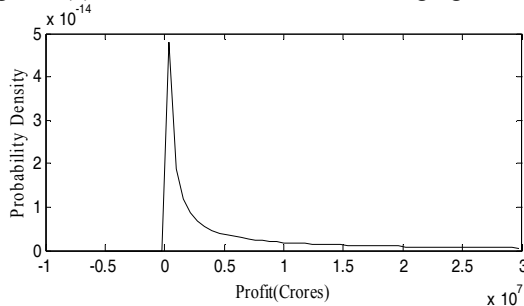


Figure 9(b). Profit distribution after hedging.

Here, taking the assumption that total generation (P) = total load (Q), the expected values of profit are not the optimal values since the premium of the options are not properly estimated (For this study, it is considered as fixed value for each time block) to accurately match the payoffs. This mismatch is positive in case of producers and negative in case of retailers.

Impact of Risk Factor

By solving the mean variance minimization problem in (8), the spot market allocation for option contract is solved. Figure 10 illustrates the amount with different risk factor and contract prices. It can be seen that, to reduce UI price risk, the Genco will allocate more capacity in option market with larger risk factor.

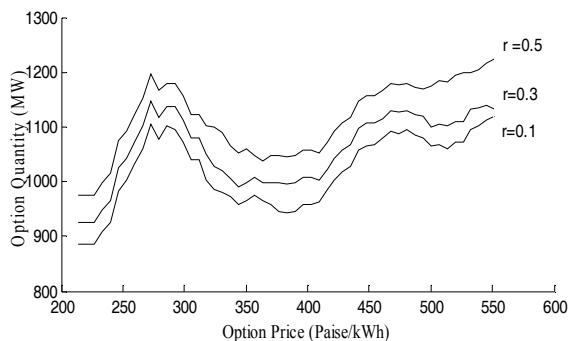


Figure 10. Option allocation with Risk involved

Four major results are highlighted from the above analysis: 1) the solution of the profit maximization process proposed here gives an excellent hedging opportunity for profit making Genco's to bid in option market to increase

system reliability. This is because it avoids Genco to game in UI, at the time of heavy demand to gain more profit. 2) It is important to note that with high correlation between spot prices with day by day increasing load in Indian market, the price risk is very high. This method provides a better price hedging strategy and gives better results of expected profit. However, the study relating to Load entities can be achieved in the similar way and proper implementing strategy can be developed. 3) With the narrowed frequency band from 49.2-50.3 Hz to 49.7-50.2 Hz, the volume of UI consumption is being reduced over the last five years. So the proposed option market can be operated with the aim to setting up a balancing market. 4) As expected, to reduce UI price risk, the power producers allocate more volume in option market with more risk.

CONCLUSION

The paper developed a practical application framework of option market design in India. An optimization procedure is proposed to find expected value of options' strike price to be offered in the day a-head market by a Genco. The theoretical frame work is tested with the real data from Indian power market. The analysis suggested block wise option price calculation with the aim to replace existing UI mechanism. By trading in option contracts could be helpful in straitening of a better forward/future price signals. However, it would be necessary to be aware that, a financial market could or couldn't be succeed depending upon various other factors of pool model, such as proper timeline design, presence of different market index etc. Certainly, the proposed model can suppress the spot price volatility to some extent and mitigate market power situations. The allocation model is proposed based on calculated option prices using mean variance risk. The proposed methodology, to some extent could answer the issues discussed in section 2 of the paper.

One limitation of this approach is that, it doesn't consider LSEs portfolio thereby lacking market liquidity. To achieve a new electricity derivative market in India, it is necessary to consider LSEs portfolios and analyse the practical aspects of implementing the financial put and call options. It would also necessary to develop a proper valuation methodology to price this kind of options underlying on the spot price.

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BIOGRAPHIES

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PRODUCTION ENGINEERING FOR ARCHITECTURAL APPLICATIONS OF ALUMINIUM MATERIALS IN BUILDINGS: THE CASE OF FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE, NIGERIA

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ABSTRACT

Production engineers play a major role in architectural applications, for no structure can be erected without making use of one or more materials produced by them. Architecture started developing with the construction of vernacular buildings in some centuries back, up to the present time where there are so many modern buildings seen in different forms and shapes. The materials used in the construction ranged from the use of clay, stone, wood, and so on, in the olden days, to so many varieties of materials seen nowadays. When carrying out this research, it was noticed that people are facing a lot of problems when it comes to the selection of materials for their buildings. In this research, some buildings were examined and noticed that, their window frames, roofs and the doors were being attacked by termites, corrosion and so on. It was clearly shown that aluminium materials have been used in some buildings with a better future because of their advanced characteristics, termite can not attack it, and they can be seen in different forms, (plain or alloy), treated in different way. The Federal University of Technology Akure campus was chosen as a case study. It was discovered that aluminium materials are being used more than any other materials nowadays, and based on the information gathered from the people through the questionnaires and interviews given to them, it can be concluded that aluminium is a prefer materials for buildings materials for windows frames, and so on, to other materials of the same categories, despite the fact the cost of purchasing is higher than other materials.

KEYWORDS: production engineering, architectural application, aluminium, structure, Akure.

INTRODUCTION

Production involves the creation of goods and services for man's consumption. To predict the future, one must apprehend the present, and of course one can only master the present if one is quite intimate with the past up to the point of projecting it into the present. Production management seeks to make production system works smoothly, effectively and abundantly and indeed efficiently. The institution of production engineers defines a production engineer as "one who is competent by reason of education, training and experience in technology and management to determine the factors involved in the manufacture of commodities, and to direct the production processes to achieve the most efficient coordination of effort with due consideration to quality, quantity and cost." The commodities under examination in this study are used in architectural applications.

However, architecture can be defined as "the art and science of designing buildings and structures." A wider

definition often includes the design of the total built environment: from the macro-level of building and urban design as well as landscape architecture to the micro-level of construction details and furniture. Architectural design involves the manipulation of mass, space, volume, texture, light, shadow, materials, programme, and other elements in order to achieve an end which is aesthetic as well as functional. This distinguishes architecture from applied science of engineering, which usually concentrates on the structural and feasibility aspect of design.

Architectural works are perceived as cultural and political symbols and work of art. Historical civilizations are often known primarily through their architectural achievements. Such buildings as the pyramids of Egypt and the Roman colosseum are cultural symbols and are important link in public consciousness, even when scholars have discovered much about a past civilization through other means.

Cities, regions and cultures continue to identify themselves with and are known by their architectural monuments. All the progresses seen in the architectural industry of today can be highlighted through the effort of production engineers. (Giwa,2003).

The aim of this research is to evaluate and determine the best architectural materials to be used for making the doors, window frames and the roof in building construction.

The specific objectives of the project are to:

1. determine the use of aluminium materials as the modern and latest materials for architectural applications.
2. highlight the problems encounter with some building materials with suggestable remedies. point out some flaws seen in architectural applications, as a result of the use of substandard materials.
3. enumerate the roles of production engineers in architectural designs and subsequent inclusion in the process.

Production engineers play a major role in architectural applications. According to Alberti (1485), the architect is concerned firstly with construction, which encompasses all the practical matters of site, materials and their limitations as well as that of human capability. The second concern is “articulation”, in which the building must work and suit the needs of those who use it. Also the third concern of the architect is “aesthetics” both of proportion and of ornament. Considering the first role which is primarily based on materials, this is the role which has to be supported properly by production engineers. If the materials used in the course of the construction are not of standard, we won't be talking about the second and the third roles.

The role of the architect, although constantly evolving, has been central to the design and implementation of the environments in which people live. Architects must have the skills and knowledge to design, plan and oversee a diverse range of projects, from a small residence to a large stadium.

The work of an architect is an interdisciplinary field, drawing upon mathematics, science, art, technology, social sciences, politics and history, and often governed by the architect's personal approach or philosophy. Vitruvius, the earliest known architectural theorist, states : *“Architecture is a science, arising out of many other sciences, and adorned with much and varied learning: by the help of which a judgement is formed of those works which are the result of other arts.”* He adds that an architect should be well versed in other fields of learning.

METHODOLOGY

Based on the latest development in technology, the information and the materials used in the course of this project are got from the internet, library, books on architecture, interviews, documentaries e.t.c. Careful observation was made on some structures, most importantly, buildings in Obanla campus, F.U.T.A, where some materials used in the course of the constructions are given special consideration. Also, some of the materials used in the construction of the buildings were examined to know their strength and other characteristics. This led to the suggestion of better materials used in the construction. But more emphasis is given to aluminium materials for roofing sheet, doors, frames, e.t.c

MATERIALS USED IN ARCHITECTURE

The materials used in architectural constructions are numerous, they can be; Aluminium,Iron, Steel, Gold, Silver, Nickel, Tin, Copper, Lead, Zinc, Asbestos, Asphalts, Brick, Clay, Concrete, e.t.c. Due to the numerous number of these materials, only Aluminium will be discussed.

PRODUCTION ENGINEERING IN ARCHITECTURE

A production engineer is the one who is competent by reason of education,training and experience in technology and management, to determine the factors involved in the manufacture of commodities, and to direct the production processes to achieve the most efficient coordination of effort with due consideration to quality, quantity and cost.

Production engineering encompasses all area of life. There is no place you can go without seeing one or more materials produced by production engineers. Items like metals, machines, equipment, kitchen utensils, chair, e.t.c, are all produced by them. In addition, production engineers contribute immensely towards the success of architecture, for they produced all the equipment used in their constructions (from the foundation level to the roof). Apart from this, the materials used in the construction, e.g, roofing sheets (galvanized iron, aluminium, e.t.c), doors, ceramics and so on, are all the products of production engineers.

However , without the assistance of production engineers in architecture, the success of the later would have been minimal.

MATERIAL AND METHODS

Based on the latest development in technology, the information and the materials used in the course of this project are got from the internet, library, books on architecture, interviews, documentaries e.t.c. Careful observation was made on some structures, most importantly, buildings in Obanla campus, Federal

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SOURCES OF INFORMATION

The information gathered in this project are got from interviews, documentaries, journals, seminar report books and so on. In the interviews conducted most especially from architecture department, we realized that there are so many materials used in architecture. The materials can be; Aluminium, Iron, Concrete, Ceramics, Copper, Gold, Bricks, Clay, Asphalts, Asbestos e.t.c. The information gathered on each material are numerous, that aluminium materials only is chosen. During the interviews, we discovered that aluminium materials are preferred to other materials in the construction of roofing sheets, window frames and doors. This due to its strength per weight ratio, resistance to corrosion and ease of fabrication. However, some journals and documentaries were seen on aluminium materials, which encompassed its existence, historical antecedents, extraction and methods involved in its production, classifications and treatments involved, e.t.c.

Also, a seminar report book on building materials which was done by the Nigerian Institute of Architects was given during one of the interviews conducted in the department (Architecture department). In the book, many materials were discussed in relative to their applications in the construction industries.

METHOD OF GATHERING DATA

In gathering the data discussed in 3.1, a selection of buildings was done, using Obanla campus in F.U.T.A as a case study. After this, a surveillance was done round the campus, while the spot assessment evaluation of each building was done. Also, a questionnaire to ask the users' view about the material was developed with careful observations to the performance.

F.U.T.A is used as a case study because of the different types of modern buildings constructed there. It is observed that the buildings were made with different materials, but more aluminium materials were used in the recent buildings. This is due to the fact that people preferred using aluminium materials nowadays because of the advantages it has over the other materials. However, an assessment evaluation was done on sixteen buildings on the campus. The buildings are: Continuing

Education Centre block, C.E.C Multipurpose hall, Bookshop, School of Environmental, Library, Engineering Workshop, Computer Resource Centre, School of science, Small Lecture Theatre, Big Lecture Theatre, E.T.F Lecture Theatre, School of Agriculture, School of Mineral and Earth Science, School of Environmental Science and then, Senate building.

In addition, a questionnaire was developed to answer the questions on: the material used in roofing the buildings, the materials used in making the doors and windows. Also the questionnaire asked about the materials preferred in making the roofing sheets, doors and the windows. Then the reason why the materials are preferred is also asked.

In the assessment of the buildings, only the materials produced by production engineers, which are used in the construction of the buildings are discussed. This does not touch the materials bought into the buildings together with other attachments. Therefore, the areas where aluminium materials were seen in all the sixteen buildings examined are in the construction of roofing sheet, frames, windows and doors.

RESULTS AND DISCUSSION

As already discussed in chapter three of this study, the result of the information gathered can be analyzed in two ways. First, based on the data gathered on the aluminium materials as they are used in building constructions inside the campus, and the second is based on the questionnaires prepared for the people using the buildings.

The Result of Spot Assessment on Sixteen Buildings Selected

This can be analyzed properly in table 1 below

In the Table 1 above, it is observed that the management of the school prefer using aluminium materials more than any other materials. It can be seen clearly in the table that less aluminium materials were used in the old buildings like School of Engineering and Engineering Technology, School of Agriculture and Agricultural Technology, School of Sciences e.t.c. While we can see more of aluminium materials in the new structures like School of Mines and

Earth sciences, School of Environmental Technology, Engineering Workshop, e.t.c. This shows that the latest technology is tending towards the use of more aluminium materials in the construction of buildings, because of its advanced characteristics.

Table 2: Result of the questionnaires prepared for 30 people in FUTA

BUILDING	WINDOW FRAMES	DOOR	ROOF
Centre for Continuing Education Block	82 (Aluminium)	1 (aluminium) 21 (wood)	Concrete
Centre for Continuing Education Multipurpose hall	42 (Aluminium)	8 (Iron)	Aluminium
Bookshop	20 (Aluminium)	3 (Aluminium)	Aluminium
School of Environmental Technology	150 (Aluminium)	62(Wood) 10(Iron)	Aluminium
Library	151 (Aluminium)	10 (Aluminium)	Concrete
Engineering workshop	122 (Aluminium)	42 (Wood)	Aluminium
Computer Resource centre	42 (Aluminium)	12 (wood)	Aluminium
School of Sciences	148 (Wood) 15 (Iron)	72 (Wood)	Concrete
Small Lecture theatre	12 (Aluminium)	3 (Aluminium Frames)	Concrete
Big Lecture theatre	12 (Aluminium)	4 (Aluminium Frames)	Concrete
750 capacity Education Trust Fund Lecture Theatre	28 (Aluminium)	4 (Aluminium Frames)	Concrete
School of Agriculture and Agricultural Technology	108 (wood) 40 (Iron)	70 (Wood)	Concrete
School of Mines and Earth Science office	60 (Aluminium)	Wood	Aluminium
School of Mines and Earth Sciences	84 (Aluminium)	70 (Wood)	Aluminium
Administration block	150 (Aluminium)	Wood	Concrete
School of Engineering and Engineering Technology	10 (Iron Frames) 158 (wood)	105 (Wood)	Concrete

Source: Author's development, 2007

As it is seen in the table 2 above, twenty two people preferred aluminium material in making the roof out of thirty people consulted. Ten people preferred aluminium material in door making, fifteen people in window frames, e.t.c. We can also see here that more people selected aluminium material in all the three questions, although, only ten people selected

aluminium material in the case of the door. In all people preferred using more of aluminium materials because of their beauty, strength, longevity, fire resistance and so on.

The Present Conditions of the Buildings

This can be explained in table 3 below

Table 3: The present conditions of the buildings

Buildings	Present conditions
Centre for continuing Education block	Good condition
Centre for continuing Education Multipurpose hall	Good condition
Bookshop	Good condition
School of environmental Technology	Good condition
Library	Good condition
Engineering workshop	Good condition
Computer Resource Centre	Good condition
School of Sciences	The iron frames have been corroded, few termites invaded wooden frames.
Small Lecture Theatre	Good condition
Big Lecture Theatre	Good condition
750 capacity Education Trust Fund Lecture Theatre	Good condition
School of Agriculture and Agricultural Technology	Corroded iron frames, few termites invaded wooden frames, green pigments on the roof
School of Earth and Mineral sciences office	Good condition
School of Earth and Mineral sciences	Good condition
Administration block	Good condition
School of Engineering and Engineering Technology	Green pigments on the roof, few termites invaded wooden frames, corroded iron frames

Source: Author's development, 2007

DISCUSSION OF THE RESULTS

As it can be seen in all the results, the areas where production engineers were involved in architectural applications were discussed, particularly where aluminium materials are being used. Production is involved in all the areas of life, even in the construction of buildings. Items like cement, furniture materials, blocks and other materials/ accessories, which are products of production engineers, were excluded in this study to give room for more focus on aluminium materials. The picture of each building is produced to see clearly the areas of discussion and the mode of their construction.

Meanwhile, as it is seen in the pictures and in the tables prepared, each of the buildings is constructed with different materials (in the roof, door and window). But more of aluminium materials are being used in the recent buildings like the school library, engineering central workshop, school of environmental technology, e.t.c (Fig 1-7, 12 and so on). This is a clear improvement on the old buildings like the school of engineering and engineering technology, school of agriculture and agricultural technology, school of sciences, e.t.c (Fig 2, 10, 15 and so on). All this and other information can be seen in Table 1. In Table 2,

peoples' opinions about the materials used in the construction of the buildings were recorded and many people preferred the use of aluminium materials because of their beauty, strength, resistance to corrosion and so on. However, the present conditions of the buildings were also examined in Table 3, in the area of the roof, door and the window. It is seen that all the buildings with aluminium roofing sheet, window frames and doors are in good conditions, as it is seen in Education Trust Fund building (Fig 17), while some buildings constructed with iron framed windows and wood are being attacked by corrosion and termites (Fig 17 and 19). This is observed at the school of engineering and engineering technology and also at the school of sciences. This invariably is an indication that the sustainability of other materials used in the buildings such as where wooden frames are utilized is quite low compared to the ones in which aluminium has been used making aluminium a more sustainable material compared to others especially in this region and climate

CONCLUSION

In recent years, aluminium materials have been embraced tremendously by production engineers for construction purposes. This is due to its strength per weight ratio, lightness, resistance to corrosion, sustainability and other characteristics. Meanwhile, research has shown within many sectors in Africa that production engineers together with architects are far from utilizing their potential in terms of inculcating the habit of using aluminium materials in building constructions. Although, there has been little effort by production engineers to incorporate a more effective approach into the design and fabrication of aluminium materials in building industries, particularly at this time that government is undertaken a major economic restructuring exercise, the best is yet to be achieved. This is due to the fact that production engineers were not included in the construction of some buildings, in which there are so many misuses of materials seen, even in aluminium. For instance, when plain aluminium roofing sheets are being used for roofing, people living in the house were always seen complaining of heat. This is due to the fact that the roofing sheets were not coated with the paint that reflects sun rays, for it is observed that plain aluminium materials conduct heat faster than other materials (including iron). Also, due to the lightness of aluminium roofing sheet, it should be used in a way that heavy wind or rainstorm will not remove it. All these involved the collaboration of both the architect and the production engineer producing it.

However, taken a major survey at F.U.T.A campus, it is clearly seen that, the management of the school, the physical-planning department, the architects together

with production engineers, are now taking a giant step in making sure that development of this kind, start from the campus. This can be seen in the recent construction of buildings in which more of aluminium materials are been used than other materials like galvanized roofing sheet, wood, e.t.c. Due to this, the three principles of firmitatis, utilitatis and venustatis in architecture discussed earlier were achieved, for we can see their beauty, usefulness, good conditions, sustainability with other characteristics that are superior to other materials highlighted earlier

RECOMMENDATION

Aluminium materials contribute immensely to the success seen in construction industries of today. As it is observed that building which is constructed with aluminium roofing sheet, window frames and doors, cannot be compared with other buildings constructed with different materials in terms of its beauty, longevity, resistance to corrosion, sustainability and strength per weight ratio. When the above characteristics are not met in some materials, then we will be replacing the roof of our houses regularly due to corrosion, and remove the doors and window frames of our buildings because of termites invasion and so on which are not encouraging to the purse and in its way alleviating poverty.

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APPENDIX



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10

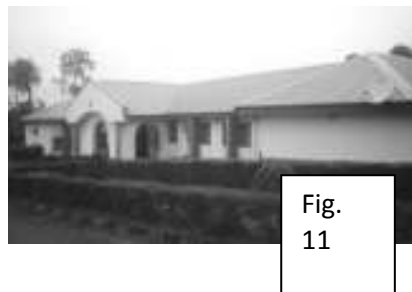


Fig. 11



Fig. 12



Fig. 13

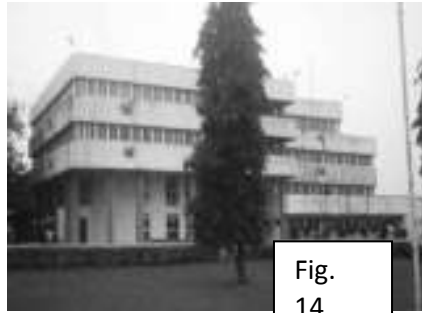


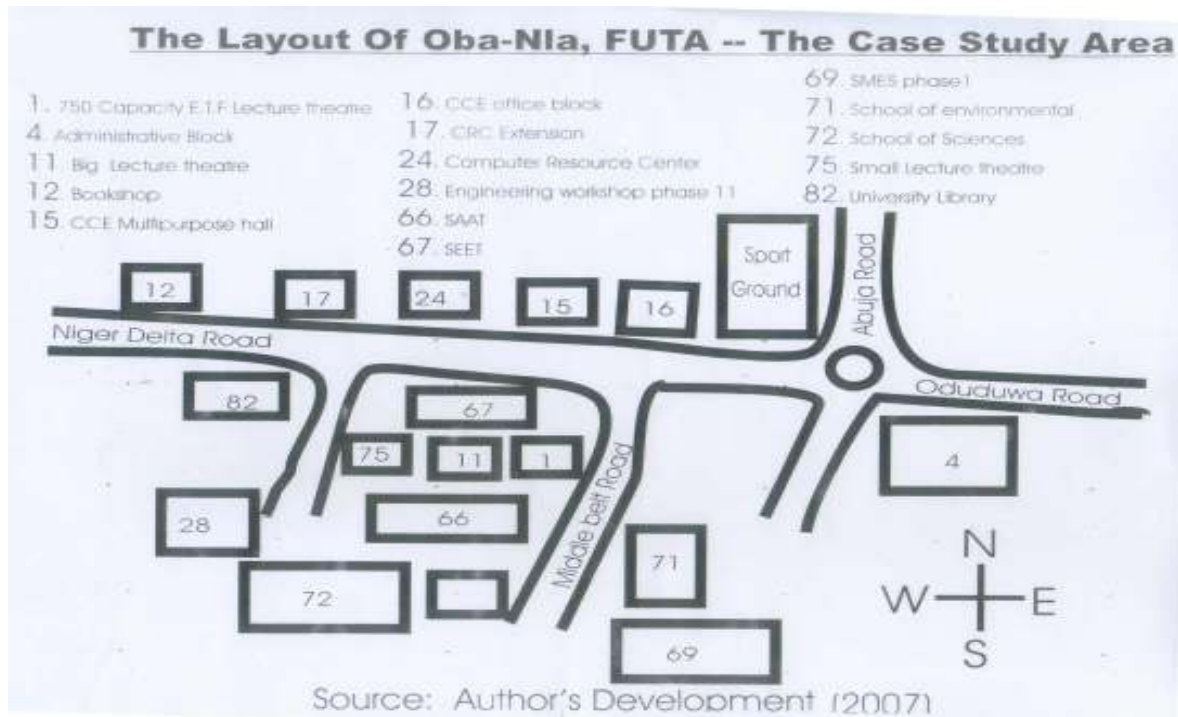
Fig. 14



Fig. 15

- Fig 1: Centre for Continuing Education Hall
- Fig 2: School of Engineering Building
- Fig 3: Centre for Continuing Education Building
- Fig 4: Computer Resource Centre Building
- Fig 5: University Library Building
- Fig 6: University Bookshop
- Fig 7: Engineering Laboratory Workshop
- Fig 8: Big Lecture Theatre

- Fig 9: Small Lecture Theatre
- Fig 10: School of Environmental Building
- Fig 11: SEMS Office Extension
- Fig 12: School of Agric Technology Building
- Fig 13: ETF Lecture Theatre
- Fig 14: Senate Building
- Fig 15: Well Glazed Aluminium Frame



INVESTIGATION OF ENERGY SAVING POTENTIAL FOR A UNIVERSITY CAMPUS IN DUBAI

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ABSTRACT

Energy saving in buildings is given paramount importance today by governments all over the world because it not only saves money and also helps protect the natural resources and make a sustainable future for the upcoming generations. Intelligently planned Buildings Management System (BMS) play a vital role in creating good ergonomic conditions. BMS has become an integral part of all modern constructions and help in continuous monitoring of physical conditions of a building so as to effectively maximize occupant comfort with minimal energy consumption. The crux of BMS lies in turning off equipment when there's no occupancy, and this denotes a tremendous savings capacity, as demonstrated in this paper. This paper aims at highlighting the advantages of BMS and its energy saving potential for a University campus in Dubai, United Arab Emirates. As found in this paper, the saving potential of any BMS, in Heating, Ventilation and Air Conditioning (HVAC), is really significant and if implemented, it can pave the way for a sustainable future. The payback period of installing BMS is also estimated and provides an idea of when the savings will outweigh the initial costs of installation of BMS.

KEYWORDS: automation, energy management, control, sustainability, occupancy

INTRODUCTION

We humans are currently in a phase of an energy crisis. Our cities and homes are powered by energy gained from the combustion of fossil fuels. These conventional sources of energy are limited, and will deplete soon at the current rates of consumption. That's why we have to start taking precautions from now itself, in conserving and reducing our usage of electrical energy to minimize the depletion of fossil fuels. Across the globe, buildings, both commercial and residential, are the largest consumers of energy (Rama Rao, K. S. et al., 2004), accounting for 47% of national energy use in India, 45% in UK and 41% in the USA (Batra, N. et al., 2013). In the European Unions, buildings reach 40-45% of total energy consumption and energy demand of the tertiary and residential sectors are increasing at 1.2% and 1.0% per year, respectively (Yu, J. et. al., 2013). Hence we can understand that buildings have tremendous saving potential. Buildings Management Systems helps in intelligently monitoring and controlling the aspects of commercial buildings like HVAC, Lighting, and Closed Circuit Television (CCTV) by a smart microcontroller making BMS very advantageous, from the perspective of occupant comfort along with low operating costs, efficient use of building resources and services, rapid alarm indication and fault diagnosis and increased productivity (Smitha, S. D., Savier, J. S., and Chacko, F. M., 2013). This paper shall focus on the energy saving potential in HVAC of a

university campus situated at Dubai, United Arab Emirates.

BMS uses several sensors for gathering data in their monitoring function. Sensors for occupancy, pressure, temperature, light, humidity, smoke and flow are used and the controlling function is done by the microcontroller after assessing the user set points and values measured from the sensors. Out of all the controls in BMS, the one having the highest load is HVAC (Choi, J., Jeong, Y. K., and Lee, H. W., 2014). And especially in a place like the Middle East, which is perennially hot, saving in HVAC would have a huge scope. Recent systems (Batra, N. et. al., 2013) show that occupancy is an important parameter in energy efficient BMS control and show the reduction in energy usage by optimizing the same. Hence occupancy sensors detect if humans are in the vicinity, and if not, then the HVAC and Lighting is either turned off or dimmed (in the case of lighting), as per the program set by the user.

LITERATURE REVIEW

UAE and Dubai, in particular, are demonstrating extraordinary leadership in promoting energy saving measures in systems and technologies. The need for research and documentation on energy saving technologies and practices in the region has assumed much more significance now after His Highness Sheikh Mohammed Bin Rashid Al Maktoum, UAE Vice-

president and Prime Minister and the ruler of Dubai issued a resolution on implementation of green building specifications. Studies on energy saving in buildings of UAE and the Middle Eastern region have been reported in the literature. The UAE government has implemented an energy ratings system for household appliances, air conditioning systems and lighting (UAE Interact). This new energy rating system is similar to that used in Australasia, but has been created specifically for the UAE (UAE Interact). In the study jointly done by the author, R. G. Bhavani with M. A. Khan, it was observed that BMS has wide acceptability in most of the new projects in the UAE. The specific reasons for the BMS to face resistance from the property owners are its initial cost and difficulty in educating the user to operate the controls (Bhavani, R. G., and Khan, M. A., 2007). Another paper also discussed the potential of lighting control measures (Bhavani, R. G., and Khan, M. A., 2008). Lighting controls, as minimum as per local code compliance, is required on all Leadership in Energy and Environmental Design (LEED) projects (Keith, L., 2005). Development of a platform for energy conservation using real-time monitoring and feedback tools for a building in a university campus at Al-Ain was presented in (Gaouda, A. et. al., 2013). Existing BMS can further contribute to energy saving by enhancing correlation levels between different building activities, class schedules, research activates, type of building and smartness/automation levels in the installed sensors (Gaouda, A. et. al., 2013). The performance of different types of lighting installations used in the commercial buildings in UAE and saving in energy consumption in the office lighting applications was highlighted (Soori, P.K., and Alubaidi, S, 2011). Energy saving potential of HVAC systems of buildings in the region have been discussed (Al-Iriani, M.A, 2007, Iqbal, I. and Al-Homoud, M.S, 2007, Radhi, H., 2008, Al-ajmi, F. and Hanby, V., 2008). Linking control systems as part of an energy management strategy can slash energy costs by as much as 30%, claimed John Geaney, Hewlett-Packard's Business Development Manager for intelligent buildings (Quillinan, J., 2005).

BITS, Pilani-Dubai Campus is situated in the academic city area of Dubai and caters to providing undergraduate and masters engineering education to a diverse population in Dubai. The management is keen to demonstrate energy saving in the academic block so that the student community will emulate the same practices in their lives. The university has been adopting some energy and water saving practices and exhibiting reduction in energy bills, thus qualifying for discounts from Dubai Electricity and Water Authority for the last three years. Table I gives the summary of annual saving in 2012 over the previous year for electricity and water

consumption. The objective of this paper therefore is to present the results of the research study conducted to investigate the energy saving potential in the university campus. From the study, we report some key findings that are specific to this region and in the process, also identify some measures that will guarantee reasonable payback periods.

Annual Saving in 2012 over the Previous Year for Electricity and Water Consumption

<i>Details</i>	<i>Electricity bill (AED)</i>	<i>Water bill (AED)</i>
Total expenditure for 2011	1819575.20	584074.00
Total Expenditure for 2012	1577743.20	534575.00
Difference	241832.00	49499.00
Overall savings	13.29%	8.47%

Design And Investigative Calculations

Empower is the supplier of chilled water to the university. This chilled water is essential for providing cooling in HVAC. The monthly consumption bills from Empower from the period September 2013 to August 2014 were obtained and the necessary data was analyzed. The university consists of classrooms, project rooms, lounges, chambers for the professors, seminar halls, etc. Based on the knowledge of how often these rooms are occupied, it was found that the best time to save HVAC was when there were no or less occupants and their energy savings were calculated.

Energy savings calculation can be achieved by either the bottom-up approach or the top-down approach (Gaouda, A. et. al., 2013). The bottom-up approach involves deploying power meters and/or sensor networks in every classroom or space of the University. Given the number of devices as well as labor needed to accomplish the goal, the strategy presents itself as very expensive as the expenditure of installing Btu meters in every room of the university would be too high for investigation. But, this can result in the collection of the most detailed meters.

In the top-down approach, the investigation starts from the monthly final HVAC chilled water bills and then the detailed consumption information estimated using techniques such as nonintrusive load monitoring. However, analyzing and understanding relationships between occupant profile and energy use is a challenging task at the design phase. This approach is known to be a compromise between cost and uncertainty. Especially since the Total Cooling Capacity (TMBH) values referred to for the load calculation were planned during the pre-commissioning days of the university, which may have changed with current times.

The procedure with which the calculation for HVAC is explained as follows: TMBH is a measure of the cooling

capacity of the Fan Coil Unit (FCU). To effectively measure how much energy can be saved on HVAC, TMBH can be multiplied with number of hours of the FCU is switched off due to the occupancy pattern as determined by the BMS operation.

$$E = \text{TMBH} \times S \quad (1)$$

where E is the energy saved in British Thermal Units (Btu), TMBH is the Total Cooling Capacity and S is the number of hours the HVAC equipment is switched off, for that particular space.

Table II shows the breakup of the rooms of the campus into several categories.

ROOM DISTRIBUTION OF THE ACADEMIC BLOCK

Type of room	Number of rooms
Lecture halls	40
Professor's cabins	26
Corridors	16
Laboratories	16
Administrative	12
Lounges/Eating areas	8
Conference/ Seminar rooms	5

The nature of tasks performed in each space can give an indication for the number of hours for which the HVAC can be switched off, without compromising in occupant comfort. The saving has been demonstrated in Table III below, for 6 types of spaces.

OPTIMAL HVAC SAVINGS CALCULATION

Room	TMBH	Time (hours) switched off per day by BMS	Thousand Btus saved per day
Seminar Hall -2	254	4	1016
Faculty Area	127	2	254
Asst. Professor 1	54	3	162
Lecture Hall 9	54	4	216
Facility Cafeteria	72	2	144
Lift Lobby	63.5	1	63.5

Table III shows the energy that can be saved in one day, using Eq. 1. It was observed that the Seminar Hall-2 is not operating for four hours in a typical day. The Faculty Area is a place where the faculty of the university dines and eats. It was noticed that only two hours worth of savings could be achieved here. Similarly applying this technique to all the other FCUs of the university,

$$\text{Total Btu savings in one day} = 12447.5 \times 10^3 \text{ Btu} \quad (2)$$

$$\text{Total Btu savings in a month} = 373425 \times 10^3 \text{ Btu} \quad (3)$$

Now, the following conversion is a known fact,
1 Btu = 0.000083 Refrigeration Ton Hour (RTH) (4)

$$\text{Applying this conversion to Eq. 3, we get} \\ \text{Total saving in a month (RTH)} = 30994.275 \text{ RTH} \quad (5)$$

Equation 5 tells us the savings in RTH in one month. The savings of an entire month in AED can be found, using the Empower tariffs. Empower is the supplier of chilled water necessary for Air Conditioning.

$$\text{Empower Tariff} = \text{AED } 0.651 \text{ per RTH} \quad (6) \\ \text{Savings in a month (AED)} = \text{AED } 20177.27 \quad (7)$$

Now, plotting the value obtained in Eq. 5, along with the same calculations for 8 hour, 12 hour and 16 hours, the graph is plotted as shown in Fig. 1. Fig. 2 shows the picture of a typical unoccupied classroom in the academic block.

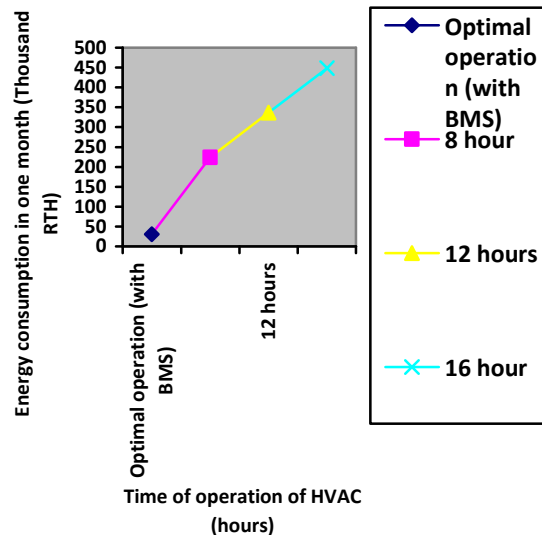


Figure 1. Energy consumption in one month (in RTH) of HVAC for different hours of equipment operation



Figure 2. A sample classroom from the University

Percentage savings = Monthly savings (AED) ÷ Total monthly expenditure (AED)
(8)

The total monthly expenditure can be obtained from the monthly Empower bills of the university. This information forms an essential part of the top-down approach followed in this paper, represented in Fig. 3.

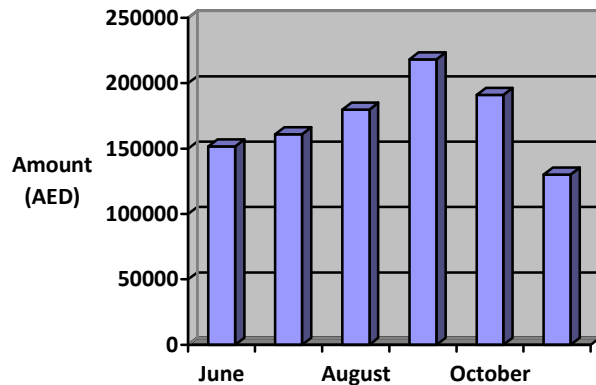


Figure 3. Monthly Empower bill amounts from June '14 to November '14

For the calculation of the percentage savings, the most recent Empower bill is considered as an example, that is, the November '14 bill of the amount AED 130133.50. Hence as per Eq. 8,

Percentage savings = $20177.27 \div 130133.5 = 15.50\%$
(9)

Naturally, after the percentage saving, the question may arise of the payback period. Payback Period is defined as the time it takes for the savings generated due to BMS to offset or recover its initial plus maintenance costs. Further, these initial costs consist of equipment cost and installation costs.

Estimated initial costs = E = AED 415,390 (10)

Hence, the payback period P is given by
 $P = E \div S$ (11)

where P is the payback period in months and S is the savings per month.

Applying Eq. 11 to calculate the payback period of the Institute

Payback period (in months) = $415390 \div 20304.69$
= 20.45 months

CONCLUSION

This paper attempted to highlight the energy savings possible at a university campus in Dubai, UAE in the Middle Eastern Region where the HVAC energy consumption is a significant one due to the hot climate prevalent throughout the year and the same presents an opportunity to investigate and see ways to have reduced expenditure in HVAC with the help of BMS. It was estimated that the monthly energy savings were AED 20177.27 which is not a meagre amount. This paper aims to highlight the advantages of a BMS and advocates building automation to be implemented in other commercial buildings too.

Collecting and analyzing data of the huge number of FCUs in the university was a challenging task. This challenge comes from the size of the data to be collected. For example, in order to operate the AHU (Air Handling Unit) more efficiently, many variables should be monitored. BMS does this job of intelligently monitoring the variables for optimal operation and gathers and stores operational data from other elements of the BMS.

Some of the figures in this paper were based on estimations in the top-down approach described earlier. The top-down approach for measuring HVAC savings was followed because of its simpler nature compared to the bottom-up approach. The bottom-up approach would have required much more manpower and far more expenditure in installation of measuring equipment. The top-down approach would not be as accurate compared to the bottom-up approach and has more chances of having deviations from realistic data, but is simpler to handle and yet, highlights the advantages of BMS. The percentage saving obtained by implementing BMS in the university was found to be 15.50% for a particular case. The payback period turned out to be 20.45 months. Thus, it would take around 20.45 months for the generated savings to outweigh the initial costs and investment.

There are many ways with which BMS achieves its optimization such as chiller sequencing, variable air volume control, variable frequency drive for fresh air handling unit, variable frequency drive for air handling unit, FCU control, following a temperature schedule and by using a control command centre. These along with central monitoring and whole building monitoring make BMS an ideal candidate for energy saving. The paper advocates the installation of BMS in other commercial buildings too, seeing the growing energy crisis.

FUTURE WORK

The future work would revolve around lighting calculation and the corresponding saving that can be

achieved by BMS. Lighting loads, till some years ago, was ignored in saving calculations under the premises that it does not compare with HVAC load percentages in a given building. However, with the knowledge that any saving, however small, is worth the effort and with the control and monitoring of BMS, lighting saving also plays a major role in planning modern constructions. When the energy is saved from a holistic profile of HVAC and lighting, greater benefit can be foreseen.

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DEVELOPMENT OF A MODEL FOR CAPACITY BUILDING AND OPTIMAL UTILIZATION OF MANUFACTURING COST IN CEMENT PRODUCTION PLANNING PROCESS

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ABSTRACT

This study introduces the development of a model for determining the manufacturing cost of cement in its production planning process, and the goal is to develop a faster and better means of determining cement-manufacturing cost. The developed model will be particularly of great assistance to new comers who are not familiar with the field and will facilitate them in gaining a better understanding of the manufacturing parameters for production process and in making decisions about any necessary actions. The developed model is versatile in the sense that it quickly generates results, which hasten decision making process

KEYWORDS: cement, manufacturing cost, planning process

INTRODUCTION

In recent years, concurrent engineering has emerged as a key practice in enhancing the competitiveness of a product. Most people agree that the cost and quality of a product are “locked” into the layout design. Many companies are actively pursuing means to integrate the life-cycle values of the product early in its development.

The manufacturing scene today is undergoing a revolution. Infact the technology that had the greatest impact on the production system over the last decades is computer modeling. Modeling have important role to play in job shop and batch production manufacturing plants, which constitute an important portion of the total manufacturing activity. It may be remembered that traditional batch manufacturing suffers from drawbacks like low equipment utilization, long lead times, inflexibility to market needs, increased indirect cost and high manufacture cost. It is estimated that in conventional batch production methods, only 5 to 10% time is utilized on machines and the rest is spent on moving and waiting. Out of the total time on machine, only 30% is on machining, rest being on positioning, loading, gauging and idling.

Consequently, a need exists for adequate modeling cement production process in the manufacturing sector using feedback control, process control, planning and decision making to support manufacturing activities (Jain, 2001). Market demands have changed towards higher quality, shorter delivery times and lower product cost. To be competitive, it is necessary to reduce or completely eliminate material wastage in order to keep the manufacture cost as low as possible, hence the need to model the production process of cement. The

objectives of this research are to ascertain the relevant manpower parameters related to the planning of cement production process and develop a mathematical model for expert system in the planning of cement production process.

Case Study: West African Portland Cement (WAPCO)

The company used as case study is West African Portland Cement (WAPCO), the oldest cement factory in Nigeria, established in 1959 and is involved in the manufacture and wholesale of cement and building products. Major shareholders include Blue Circle of the UK, O’dua Investment Company, and the Nigerian government. WAPCO has two cement factories, both in Ogun State, precisely in Ewekoro and Shagamu, established in 1960 and 1978 respectively. The former was replaced by a new plant in 2003, and is the largest cement producer in Nigeria, with an effective annual production capacity of approximately 1 million tons (WAPCO Cement, 2010) with a workforce of about 1,750 employees in its labour force (WAPCO Cement, 2010)

Ewekoro cement factory is located in Ewekoro Local Government Area, Ogun State in southwestern Nigeria (Figure 1; Maps 1–4). The cement production facility, located about 5 km north of Ewekoro town (6°55’N, 3°12’E), lies within the tropical rainforest vegetation belt of Nigeria. The production facility is surrounded by settlements which predate the cement company. The settlements include Olapeleke and Itori to the north and Elebute Alaguntan to the east of the factory (Figure 1; Map 3). The climatic conditions prevailing over the

cement production facility riparian ecosystems were mainly those of the tropical rainforest, typified by an average annual temperature of $30 \pm 10^\circ\text{C}$, relative humidity of $65 \pm 10\%$ and an average annual rainfall of $1500 \pm 120 \text{ mm}$ (Oguntoyinbo et al. 1983).

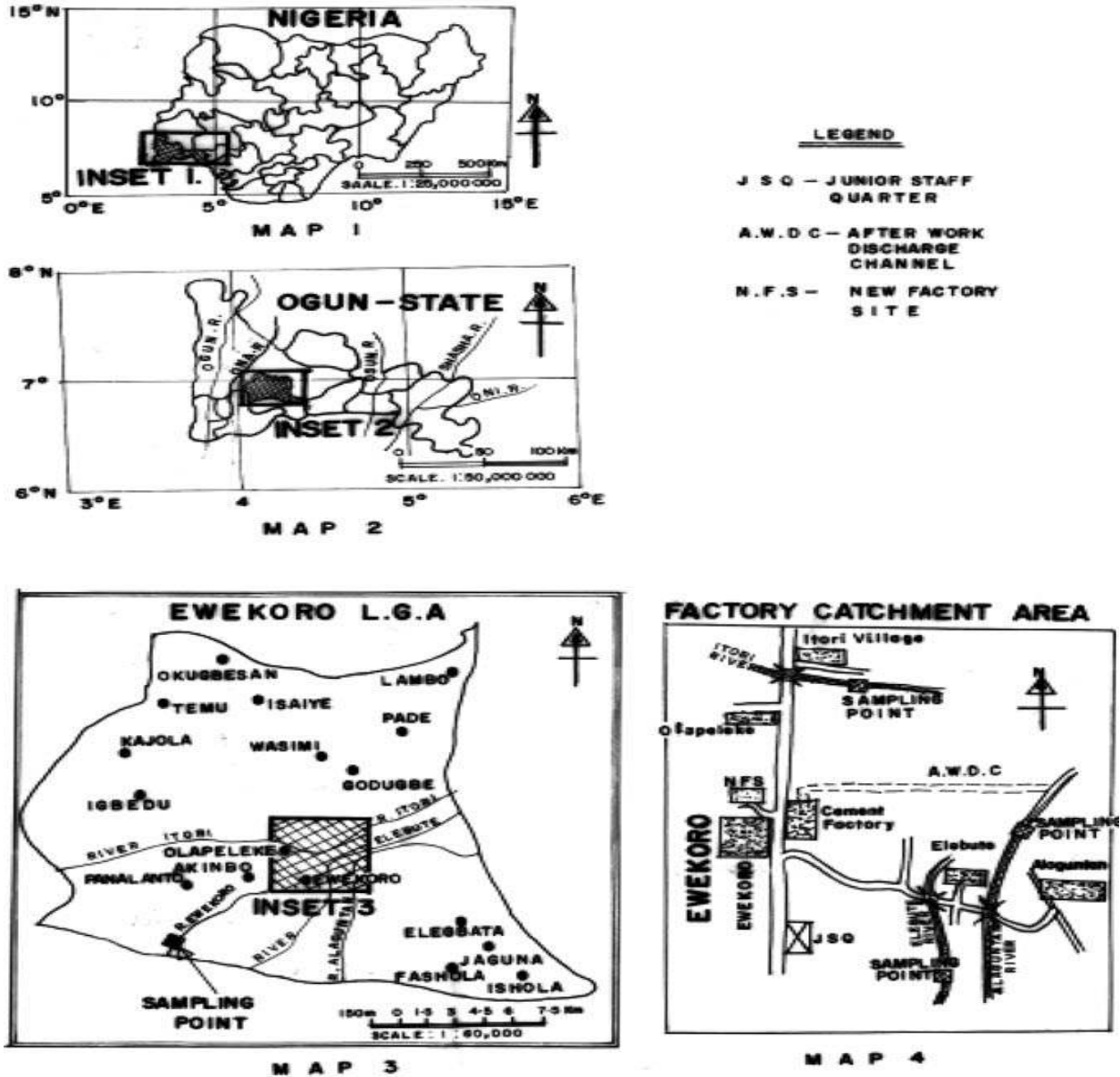


Figure 1. Maps Showing the Location of Ewekoro Cement Factory Within Ogun State, Nigeria and The Location of the Sampled Rivers With The Factory Catchment Area.
 Source: (Oguntoyinbo et al. 1983)

The manufacturing cost of cement is as shown in table 1, as obtained from west African Portland cement, 2010, the cost differs from the one obtained using the developed model showing an improvement.

Table 1: Data on Manufacturing Cost of Cement

Cost Component	Manufacturing Cost (₦)
Direct machine cost	921,000,000
Direct labour cost	710,499,970
Direct expenses	536,099,970
Machine hour rate	25,900,000
Overhead cost	403,840,000
Cost per unit bag	₦ 1,279.67K

Source: (WAPCO Cement, 2010)

Manufacturing Cost of the Processed Cement

Manufacturing cost, C_g^{f*} , of the processed cement is computed using Eqn. 1.

$$C_g^{f*} = \sum_{j=1}^u C_j^{f*} \quad (1)$$

Where j is the cost elements such as direct material cost, direct labour cost, direct expenses machine hour rate, energy cost, overhead cost, etc.

Manufacturing cost per tonne of cement, C_o^e is estimated using Eqn.2

$$C_o^e = C_j / C_g^m \quad (2)$$

from which cost per bag of processed cement is estimated as $C_o^t / 20$

Performance Evaluation

Post decision-making for cement production is evaluated based on break-even point analysis. Break-even point, β of the cement production processes is evaluated using expression in Eqn.3, which is based on ratio of Overhead cost, $C_j^{overhead}$ and profit margin, ρ , as

$$\beta = \frac{C_j^{overhead}}{\rho} \quad (3)$$

and ρ is measured as:

$$\rho = C_R - C_V \quad (4)$$

where,

C_R , is the average monthly revenue per tonne of output cement

C_V , is the average monthly variable cost per tonne of output cement.

The value of β in Eqn. 3.19, determines whether production process is economically viable or not. It also determines whether to continue production process or stop the process. The smaller the value of β is for the production process, the better is its economic viability. The value of β is, also varied with the types of cement one is intended to produce.

Modeling Cement Production Processes

The identified critical elements of cement production includes: the proportion of materials used for cement production; proportion of energy used for the production; capacity of the machines used for cement production and manpower required for the operations. But for the purpose of this study, effort will be

concentrated on the machine capacity development using a model.

The summary of the savings in the whole plant manufacturing cost is shown in the table below. It shows that the developed model had a savings of (N)426.56 over the one obtained from WAMPCO

Table 2: Savings Results on Manufacturing Cost of Cement for the Entire Plant

Cost Component	Actual Cost (₦) (WAPCO)	Expected Cost (₦) (Model Developed)	Savings (₦)
Direct machine cost	921,000,000	672,237,439	248,762,561
Direct labour cost	710,499,970	518,593,594	191,906,376
Direct expenses	536,099,970	392,758,920	143,341,050
Machine hour rate	25,900,000	18,904,397	6,995,603
Overhead cost	403,840,000	294,762,614	109,077,386
Cost per unit bag	1,279.67K	853.11	426.56

Expert system would assist tremendously in the synchronisation and effective planning of the cement production process in order to avoid these wastage of manpower. This development will bring about savings in additional cost of procuring unusable resources in the cement production process. Savings in manufacturing cost of cement will definitely reduce the price per tonne of processed cement in Nigeria.

The developed model has helped to identify and ascertain the right proportion of the requirements of manpower and parameters related to the cement production process and have proved to be very consistent in its decision making process during verification of its results by using test cases, based on relevant data collected from the case study, Ewekoro cement company

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OPTIMIZATION OF PROCESS PARAMETERS OF A CONDUCTIVE ROTARY DRYER FOR *GARI* PRODUCTION

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ABSTRACT

In this study, the Taguchi method was used to optimize the parameters of a conductive rotary dryer which was developed for the roasting of wet cassava meal (*Manihot esculenta Crantz*) for *gari* production. The optimum levels of batch quantity (kg), vapour extraction rate (m³/s) and drum temperature (°C), at which good quality *gari* was produced were 5 kg, 0.0075 m³/s and 190 °C respectively. Both signal-to-noise ratio (S/N) and analysis of variance (ANOVA) showed that the three parameters respectively contributed 27.46 %, 10.41 % and 42.89 % to the quality characteristic of the *gari* with at least 99 % confidence. By increasing the drum temperature from 190°C to 200°C at batch quantities of 5 kg and 6 kg, the swelling index of the *gari* increased from 2.63 to 3.11 and 3.20 respectively. The use of the conductive rotary dryer for roasting *gari* removed most of the limitations associated with the traditional method. By scaling up the capacity of the dryer, it can fit into an industrial process line for commercial production of *gari*, and contribute to regional food security.

KEYWORDS: Taguchi method, optimization, process parameters, conductive rotary dryer, *gari*

INTRODUCTION

Cassava (*Manihot esculenta* Crantz.) is a major food crop and it supplies about 70% of the daily calorie requirement for millions of people in Nigeria (Oluwole *et al.*, 2004). It is widely reported that over 500 million people around the world derive their daily carbohydrate intake from cassava (Cock, 1985; FAO, 2000; Udofia *et al.*, 2010), and the industrial application of the crop is also growing, due to the increasing demand for cassava-based products such as glucose syrup used by pharmaceutical companies, and cassava flour used as substitute for wheat flour in confectionaries. Nigeria is the largest producer of cassava in the world with an estimated annual production of between 34 and 37 million metric tons in 2002 (FAO, 2004; FAO, 2006). Estimate of cassava use in Nigeria shows that about 84% of annual production in 2001, equivalent to 28.9 million metric tons was processed into various food forms for local consumption (Phillips *et al.*, 2004). Among many of the staple foodstuffs produced from cassava, *gari* is by far the most popular (Oluwole *et al.*, 2004).

Gari is a toasted granular product that is readily consumed as a snack by soaking in water in combination with pea-nuts, sugar and milk. It is also consumed as dough called 'eba' in *Yoruba* language, with rich soup which provides additional nutrients (Irtwange and Achimba, 2009). According to Nweke *et al.* (2002), *gari* is produced traditionally by peeling and washing fresh cassava tubers which are grated into a

watery pulp and packed in clean perforated polyethylene bags. The grated mash is left to ferment in the bags for a few days after which they are placed under a press to be dewatered. The pressed cakes of cassava are manually pulverized and sifted using a hand-woven sieve to produce a wet meal of between 45 – 50 % moisture content (CIGR, 1999). The wet meal is toasted on a hot frying pan, to produce a gelatinized, dried and ready-to-eat meal – a process known as 'garification' (Achinewhu *et al.*, 1998). High quality *gari* should have maximum moisture content of 11 % wet basis, and when soaked in water its swelling capacity should be at least three times its initial volume (SON, 2004).

Challenges with Traditional Method of *Gari* Production

Despite many research efforts to mechanize the roasting of *gari* (Igbeka, 1995), the process is still carried out by local processors who use the traditional method in many parts of Nigeria (Ajibola *et al.*, 1998). Survey of cassava processing centers in South-western Nigeria Sanni (2014), shows that an open metallic tray (round or square in shape) made from mild steel sheet is placed on a firewood stove and heated to a temperature of 180°C – 220°C depending on the calorific value of the wood and the local weather. A batch of the wet cassava meal, weighing between 4.5 – 6 kg is poured on the hot tray and by conduction the activation energy required for gelatinizing and drying the cassava meal is absorbed. The processor uses a wooden paddle or short broom to

stir the cassava meal in order to allow for uniform heat distribution and breaking of unwanted cassava lumps.

Because the vapor extraction takes place by natural convection, the drying of the cassava meal is affected by the local atmospheric air condition (especially air relative humidity and velocity). After about 25 to 40 minutes, the cassava is dried to 11 % (wet basis) or below and the *gari* is evacuated and cooled before bagging. The quantity of *gari* recovered is generally about half the initial mass of the wet meal introduced (Sanni, 2014). During roasting, the pan temperature is regulated by removal or addition of firewood. Other limitations of the traditional method are: continuous stirring and prolonged exposure of the handler to heat and smoke from the fire place, exposure of the cassava meal to contamination from the environment and



Plate 1: Popular traditional method of roasting *gari*

MATERIALS AND METHODS

The Taguchi method was used to study the effects of four process parameters namely, shape of flights in the drum, quantity of wet cassava meal fed into the drying chamber (kg), rate of vapor extraction from the drying chamber (m^3/s) and drum temperature ($^{\circ}C$). Each parameter was varied at two levels as presented in Table 1 (Akhyar *et al.*, 2008).

Table 1: Four process parameters at two levels each

Symbol	Process Parameters	Unit	Level 1	Level 2
A	Flight shape	-	Straight	Curved
B	Batch quantity	kg	5	8
C	Vapour extraction rate	m^3/s	0.0075	0.03
D	Drum temperature	$^{\circ}C$	140	190

Using the Taguchi array selector, an L8 orthogonal array was chosen for the experimental investigations. This implied that eight drying experiments were sufficient to study the effects of the four parameters on the quality of *gari* produced in the CRD. The use of the L8 experimental design was justified by the fact that the

corrosive effect of the frying pan, environmental pollution due to use of firewood, limited quantity of cassava meal handled per batch and spillage of the cassava meal in the process of stirring. To mitigate the problems associated with the traditional method of roasting and increase the capacity for commercial production of *gari*, a conductive rotary dryer (CRD) was designed and constructed in the Department of Agricultural and Environmental Engineering of Obafemi Awolowo University, Ile-Ife, Nigeria. Plate 1 shows a typical traditional method of roasting *gari* and Plate 2 shows the CRD used for the study. Experiments carried out were aimed at optimizing the performance of the dryer with a view to industrializing *gari* production (Sanni, 2014).



degree of freedom of the L8 orthogonal array ($DF_{\text{orthogonal array}} = 7$) was greater than that of the four process parameters that were varied at two levels each ($DF_{\text{process parameters}} = 4$). The experimental design used for the study is presented in Table 2.

Table 2: Experimental layout of the L8 garification experiments

Number of Experiment	Flight shape	Batch quantity (kg)	Vapor extraction rate (m^3/s)	Drum temperature ($^{\circ}C$)
1	Straight	5	0.0075	140
2	Straight	5	0.0075	190
3	Straight	8	0.03	140
4	Straight	8	0.03	190
5	Curved	5	0.03	140
6	Curved	5	0.03	190
7	Curved	8	0.0075	140
8	Curved	8	0.0075	190

Quality characteristic and the Taguchi Loss Function

Studies have shown that swelling index (SI) of *gari* is a good quality characteristic which measures how gelatinized and dried the *gari* is (Ajibola *et al.*, 1987).

When soaked in water, high quality *gari* is expected to swell well beyond its initial volume and previous works have shown that the swelling index of *gari* can vary between 2.0 and 4.0 depending on the cassava cultivar and processing method used (Irtwange and Achimba, 2009; Owuamanam *et al.*, 2010; Apea-Bah *et al.*, 2009). Each of the eight drying experiments outlined in Table 2 above was run for 35 minutes at the end of which the swelling index of the *gari* was determined. The swelling index (SI) of the samples was determined by the method of Apea-Bah *et al.* (2009) with slight modification. At the end of each experiment a volume of 18 ml of the *gari* was introduced into a 100 ml measuring cylinder. The cylinder was filled with distilled water to the 100 ml mark and shaken for proper mixture. The solution was allowed to settle for 5 minutes before shaking again. The intermittent shaking and settling lasted for 20 minutes and after the last settlement, the final volume of the cassava meal was recorded. The swelling index for each sample was calculated as:

$$\text{Swelling index} = \frac{\text{Final volume of cassava meal}}{\text{Initial volume}} \quad (i)$$

The Taguchi loss function was determined according to the method used by Kamaruddin *et al.* (2004) and Esme (2009). The relationship between the swelling index and quality of *gari* is that, the higher the swelling index the better the quality. Therefore the Taguchi loss function which is equivalent to the mean squared deviation (MSD) was based on the-larger-the-better and the following mathematical expression was used to calculate the corresponding signal-to-noise ratio (SN) for each experiment:

$$SN_i = -10 \log \left(\frac{1}{n} \sum_{k=1}^n \frac{1}{y_i^2} \right) \quad (ii)$$

where,

n = number of experiments in the orthogonal array
y_i = swelling index of the dried cassava from the ith experiment

An estimate of the swelling index of the *gari* at the optimum parameter levels was predicted using the following regression equation (Kamaruddin *et al.*, 2004).

$$y_{opt} = \bar{y}_m + (\bar{y}_{Aopt} - \bar{y}_m) + (\bar{y}_{Bopt} - \bar{y}_m) + (\bar{y}_{Copt} - \bar{y}_m) + (\bar{y}_{Dopt} - \bar{y}_m) \quad (iii)$$

y_{opt} = predicted value of swelling index when the optimal levels of parameters are used

\bar{y}_m = grand mean of quality characteristic

\bar{y}_{Aopt} = average value of quality characteristic for parameter A at its optimum level

\bar{y}_{Bopt} = average value of quality characteristic for parameter B at its optimum level

\bar{y}_{Copt} = average value of quality characteristic for parameter C at its optimum level

\bar{y}_{Dopt} = average value of quality characteristic for parameter D at its optimum level

RESULTS AND DISCUSSION

The swelling index and corresponding S/N ratio for each experiment are summarized in Table 3 and the S/N ratio analysis and the corresponding values of swelling index for each parameter at the two levels are presented in Table 4.

Table 3: S/N responses to swelling index of *gari* from L8 experiments

Exp. No.	Code	Flight shape	Batch quantity (kg)	Vapour extraction rate (m ³ /s)	Drum temperature (°C)	Moisture content (%)	Swelling index	S/N ratio
1	A1B1C1D1	Straight	5	0.0075	140	16.12	1.72	4.71
2	A1B1C1D2	Straight	5	0.0075	190	6.77	2.89	9.22
3	A1B2C2D1	Straight	8	0.03	140	19.79	1.00	0.00
4	A1B2C2D2	Straight	8	0.03	190	9.43	1.94	5.76
5	A2B1C2D1	Curved	5	0.03	140	16.07	1.67	4.45
6	A2B1C2D2	Curved	5	0.03	190	7.24	2.06	6.28
7	A2B2C1D1	Curved	8	0.0075	140	14.98	1.61	4.14
8	A2B2C1D2	Curved	8	0.0075	190	8.53	1.72	4.71

The parameter level with the highest S/N ratio is the optimum and the difference between the highest and lowest S/N ratios indicates the extent of its effect on the swelling index of the *gari*. As shown in Table 4, the drum temperature has the greatest effect with S/N difference of 3.16, followed by the batch quantity and vapor extraction rate with S/N differences of 2.52 and

1.58 respectively. The shape of flight used has a much lower S/N difference of 0.02 which is an indication that its effect on the swelling index of *gari* is not significant. However the S/N ratio analysis shows that the optimum levels at which the four CRD parameters should be combined for best performance is A₁B₁C₁D₂ as shown in Figure 1.

Table 4: S/N responses to swelling index of *gari* produced in the CRD

CRD Parameter	Symbol	Average S/N Ratio		Parameter Average	Grand Mean	Difference of S/N	Ranking
		Level 1	Level 2				
Shape of flight	A	4.92 ^a ^b 1.89	4.90 1.77	4.91 1.83	S/N: 4.91	0.02	4 th
Batch quantity	B	6.17 ^a ^b 2.09	3.65 1.57	4.91 1.83			
Vapor extraction	C	5.70 ^a ^b 1.99	4.12 1.67	4.91 1.83	SI: 1.83	1.58	3 rd
Drum temperature	D	3.33 1.50	6.49 ^a ^b 2.15	4.91 1.83		3.16	1 st

^aHighest value of S/N ratio indicate the optimum level of each parameter: A₁B₁C₁D₂

^bCorresponding values of swelling index of *gari* at optimum levels of parameters

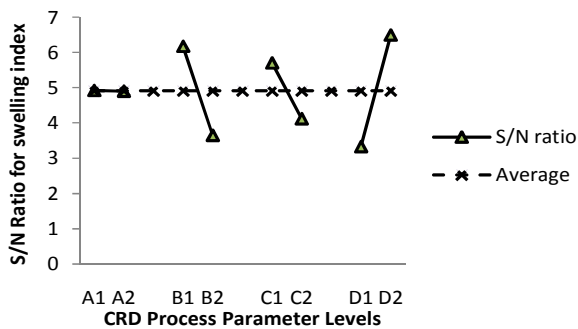


Figure 1: Graph of effects of CRD parameters on the swelling index of *gari*

The figure shows that batch quantity of 5 kg, vapor extraction rate of 0.0075 m³/s and drum temperature of 190°C are optimal for proper roasting of *gari*. The S/N

ratio line for shape of flight did not deviate from the mean significantly, meaning that shape of flight did not significantly affect the swelling index of *gari* in the CRD. Only batch quantity, vapor extraction rate and drum temperature have main effects on the roasting process. Production cost can therefore be reduced by removing the flights from the CRD without affecting the quality of the *gari*. The analysis of variance (ANOVA) in Table 5 below corroborates the S/N analysis. It shows that drum temperature and batch quantity have significant effects with F-values of 7.22 and 4.22 respectively at 99% confidence. The contributions of each parameter to the performance of the dryer in order of strength are 42.89 % from drum temperature, 27.46 % from batch quantity, 10.41 % from vapor extraction rate and only 1.47 % from flight shape.

Table 5: Result of ANOVA on the swelling index of *gari*

Parameter Code	Process Parameter	Degree of Freedom	Sum of Square	Mean Square	F	Contribution (%)
A	Type of flight	1	0.029	0.029	0.248	1.47
B	Batch quantity	1	0.541	0.541	4.624*	27.46
C	Vapour extraction Rate	1	0.205	0.205	1.75	10.41
D	Drum temperature	1	0.845	0.845	7.222*	42.89
	Error	3	0.350	0.117		17.77
	Total	7	1.97			100

*At least 99% confidence

By substituting the corresponding values of swelling index from Table 4 into Equation (iii), an optimum swelling index of 2.63 was estimated. Although the swelling index falls within the range of 2.0 – 4.0 established in previous works, there is still room to increase the value by improving the cassava roasting

process. The process was therefore improved upon by removing the flights from the drum and slightly increasing the drum temperature from 190°C to 200°C. To confirm the effects of the changes, two new experiments were conducted in line with the optimum parameter levels and the results are recorded in Table 6.

Table 6: Result of experiments to confirm process improvement

Experiment	Flight shape	Batch quantity (kg)	Vapor extraction rate (m ³ /s)	Drum temperature (°C)	Swelling index	Moisture content (%)
1	-	5	0.0075	200	3.11	8.07
2	-	6	0.0075	200	3.20	10.32

At batch quantity of 5 kg and 6 kg with other parameters held at the optimal levels, the swelling index of the *gari* increased from 2.63 to 3.11 and 3.20 respectively. The removal of flights and slight increase of the drum temperature therefore caused an improvement in the performance of the conductive rotary dryer.

CONCLUSION

The outcome of the study shows that the conductive rotary dryer improved the process of *gari* production when compared with the popular traditional method. While removing the disadvantages associated with the traditional roasting method, the use of the conductive rotary dryer increased the quality of *gari* produced. The development of the conductive rotary dryer therefore promises to increase the production capacity of local cassava processing plants and thus boost food security and contribute to poverty alleviation in Africa. However the application of the dryer for *gari* production requires electricity.

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DEVELOPMENT OF CAD SOFTWARE FOR MECHANICAL CHAINS DESIGN

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ABSTRACT

The problem of designing is a major problem in the field of engineering due to the stress encountered during the manual method of operation and high risk of inaccuracy, this has brought about the need for a more reliable and accurate method, the emergence of modern technology has brought about the use of computer aided design to improve and create new atmosphere for the process of design and documentation. The use of chains have been employed over the years for various mechanical operations, for various kinds of mechanical drive such as sprocket, roller chains, in bicycles, in rotary machines, crank etc. these also includes the difficulty of designing a suitable software that will enhance the identification and application of chains. The software developed for mechanical chains is equipped with Windows XP or Windows 7 Operating System with processor speed not less than 2.3GHZ for acquiring information and logistics, Microsoft Visual Studio was used due to its worldwide acceptability, easy interface and being an open system and most importantly its ease of file format acceptability . The software can simulate mechanical chains operation and thus captures it in different phase using algorithm. The software was able to determine effectively the operations involved in design of chains such as inputting the sprocket parameters, power transmitted, the driver teeth ratio, gear ratio and the final result of the chain drive. With the help of this software there has been a rapid improvement in the design of chains automated. This research work have been able to eliminate chain design problems by generating a suitable and competent Software that can aid chains at lower cost and above all which can be operated by anybody without the requirement of programming knowledge or any special skill.

KEYWORDS: CAD, chain, design, software, sprocket

INTRODUCTION

Computer Aided Design (CAD) is defined as the use of Information Technology (IT) in the Design process. A CAD system consists of IT hardware (H/W), specialized software (S/W) (depending on the particular area of application) and peripherals, which in certain applications are quite specialized. The core of a CAD system is the S/W, which makes use of graphics for product representation; databases for storing the product model and drives the peripherals for product presentation. Its use does not change the nature of the design process but as the name states it aids the product designer. The designer is the main actor in the process, in all phases from problem identification to the implementation phase. The role of the CAD is in aiding him/her by providing:

- ❖ Accurately generated and easily modifiable graphical representation of the product. The user

can nearly view the actual product on screen, make any modifications to it, and present his/her ideas on screen without any prototype, especially during the early stages of the design process.

- ❖ Perform complex design analysis in short time. Implementing Finite Elements Analysis methods the user can perform □Static, Dynamic and Natural Frequency analysis, Heat transfer analysis, Plastic analysis, Fluid flow analysis, Motion analysis, Tolerance analysis, Design optimization.
- ❖ Record and recall information with consistency and speed. In particular the use of Product Data Management (PDM) systems can store the whole design and processing history of a certain product, for future reuse and upgrade.

COMPUTER AIDED DESIGN

Computer-Aided Design (CAD) involves creating computer models defined by geometrical parameters. These models typically appear on a computer monitor as a three-dimensional representation of a part or a system of parts, which can be readily altered by changing relevant parameters. CAD systems enable designers to view objects under a wide variety of representations and to test these objects by simulating real-world conditions. The increasing power of CAD has had a significant impact on the product development process, allowing improved quality, reduced cost, and aids products to get to market faster. CAD software is rapidly evolving into what might be better described as product development, or perhaps virtual prototyping software. (Adekunle and Adejuyigbe, 2012).

Cad Application

Computer-Aided Design is a data that can facilitate design and to assist manufacturing process. Due to the complexity of product design nowadays, there is an increasing need to integrate computer simulation and designer intelligence for maximum benefits from expediting advanced design. Computer simulation has played an important role in the design stage. It is a system, which assumes or characteristic of the object under study. (Mohd, 2008).

Software Design

This is a process of problem solving and planning for a software solution. After the purpose and specifications of software are determined, software developers will design or employ designers to develop a plan for a solution. It includes low-level component and algorithm implementation issues as well as the architectural view (Wikipedia, 2006).

Chain Drive

This is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles. Most often, the power is conveyed by a roller chain, known as the drive chain or transmission chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system. Another type of drive chain is the Morse chain, invented by the Morse Chain Company of Ithaca, New York, USA. This has inverted teeth.

Power Transmission

A power transmission machine uses chains, gears, or belts, to provide a comparison of typical applications. Usually, chain is an economical part of power

transmission machines for low speeds and large loads. However, it is also possible to use chain in high speed conditions like automobile engine camshaft drives. This is accomplished by devising a method of operation and lubrication. Basically, there are lower limits of fatigue strength in the gear and the chain, but not in the belt. Furthermore, if a gear tooth breaks, the gear will stop at the next tooth. Therefore, the order is gear, chain, and belt in the aspect of reliability.

In most cases:

1. An increase in gear noise indicates that the end of the service life is near.
2. You will know that the chain is almost at the end of its life by wear, elongation or an increase in vibration caused by wear elongation.
3. It is difficult to detect toothed-belt life without stopping the machine and inspecting the belt carefully.

Some Features of Chain Drives

1. Chain can accommodate long shaft-centre distances (less than 4 m), and is more versatile.
2. It is possible to use chain with multiple shafts or drives with both sides of the chain.
3. It is easy to cut and connect chains.
4. The sprocket diameter for a chain system may be smaller than a belt pulley, while transmitting the same torque.
5. Sprockets are subject to less wear than gears because sprockets distribute the loading over their many teeth.

Sprockets

The chain converts rotational power to pulling power, or pulling power to rotational power, by engaging with the sprocket (oxford English dictionary, 2nd edition, oxford university press 1989). The sprocket looks like a gear but differs in three important ways:

1. Sprockets have many engaging teeth; gears usually have only one or two.
2. The teeth of a gear touch and slip against each other; there is basically no slippage in a sprocket.
3. The shapes of the teeth are different in gears and sprockets.

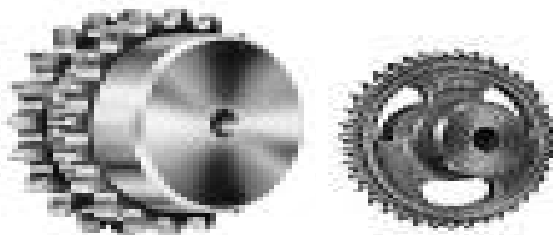


Fig. 1: sprockets. Source: (Ambrosio et al 2002)

Roller Chain Drive Systems

The dynamics of the roller chain drives is characterized by a complex behavior with impacts between the chain links and sprockets and by discontinuities in the system components velocities giving rise to transversal and longitudinal vibrations on the spans of the chain. These events are the responsible factors for part of the noise presented by mechanical devices that use roller chains and ultimately by the wear of the roller chain drives. Though roller chains have been used for a long time as a reliable mechanical component to transmit power and to handle materials mechanically, only in the last decades their dynamical behavior is studied, (Wang and Liu, 1991 Fritz and Pfeiffer, (1995) presented a methodology where the roller-sprocket and the guide chain contacts were treated as unilateral constraints.

Chain Strength

The most common measure of roller chain's strength is tensile strength. Tensile strength represents how much load a chain can withstand under a one-time load before breaking. Just as important as tensile strength is a chain's fatigue strength. The critical factors in a chain's fatigue strength is the quality of steel used to manufacture the chain, the heat treatment of the chain components, the quality of the pitch hole fabrication of the link plates, and the type of shot plus the intensity of shot peen coverage on the link plates. Other factors can include the thickness of the link plates and the design (contour) of the link plates. The rule of thumb for roller chain operating on a continuous drive is for the chain load to not exceed a mere $\frac{1}{6}$ or $\frac{1}{9}$ of the chain's tensile strength, depending on the type of master links used (press-fit vs. slip-fit). Roller chains operating on a continuous drive beyond these thresholds can and typically do fail prematurely via link plate fatigue failure (Fritz and Pfeiffer, 1995).

Bicycle Chain

A bicycle chain is a roller chain that transfers power from the pedals to the drive-wheel of a bicycle, thus propelling it. Most bicycle chains are made from plain carbon or alloy steel, but some are nickel-plated to prevent rust, or simply for aesthetics. Nickel also confers a measure of self-lubrication to a chain's moving parts. Nickel is a relatively non-galling metal.

Obsolete chain designs previously used on bicycles included the block chain, the skip-link chain, and the Simpson lever chain. Most modern bicycle chains used with a single chaining and single rear sprocket are conventional industrial bushing chain. However, it also wears much faster and has slightly worse mechanical efficiency than a bushing chain (wiki books, bicycle maintenance and repair, 2008). Before the safety bicycle, bicycles did not have chains and the pedals

were typically attached directly to the drive-wheel, thus limiting top speed by the diameter of the wheel and resulting in designs with front wheels as large as possible. Various linkage mechanisms were invented to raise the effective gear ratio, but with limited success. Using chain drive allowed the mechanical advantage between the drive and driven sprockets to determine the maximum speed, thereby enabling manufacturers to reduce the size of the driving wheel for safety. It also allowed for the development of variable gearing, allowing cyclists to adjust their gearing to the difficulty of the terrain, on the fly (Spicer and James, 1999).

Wear

Chain wear, or chain stretch, becomes an issue with extensive cycling. Although the overall effect is often called "stretch", chains generally wear through attrition of the bushings (or half-bushings, in the Sides design) and not by elongation of the side plates. The tension created by pedaling is insufficient to cause the latter. Because an old chain is longer than needed, its links will not precisely fit the spaces between teeth in the drive train, making gear shifts a problem and possibly resulting in a 'skipping' chain that reduces power transfer and makes pedaling very uncomfortable. Since chain wear is strongly aggravated by dirt getting into the links, the lifetime of a chain depends mostly on how well it is cleaned (and lubricated) and does not depend on the mechanical load. Therefore, well-groomed chains of heavily used racing bicycles will often last much longer than those of a lightly used, but not so well cleaned city bike. Depending on use and cleaning, a chain can last only 1,000 km (e.g. in cross-country use, or all-weather abuse), 3,000 to 5,000 km for well-maintained derailed chains, or more than 6,000 km for perfectly groomed high-quality chains, single-gear, or hub-gear chains (preferably with a full cover chain guard).

The chain in use on modern bicycles has a $\frac{1}{2}$ " pitch, which is ANSI standard #40, where the 4 in "#40" indicates the pitch of the chain in eighths of an inch, and metric #8, where the 8 indicates the pitch in sixteenths of an inch,(Matt d et al, 1998).

Length

New chains usually come in a stock length, long enough for most upright bike applications. The appropriate number of links must be removed before installation in order for the drive train to function properly. The pin connecting links can be pushed out with a chain tool to shorten, and additional links may be added to lengthen. In the case of derailleur gears the chain is usually long enough so that it can be shifted onto the largest front chain ring and the largest rear sprocket without jamming, and not so long that, when shifted onto the

smallest front chain ring and the smallest rear sprocket, the rear derailleur cannot take up all the slack. (Green et al., 1996).

Software Design

Software is a set of machine-readable instruction that directs a computer's processor to perform specific operations. The term is used to constant with computer hardware, the physical objects which are the processor and related devices that carry out the instructions. Hardware and software require each other; neither has any value without the other. (Adekunle et al, 2014). Software is a general term. It can refer to all computer instructions in general or to any specific set of computer instructions. It is a process of problem solving and planning for a software solution. After the purpose and specifications of software are determined, software developers will design or employ designers to develop a plan for a solution. It includes low-level component and algorithm implementation issues as well as the architectural view. The need for better quality control of the software development process has given rise to the discipline of software engineering, which aims to apply the systematic approach exemplified in the engineering paradigm to the process of software development (dictionary, 2007). A software design may be platform-independent or platform-specific, depending on the availability of the technology called for by the design, (Janadekar, 2004).

According to Adekunle *et al*, (2014), Software can be developed for a variety of purposes, the three most common being to meet specific needs of a specific client/business (the case with custom software), to meet a perceived need of some set of potential users (the case with commercial and open source software), or for personal use (e.g. a scientist may write software to automate a mundane task). Embedded software development, that is, the development of embedded software such as used for controlling consumer products, requires the development process to be integrated with the development of the controlled physical product. Software design can be considered as putting solution to the problem(s) in hand using the available capabilities. Hence the main difference between Software analysis and design is that the output of the analysis of a software problem will be smaller problems to solve and it should not deviate so much even if it is conducted by different team members or even by entirely different groups. But since design depends on the capabilities, we can have different designs for the same problem depending on the capabilities of the environment that will host the solution (whether it is some OS, web, mobile or even the new cloud computing paradigm). The solution will

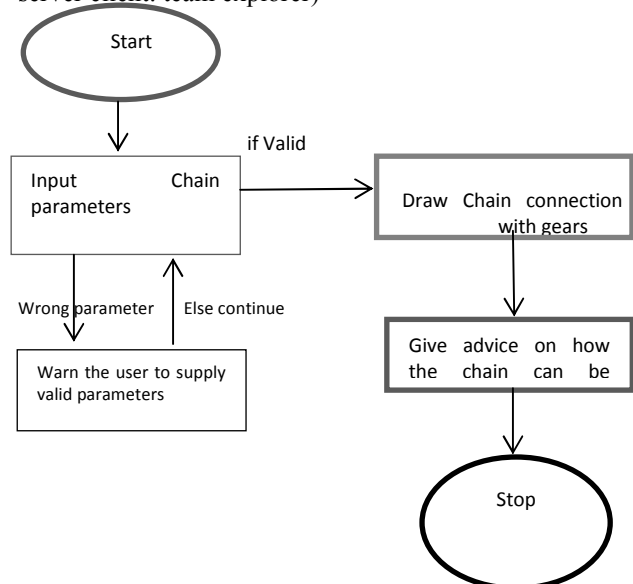
depend also on the used development environment. (Janadekar, 2004).

METHODOLOGY

Programming the computer to handle a design work involves the development of a set of instructions (program) in line with the design procedures, coding the instruction set with a high level programming language and using a compiler, which serves as an interface between the computer and user, to enable user supply various inputs or parameters of the design. The compiler translates the written program (high – level language) to a machine – readable program (low – level language) (Adekunle *et al* 2012).

Microsoft Visual Studio

This is an Integrated Development Environment (IDE) from Microsoft. It will be used to develop console and graphical user interface application along with window forms application, website, web applications and web services in both native code together with managed code for all platforms supported by Microsoft windows, windows mobile, windows CE, NET compact framework and Microsoft silver light. Visual studio comprises of a code editor supporting intelligence as well as code refractory. The integrated debugger works both as a source lead debugger and a machine level debugger. Other built in tools include a forms designer for building GUI applications, web designer, class designer and data base schemer designer. It accepts plug in that enhance the functionality at almost every level including adding support for source control systems(like sub version and visual source safe)and adding new tool sets like editors and visuals designers for domain. Specific languages or tool sets for other aspect of the development life cycle (like the foundation server client: team explorer)



RESULTS AND DISCUSSIONS

The challenges of this century have brought about drastically changes in the techniques used in the design of any mechanical system. Due to this revolution of change it has been discovered that vast majority of companies uses computer aided design programs to design their products. The application developed here enables the user to define specifically the length of the driver and the driven teeth of the sprocket, the power

transmitted, the gear ratios and so on showing this stages through different interface.

When the specifications are being entered correctly, there is a design button, after clicking on this design command, this same program converts it to computer aided design (CAD) commands that can be immediately tested for detailed design.

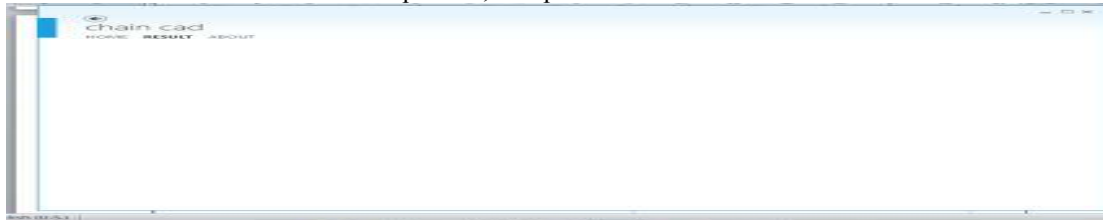


Plate 1: Initial interface

This is the users' friendly set up interface where all the required parameters would be inputted.

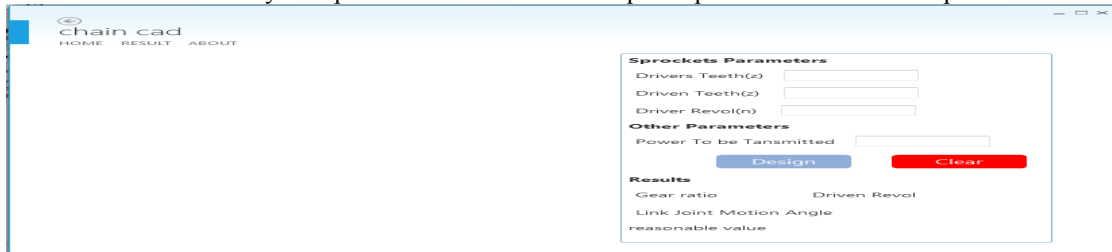


Plate 2

The interface is where sprocket parameters such as drivers teeth, driven teeth, driver revolution and other parameters were been inputted

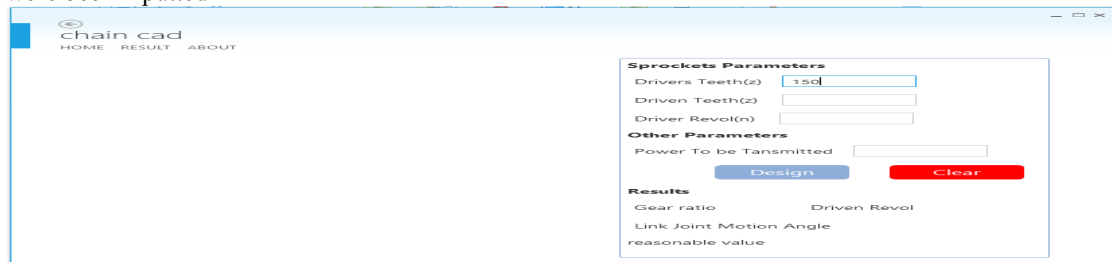


Plate 3

This is practically the first stage of operation where the dimension for the driver teeth is being supplied.

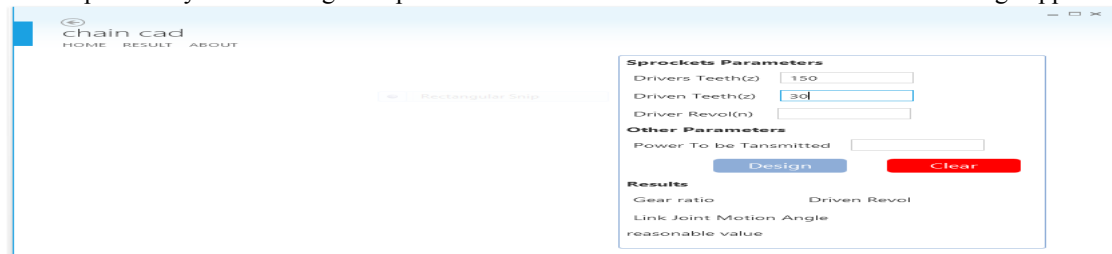


Plate 4

This is where the parameters for the driven teeth and the sprocket parameters were being inputted



Plate 5

This is where the driver revolution per minute required is specified by the user.

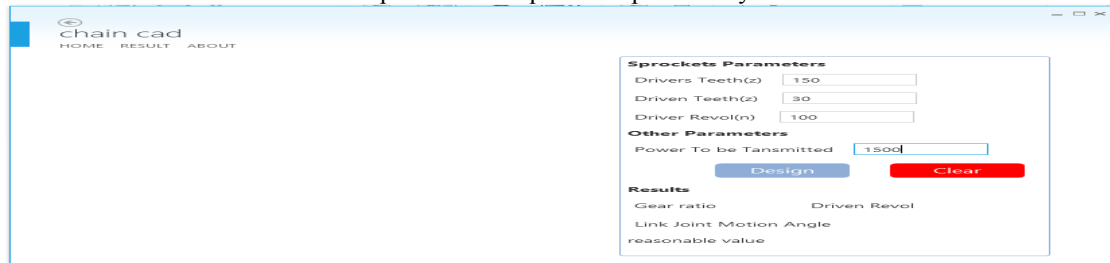


Plate 6

At this stage other parameters needed in the chain design such as the power transmitted was supplied.

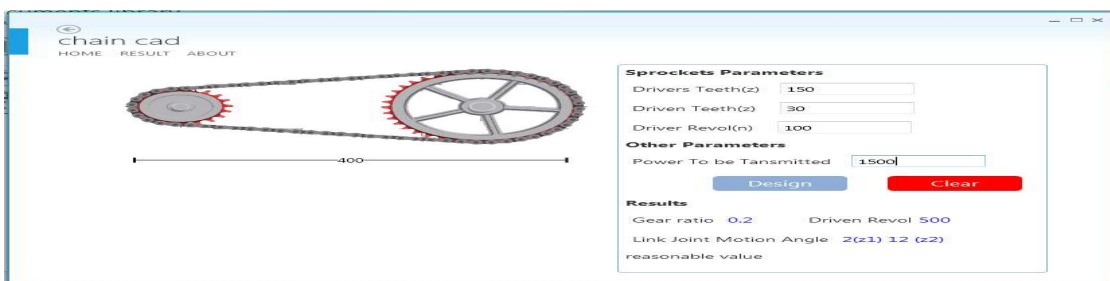


Plate 7

This is the most important stage of the design process, where simulation takes place, after clicking on the design button, the software automatically designs it to conform it to the given parameters and it shows the result of the design such as the gear ratio, driven revolution, link joint motion angle and in some

exceptional cases it gives advice on a reasonable value for optimum speed for the driver teeth where values exceeds a standard value. The diagrammatic representation of the design is shown on the right side of the interface showing the length between the driver and driven sprocket joined together with the aid of a chain.

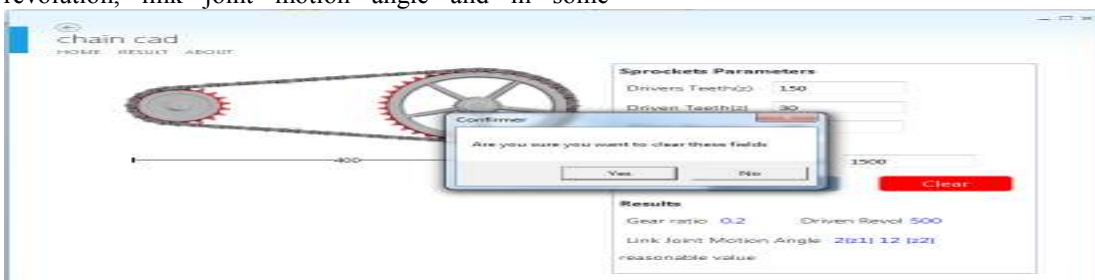


Plate 8

This is the final stage in the design. Having completed the design, the result generated shows the Gear ratio, Driven revolution and link angle were generated There is a clear button option, with a red sign, after clicking on the clear option, there is a confirmation drop down box asking whether to clear or not, after clearing the fields the interface automatically changes to a new page.

CONCLUSION

In summary, we have been able to derive a very easy means of designing chains with the aid of a CAD interface being used in the process of designs of chains. This process have been the most preferred by design engineers and craftsmen since it is very easy to access and it doesn't need rigorous calculations in its

application, mistakes can be easily corrected and it does not involve special techniques thus it can be said that it is very efficient in term of accuracy when compared with that of the manual design.

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EVALUATION OF AFRICAN PEAR (*DACRYODES EDULIS*) SEEDS-OIL AS A VIABLE FEEDSTOCK FOR BIODIESEL FUEL

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ABSTRACT

Viability of African Pear (*Dacryodes edulis*) Seed-oil as a potential feedstock for biodiesel was examined. The yield of the extracted oil was 59% of the total seed. Gas-chromatographic analysis of the oil extract showed that the oil was predominantly constituted by mono-unsaturated fatty acid (Oleic acid, 76%) while the percentage of the saturated fatty acids was 24% (palmitic acid 6.1%, Stearic acid 7.5% and others 10.4%). Pretreatment of the oil extract with 1% w/w H₂SO₄ showed tremendous reduction in the free fatty acid from 12.33±0.05 to 0.10 ± 0.02mgKOH/g. Biodiesel yield of the seed oil attained optimum yields at the methanol/oil molar ratio of 7:1, catalyst concentration of 1.00%, reaction temperature of 60°C, agitation speed of 850rpm and effective contact time of 120min. However, the yields of the biodiesel were higher at these experimental conditions with homogeneous KOH catalyst than its NaOH counterpart. Fuel properties such as smoke point, flash point, fire point, viscosity and specific gravity exhibited by the biodiesel of African Pear (*Dacryodes edulis*) were comparable with those of the petrol- diesel and the values fall within the acceptable limits of ASTM and EN standards.

KEYWORDS: african pear, acid pre-treatment, transesterification, fuel properties, biodiesel

INTRODUCTION

The largest proportion of the energy consumed in most parts of the world comes from fossil fuels sources. The high dependence on fossil fuels is attributed to the persistent global growth in industrialization and modernization. Nevertheless, the key resultant indicator of such high consumption and dependence are evident in the dwindling petroleum reserves and numerous environmental pollution challenges occasioned by emission of greenhouse gases. One severe consequence of greenhouse gas emissions is global warming, the chief driver of climate change. Presently, climate change constitutes the major environmental challenge at the world level and attracts so much concern due to the fact that many systems are tied to climate, a change in climate can lead to problems such as damage to property and infrastructure, lost productivity and mass migration and security threats. Of course, all these problems have adverse socio- economic implications of which poverty, hunger and displacement are key players. Hence, research attention is increasingly drifting towards the search for energy options that are environmental friendly, safer, renewable and sustainable.

Biodiesel is one of the various alternatives currently receiving attention globally due to its non-emission of obnoxious gases, excellent fuel properties and renewability (Anindita et al, 2012). Besides, biodiesel

is non-toxic, bio-degradable and blends satisfactorily with conventional diesel (Singh and Singh, 2009). Hitherto, notable among the chief raw materials for biodiesel are the edible vegetable oils. Utilization of edible oils as feedstock for biodiesel production poses a lot of concerns as this practice competes with food supply, encourages relatively high cost of edible vegetable oil and consequently, makes biodiesel relatively expensive. Therefore, concerted research efforts are geared towards identifying and evaluating indigenous non-edible seed oils as suitable feedstock. The present study is therefore focusing on exploring the potential of non-edible seed oil like African pear (*Dacryodes edulis*, Fig. 1) as feedstock for the production of biodiesel through alkali-catalysed transesterification.

The African pear, African plum or Safou, locally called 'Ube' among the Igbos in South eastern part of Nigeria belongs to the family of Burseraceae and botanically known as *Dacryodes edulis*. It is an indigenous fruit tree grown in the humid low lands and Plateau regions of West, Central African and Gulf of Guinea countries. In South-eastern Nigeria, the trees are grown around homesteads and flowering takes place from January to April. The major fruiting season is between May and October. It is an annual fruit of about 3cm in diameter and contains a leathery shelled stone surrounded by a

pulpy pericarp about 5mm thick. The pericarp is butyraceous i.e, having the qualities of butter. It is this portion of the pear which is eaten, either raw or cooked that forms a sort of 'butter'. Besides, the pulp contains 48% oil and a plantation can produce 7-8 tonnes of oil per hectare. This makes it useful as feedstock for biodiesel production.(Awono et al, 2002)



Figure 1: Dacryodes edulis fruits

MATERIALS AND METHOD

Sample Collection and Treatment

Dacryodes edulis seeds used in this process was purchased from Oore township market in Odigbo Local Government Area of Ondo State, Nigeria. The seeds were dehulled, sun dried for seven days and finely ground into powder using milling machine then stored in an air-tight container before the extraction process was carried out.

Extraction of Oil

One hundred grams(100g) of the powdered *Dacryodes edulis* seeds was wrapped with whatmann filter paper and transferred into the thimble of Soxhlet extractor. The thimble was carefully fixed on a 1-litre capacity round-bottomed flask. 700ml of n- hexane (B.p. 40-60°C) was poured to about two-third of the volume of the flask and heated at 60°C on a thermostatically controlled heating mantle and allowed to reflux continuously for 6hrs. Percentage oil yield was determined as expressed and replicate extraction process was performed.

$$\text{Seed oil content} = \frac{W_o}{W_s} \times 100$$

Where W_o = weight of the oil extracted
 W_s = weight of the sample

Pretreatment of the Oil Extract

A pretreatment procedure was performed on the oil extract due to its high Free Fatty Acid (FFA) content of 12.33mg/KOH/g. Thus the FFA was reduced below 1.0% using methanol and concentrated Sulphuric acid as catalyst prior to transesterification reaction.

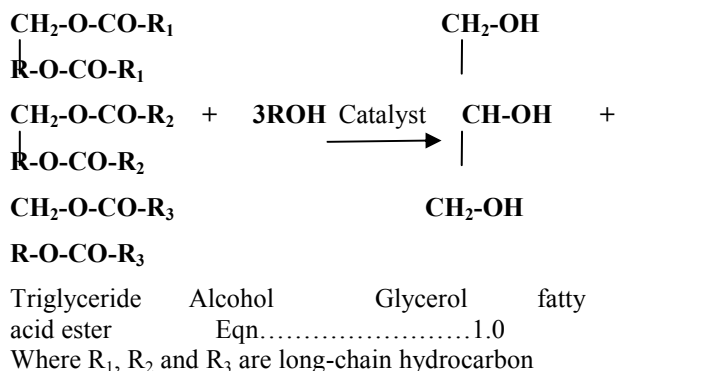
87ml of the oil was weighed into a 500mL flat bottomed flask, 12ml of methanol and 1% H_2SO_4 were added. The mixture was agitated at a high speed of 450rpm and temperature of 60°C using Surgifriend AM-3250B magnetic stirrer within a reaction time of 120min.

The mixture was then transferred into a 50mL separating funnel which later separated into three layers comprising water at the bottom, pretreated oil in the middle and methanol at the upper layer. The mixture was carefully separated by removing the water first, followed by the oil and finally the methanol. The pretreated oil was poured into a beaker and dried carefully in an oven regulated at a temperature of 105°C until the residual water evaporated off completely. After this process, the pretreated oil was made ready for the transesterification process.

Transesterification Process

The homogenous base-catalyzed transesterification reaction was performed as described by Umer et al, 2009. Controlling experimental parameters such as methanol to oil molar ratio, catalyst concentration, agitation speed, contact time and temperature were examined within specific range of values to ascertain optimum experimental conditions for the reaction..

The transesterification reaction was carried out using a 250mL round bottomed flask equipped with thermostat, mechanical stirrer, sampling outlet and condensation system. About 50g of the pretreated oil was initially heated to the set temperatures (50, 55, 60, 65 and 70°C) on a hot plate prior the reaction. Freshly prepared methanolic solutions of NaOH and KOH at varying concentrations of 0.25, 0.50, 0.75, 1.00 and 1.25% (based on the weight of the oil) were added to the oil. And the experiment was conducted at a time for 120min at varying temperatures, methanol to oil molar ratio (3:1,5:1, 6:1,9:1,12:1 and 15:1) and agitation speed within the range of 200-850rpm to determine the best experimental conditions for complete conversion of the vegetable oil in to fatty acid methyl ester (biodiesel) as illustrated in eqn 1.0



Phase Separation, Washing and Purification of Biodiesel

At the completion of the transesterification process, the mixture was allowed to stand overnight to ensure proper settling and easy separation of the glycerin portion of the mixture. The ester left in the separating funnel was quite caustic with a pH between 8.0 and 9.0 and washed thrice with warm water to remove residual catalyst. Complete removal of the catalyst from the ester was assured by determining the amount of potassium salt in the glycerin phase and the total potassium removed from the ester phase. The sum of these accounted for all of the potassium entering the reaction as a constituent of the catalyst. The washed ester (biodiesel) was poured into a 250mL beaker, placed in an oven set at 105^oC and dried for 2hr. Finally, volumes of the biodiesel and percentage yields were noted. The procedure was repeated using NaOH catalyst.

RESULTS AND DISCUSSION

Percentage Oil Yield and Fatty Acid Content

The extraction process showed that the percentage oil yield from *Dacryodes edulis* was 59% . This yield was relatively higher than the yields reported for other non-edible seed oil like mangifera indica; 30.7% (Ogunsuyi, 2012) almond seed oil; 47%, (Ogunsuyi and Daramola, 2013). The observed oil content of *edulis* was also found comparable to the yields of some edible oil such as soybeans 65% and cottonseed 60% (Rashid et al, 2009). The relatively high oil content of *Dacryodes* will encourage less dependence on edible oils as feedstock for biodiesel production, therefore promotes food security and food availability. Besides, the cost of producing biodiesel will be minimized, since the major feedstock is cheaply available, hence making biodiesel economically pleasant.

The fatty acid composition of *Dacryodes edulis* seed oil is as given in Table 1 and Fig.1. *Dacryodes edulis* oil comprises 13.6% saturated acids (palmitic and stearic) and 86.40% unsaturated acids (oleic, linoleic and linolenic). The dominant monounsaturated fatty acid of the oil was Oleic, which accounted for 76% of the total fatty acid content, hence, the oil belongs to oleic acid category (Sonntag, 1982).The oleic acid content of *Dacryodes* is comparatively higher than 15-20% reported for cottonseed oil and contains lower palmitic acid than 22-26% reported for cotton seed(Rashid et al, 2009) . Nevertheless, the fatty acid components of the *Dacryodes* oil were found to be consistent with the fatty acids present in typical oils used for producing biodiesel.

Physical and Fuel Properties of the Raw Oil and Biodiesel of *Dacryodes edulis*

Table 2 shows the physiochemical properties of the raw-oil of *Dacryodes edulis* seeds. The oil has high acid number and free fatty acid values of 24.66mgKOH/g and 12.33mgKOH/g respectively. These high values justified the pretreatment step carried-out on the raw-oil before the transesterification step. Otherwise, the alkali catalyst used in the conversion reaction will react with the excess FFA to form soap. Soap formation is undesirable as it lowers the yield of biodiesel and inhibits separation of biodiesel from glycerol (Widyan and Shyoukh, 2002). In addition, excess FFA binds with catalyst and consequently leads to more consumption of the catalyst, which implies a higher cost of production (Soriano et al, 2009). The physicochemical properties of the raw oil compare favourably with those of some other non-edible oils such as *Pongamia pinnata* (Agarwal and Garima, 2011), *Jatropha Curcas* (Adebayo et al, 2011), *Madhuca Indica*(Azam et al, 2005). The raw oil of the seed has higher values of Smoke point (170^oC), Flash point(182^oC) and Fire points (229^oC) than their corresponding values in the biodiesel generated as shown in Table 3. This implies that the seed oil exhibited improved fuel properties upon transesterification process. The flash point(0^oC) of the biodiesel were found to 152.5±0.16 and 136±2.00 respectively with NaOH and KOH catalysts, these values are comparatively higher than that of the petrol-diesel and also fall within the acceptable standard values (Table 3). This implies that the biofuel will be safer to handle than its petrol-based counterparts since flash point is an important parameter that determines the safety, handling and storage of fuel. These properties imply that the biodiesel of *Dacryodes* seed oil is promising. .

Viscosity plays a critical role in fuel combustion, it influences atomization of fuel upon injection into the combustion chamber and causes formation of soot and engine deposit if too high (Landommatos, 1996). The viscosity of the raw oil of *edulis* at 27^oC was 3.70cSt but after transesterifying the raw oil, there was a remarkable reduction in the viscosity of the biodiesel generated as shown in Table 3. This indicates that the transesterification option chosen for the conversion of the seed oil was successful. This observation is quite consistent with the findings of Fukuda, (2001.)

Effect of Type and Amount of Catalyst on the Yield of Biodiesel of *Dacryodes* Seed Oil

The effect of catalyst concentration on the yield of *Dacryodes edulis* biodiesel is as shown in fig.3. The trend shows that the yields were initially increasing with catalyst concentration but after attaining the optimized concentration, it began to decline. This observation

could be explained by the fact that the formation of soap hindered the separation of the biodiesel phase during the washing step. The soap particles formed emulsions with water, which resulted into increase in viscosity. The effect of soap formation was evident in the high viscosity of the reaction mixture in the course of the experiment, which resultantly made recovery of the biodiesel quite difficult. Of the two homogeneous catalysts employed for the experiment, KOH showed higher biodiesel yields compared to its NaOH counterpart

Effect of Methanol/Oil Molar Ratio on the Yield of Biodiesel of *Dacryodes* Seed Oil

The influence of molar ratio on transesterification reaction with *Dacryodes edulis* seed oil was studied using six different molar ratio of 3:1, 5:1, 6:1, 9:1, 12:1 and 15:1methanol/oil. The respective yields at each molar ratio are given in Table 4. A steady increase was observed from the lowest molar ratio of 3:1 up to 7:1 regardless of the type of catalyst used. The progressive yields indicated positive influence of the methanol/oil ratio on the transesterification reaction of the seed oil and this observation substantiate the fact that the methanol was sufficient to break the glycerine-fatty acid linkages (Widyan et al, 2002). However, at molar ratios higher than 7:1, the yields began to decline, which showed that further increase beyond the optimized ratio had little or no impact on the ester yield. This trend can be explained by the fact that methanol has polar hydroxyl group which act as an emulsifier causing emulsification that made the separation of the ester layer from the water layer very difficult at higher volume of the methanol thus, causing loss in the yield of the ester. (Leung and Guo, 2006).

Effect of Temperature on the Yield of Biodiesel of *Dacryodes* Seed Oil

Fig. 4 shows the effect of reaction temperature on the biodiesel yield of *Dacryodes edulis* seed oil, while other parameters such as Methanol/oil molar ratio of 7:1 and 1.00%KOH/NaOH were fixed.. The figure shows that as the temperature increases the yield of the biodiesel increases. High conversion efficiency of 64.20% and 60.08% were observed respectively with KOH and NaOH as catalyst at 60°C. Above which, the yield began to decrease because a higher reaction temperature

accelerates the saponification reaction of triglycerides (Leung et al, 2006 and Eevara et al, 2009).

Effect of Contact Time on the Yield of Biodiesel of *Dacryodes* Seed Oil

Fig.5. shows the variation in the yields of *Dacryodes* biodiesel with contact time. At 30min the reaction was slow due to the mixing and dispersion of methanol into the oil (Freedman et al, 1984). After some time, the reaction proceeded faster until maximum yield was reached at 120min. However, at higher contact time than 120min, reduction in the biodiesel yield was noticed and this was due to the reaction between the fatty acids and alkali to form soaps (Eevara et al; 2009)

Effect of Agitation Speed on the Yield

Fig. 6 depicts the effect of agitation speed on the yield of biodiesel. At the lowest stirring speed i.e. 200rpm, the yields were 40.00% and 41.20% for NaOH and KOH catalysts respectively. At the highest stirring speed i.e. 850rpm, the yield of the biodiesel were 60.80 and 64.20% with the two homogeneous catalysts respectively. This observation is in avariance to the optimum stirring speed of 600rpm reported for some non-edible seed oils investigated for biodiesel production (Rashid et al, 2009; Ma et al, 1998; Peterson et al, 1992). This implies that efficient mixing during transesterification is crucial to optimum yield of biodiesel with *Dacryodes edulis* seed oil.

CONCLUSION

Dacryodes edulis seed oil is found a promising feedstock for biodiesel considering the physical and fuel properties of both the raw oil and biodiesel of the seed which are compatible with the standard values. In addition, the close comparison of its properties with those of the conventional diesel encourages blending with petrol diesel. Therefore, exploitation of oil-plant biomass such as African pear (*Dacryodes edulis*) as substitute for fossil fuel will reduce the ever increasing emission of green house gases associated with petrol diesel, hence, providing a safer, cleaner and pollution free environment. Furthermore, the research outcome clearly demonstrated that African pear seed oil can be gainfully utilized for biodiesel production, thereby encourages its cultivation on industrial scale for sustainable and cheap source of feedstock

Table 1: Free Fatty Acid Composition of *Dacryodes edulis* Seeds Oil

Fatty acid	Systemic name	Formula	Amount (%)
Palmitic	Hexadecanoic	C ₁₆ H ₃₂ O ₂	6.1
Stearic	Octadecanoic	C ₁₈ H ₃₆ O ₂	7.5
Oleic	Cis-9-Octadecanoic	C ₁₈ H ₃₄ O ₂	76.0
Linoleic	Cis-9, Cis-12-Octadecadienoic	C ₁₈ H ₃₂ O ₂	1.9
Others(Linolenic)	Cis-9, Cis-12, Cis-15-Octadecatrienoic	C ₁₈ H ₃₀ O ₂	8.5

Table 2: Physiochemical properties of the extracted *Dacryodes edulis* seeds oil

Parameter	Mean \pm SD
Acid value	24.66 \pm 0.10
Free Fatty Acid	12.33 \pm 0.05
Peroxide value	45.20 \pm 0.10
Saponification value	171.10 \pm 0.2
pH	4.39 \pm 0.00
Smoke point ($^{\circ}$ C)	170 \pm 0.15
Flash point ($^{\circ}$ C)	182 \pm 0.20
Fire point ($^{\circ}$ C)	229 \pm 0.10
Viscosity @ 27 $^{\circ}$ C(Cst)	3.70 \pm 0.05
Specific gravity	0.81 \pm 0.00
Refractive index	1.44 \pm 0.02

Values are mean \pm S.D of triplicate determination

Table 3:- Comparison between the Fuel Properties of D.edulis Biodiesel and Petrol Diesel

	Biodiesel (NaOH)	Biodiesel (KOH)	Petro-diesel	ASTMD6751	EN14214
Acid value	0.84 \pm 0.28	0.34 \pm 0.17	Max 0.8	0.50max	0.50max
Free Fatty Acid	0.42 \pm 0.14	0.17 \pm 0.03	0.40	-	-
pH	4.63 \pm 0.00	3.62 \pm 0.02	-	-	-
Smoke point ($^{\circ}$ C)	138 \pm 2.00	129 \pm 1.00	80 $^{\circ}$ C	-	-
Flash point ($^{\circ}$ C)	152.50 \pm 0.16	136.50 \pm 0.20	82 $^{\circ}$ C	93min	120min
Fire point ($^{\circ}$ C)	177.05 \pm 1.00	150.20 \pm 0.50	78 $^{\circ}$ C	-	-
Viscosity @ 27 $^{\circ}$ C	2.60 \pm 0.12	2.45 \pm 0.00	1.9-6.0	1.9-6.0	3.5-5.0
Density/cm ³	0.825 \pm 0.00	0.80 \pm 0.01	0.835	0.888	0.86-0.90
Refractive index	1.442	1.433	1.32	-	-

Min= minimum

Table 4 :Effect of methanol /oil molar ratio on the yield of Biodiesel using NaOH catalyst

Molar ratio of methanol/oil	Reaction time	Yield of Biodiesel
3:1	120mins	19.60
5:1	120mins	27.30
6:1	120mins	30.40
7:1	120mins	33.70
9:1	120mins	31.10
12:1	120mins	22.:50

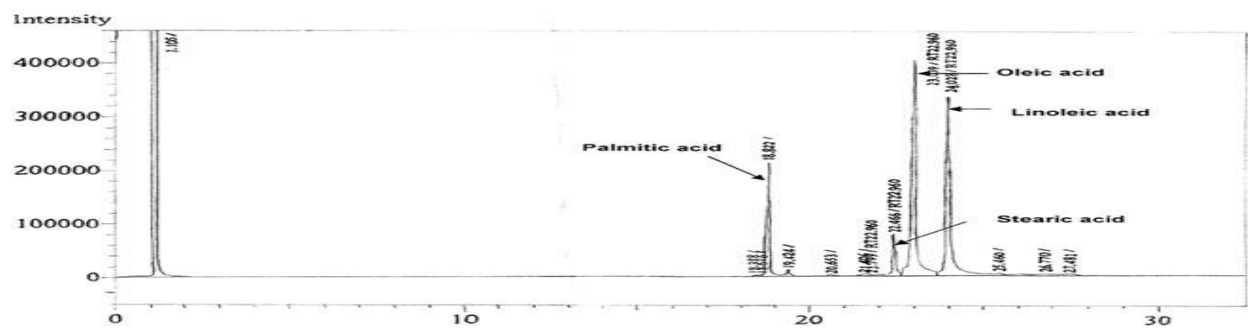


Figure 2: GC profile of *Dacryodes edulis* seeds oil.

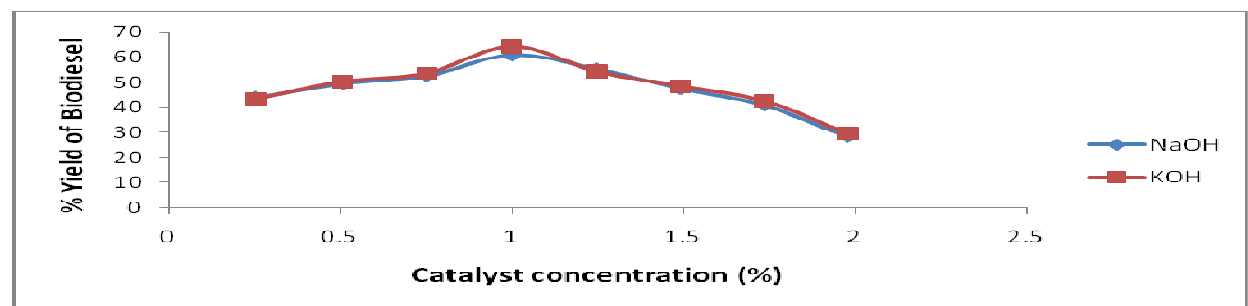


Figure 3: Effect of catalyst concentration on the yield of Biodiesel

Table 5: Effect of molar ratio on the yield of Biodiesel using KOH catalyst

Table 4 :Effect of methanol /oil molar ratio on the yield of Biodiesel using NaOH catalyst	Molar ratio of methanol/oil	Reaction time	Yield of Biodiesel
	3:1	120mins	19.60
	5:1	120mins	27.30
	6:1	120mins	30.40
	7:1	120mins	33.70
	9:1	120mins	31.10
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	7:1	120mins	33.70
	9:1	120mins	31.10
	12:1	120mins	22.:50

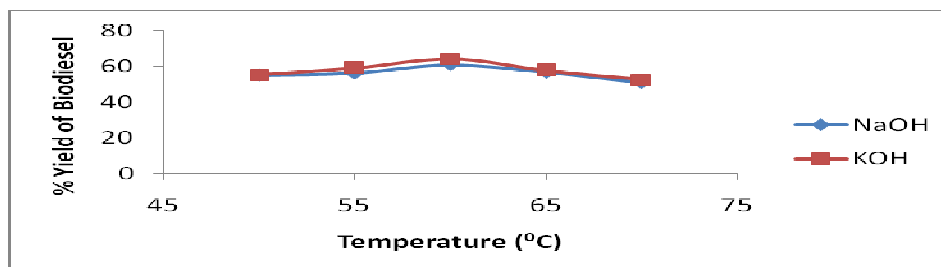


Figure 4:- Effect of reaction temperature on the yield of Biodiesel

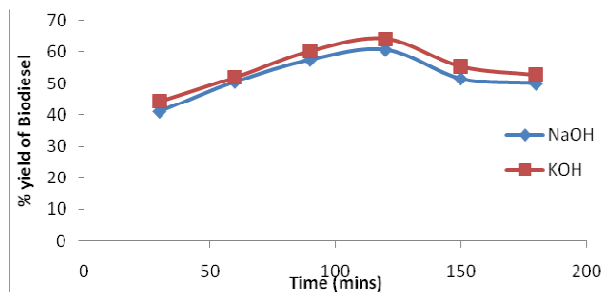


Figure 5:- Effect of contact time on the yield of Biodiesel

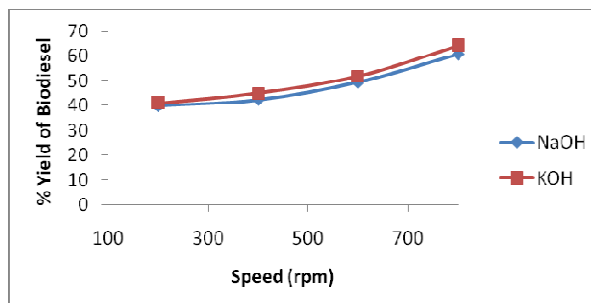


Figure 6:- Effect of Agitation speed on the yield of Biodiesel

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CAPACITY BUILDING THROUGH DEVELOPMENT OF ASSOCIATED GAS AS A SOURCE OF DOMESTIC ENERGY FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

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ABSTRACT

Identifying resource capability is a form of national capacity building strategy through which sustainable development and poverty alleviation can be achieved. Meeting the domestic energy needs of a nation has the potential in alleviating poverty and bringing about sustainable development. Nigeria is one of the major oil-producing nations and her gas reserves are well over 187 trillion ft³ (2,800 km³). This study reviewed associated gas utilization in Nigeria, carried out the estimation of associated gas being produced and flared in some selected identified associated gas producing sites in the Niger Delta region of Nigeria, and investigates the potential of Associated Gas (AG) as a source domestic energy. Study results revealed that the total quantity of Associated Gas (AG) utilized from 2002 to 2010 amount to about 12,201,493,638 mscf valued at \$14,837,016,263.80 and Naira equivalent of N2, 225,552,439,570.00, and the total quantity of Associated Gas (AG) flared from 2002 to 2010 amount about to 6,570,297,427 mscf valued at \$7,989,481,671.23 and Naira equivalent of N1, 198,422,250,680.00. Considerable amount of associate gas which can be annexed as energy source is being wasted through flaring. This study recommends the development necessary facilities that will optimize the use of associated gas for domestic energy needs.

KEYWORDS: capacity building, domestic energy, associated gas, flaring, sustainable development.

INTRODUCTION

Capacity building encompasses the country's human, scientific, technological, organizational, institutional and resource capabilities. A fundamental goal of capacity building is to evaluate and address the crucial questions related to policy questions, policy choices and modes of implementation among development options, based on an understanding of environment potentials and limits and needs perceived by the people of the country concerned (UNCED, 1992). It is on this note that the present study look into the area of Capacity Building through development of Associated Gas (AS) as a source of Domestic Energy for sustainable development in Nigeria. Julius (2007) has identified that the formulation of a long-term growth strategy geared towards the development of human capital and infrastructure will redress the current imbalances in the system and drive economic growth in Nigeria. Julius (2007) further recommend the restoration of education standards at all levels, to which the nation will need to

commit 25 percent of its budget for the construction of classrooms, training of teachers and redesign of curriculum, rehabilitation of health care infrastructure, and a commitment of 10 percent of the budget to health. Creation of social security apparatus as a safety net, this will include an overhaul of pension scheme to make it contributory for everyone, employment creation, revamping the public transport systems and housing. Ogbo (2009) noted in her article on occupational safety management adherence for sustainable development in Nigeria that quality of a working environment has a strong influence on the performance and profitability of firms., and that recent technological advancement of modern industry has considerably increase the potential dangers from dust, fumes, and gases to the humans and environment. Nigeria, located in West Africa on the Gulf of Guinea, is a federal constitutional republic comprising thirty-six states and its Federal Capital Territory, Abuja. The country has a total area of

923,768 km² (356,669 sq mi), making it the world's 32nd-largest country. Since the British discovered oil in the Niger Delta area of Nigeria in the late 1950s, the oil industry has been main generator of Gross Domestic Product (GDP) for the nation. As of 2000, oil and gas exports accounted for more than 98% of export earnings and about 83% of federal government revenue, as well as generating more than 40% of its GDP. It also provides 95% of foreign exchange earnings, and about 65% of government budgetary (Bronwen, 2007). Nigeria is one of the few major oil-producing nations still capable of increasing its oil output. Nigeria gas reserves are well over 187 trillion ft³ (2,800 km³) and the gas reserves are three times as substantial as the crude oil reserves. The biggest gas initiative is the Nigerian Liquefied Natural Gas Company, which is operated jointly by several companies and the state. It began exploration and production in 1999.

Domestic energy is the amount of energy spent on the different appliances used within housing. The amount of energy used per household varies widely depending on the standard of living of the country, climate and type of residence as well as availability of energy source. The common domestic energy sources in Nigeria are fuel wood, charcoal, sawdust, solar energy, electric power, kerosene and gas (Ibitoye and Adenikinju, 2007; Milton, 2005). The Nigerian domestic energy industry is still inefficient in meeting the needs of the Nigerian citizens. This is most evident in the persistent disequilibrium in the utilization of electricity and petroleum products, especially kerosene and diesel. The dismal energy service provision has adversely affected living standards of the population and exacerbated income and energy poverty in an economy where the majority of the people live on less than \$2 a day. Yet, Nigeria is rich in domestic energy resource and the sixth largest exporter of crude oil in the world (Ibitoye and Adenikinju, 2007). Nigeria is engrossed in a persistent inadequate quantity, poor quality and low access to domestic energy despite the enormous domestic endowments of non-renewable and renewable primary energy resources (Adenikinju, 2005). Coal reserves are also substantial at 2.75 billion metric tons. Also, a large amount of renewable energy resources including hydroelectricity, solar, wind and biomass energy are present. Despite being a world ranking exporter of liquefied natural gas (LNG), Nigeria's electricity supply and distribution experiences frequent system collapse linked often to inadequate gas supply (Adenikinju, 2005).

There also exists the extensive substitution of poor public electricity supply with highly polluting self-generated power and also the scarcity of kerosene combined with kerosene shortage due to high prices has

induced greater use of fuel wood for the low and middle income classes with adverse environmental consequences. Diesel shortages have crippled industrial production dependent on diesel-generated (Adenikinju, 2005). So it is evident that there is increase in domestic energy needs in Nigeria. The conventional sources like wood products are causing desertification due to over exploring while kerosene is beyond the reach of the common citizen due to scarcity and high cost. Also the power supply is still erratic. All these bring about the need for alternate energy source to meet the domestic energy needs. One possible area presently under exploited is Associated Gas. Associated Gas (AG) can be defined as natural gas found in association with oil, either dissolved in the oil or as a cap of free gas above the oil. In other terms, raw natural gas that comes from crude oil wells is also called associated gas. This gas can exist separate from the crude oil in the underground formation, or dissolved in the crude oil (www.assogas.co.uk). Utilization of associated gas which is still been flared in Nigeria could help in meeting part of the domestic energy needs as well reduce of atmospheric emissions.

Hence, this study is aimed at reviewing associated gas utilization, carrying out the estimation of associated gas being produced and flared in some selected identified associated gas producing sites in the Niger Delta region of Nigeria, and investigates the potential of Associated Gas (AG) as a source domestic energy in Nigeria. The significance of this study lies in its potential of assisting in the determination of potential benefit of associated gas that is been flared in Nigeria as well assist the government and relevant stakeholders with useful information on the need to harness the Associated Gas (AG) for better usage. Thus optimizing use of the gas for the benefit of the Nigerian citizens, reduce pollution and as well enhance the economy of the country. In this way, national sustainable development and poverty alleviation can be achieved.

MATERIALS AND METHODS

Primary and secondary data were used for the study. Primary data was collected with the use of well-structured questionnaire administration and personal observation while direct interviews with the operators and workers were carried out when it was considered necessary. Secondary data was also gathered from published articles and reports as well as company's Associated Gas (AG) production and flaring records. The study covers the associated gas produced in some oil and gas producing fields in the Niger Delta area of Nigeria. The fields are: Antan, Okono, Okoro, Okwori, and Yoho. The various data collected were analysed using descriptive statistics of percentages.

RESULTS AND DISCUSSION

Efforts to Utilize the Flared Gas in Nigeria

The consumption of natural gas increased steadily in the late 1970s, 1980s and in 1990 constituted more than 20 percent of Nigeria's total energy from commercial sources. The quantity of gas used was only a fraction of what was available. In 1988, with the largest natural gas reserves in Africa, Nigeria produced 21.2 billion cubic meters per day, with 2.9 billion cubic meters used by the National Electric Power Authority (NEPA) now Power Holding Company of Nigeria (PHCN) and other domestic customers, 2.6 billion cubic meters used by foreign companies, and 15.7 billion cubic meters (77 percents) wasted through flaring. Small amounts of gas were also consumed by petroleum producers to furnish power for their own operations and as fuel for some equipment. Domestically, there remained a large market for Liquefied Petroleum Gas (LPG) (Oyekunle, 1999).

In the early 1990, Nigeria embarked in a major project to market Liquefied Natural Gas (LNG) instead of flaring gas produced in the oil fields by building a gas liquefaction plant by the Bonny River. Four companies signed an agreement in May 1989 to implement this plan: NNPC (60 percent), Shell (20 percent) Agip (10 percent) and Elf Aquitaine (10 percent), with plant construction scheduled to begin in 1991 (www.nnpcgroup.com, 2012). Other aspects of the project involved Nigerian government construction of gas pipelines for distribution to domestic, residential and commercial users and as well supply gas to the NNPC chemical complex at Port Harcourt. Much of the gas was however intended for export (Oyekunle, 1999). Nigeria flares more associated gas than any other country, with estimates suggesting that of the 3.5 billion cubic feet (99,000,000 m³) of associated gas (AG) produced annually, 2.5 billion cubic feet (71,000,000 m³), or about 70% is wasted via flaring. Statistical data associated with gas flaring is unreliable, but Associated Gas (AG) wasted during flaring is estimated to cost Nigeria US \$2.5 billion on a yearly basis. Companies

operating in Nigeria harvest associated gas for commercial purposes however prefer to extract it gas from deposits where it is found in isolation as non-associated gas. It is costly to separate commercially viable associated gas from oil, hence gas flaring is carry out to increase crude production (Gas flaring in Nigeria, 2004). Gas flaring is discouraged by the international community as it contributes to climate change. In fact, in Western Europe 99% associated gas is used or re-injected into the ground. Gas flaring in Nigeria releases large amounts of methane, which has very high global potential. The methane is accompanied by carbon dioxide, of which Nigeria is estimated to have emitted more than 34.38million tons in 2002, accounting for about 50% of all industrial emissions in the country and 30% of the total CO₂ emissions. As flaring in the west has been minimized, in Nigeria it has grown proportionally with oil production. While the international community, the Nigerian government, and the oil corporations seem to agree that gas flaring need to be curtailed, efforts to do so have been slow and largely ineffective.

Gas flares release a variety of potentially poisonous chemicals such as nitrogen dioxides, sulphur dioxide, volatile organic compounds like benzene, toluene, xylene and hydrogen sulfide, as well as carcinogens like benzopyrene and dioxin. Often gas flares are often close to local communities, and lack adequate fencing or protection for villagers who may risk nearing the heat of the flare in order to carry out their daily activities. Flares which are often older and inefficient are rarely relocated away from villages, and are known to coat the land and communities in the area with soot and damage adjacent vegetation.

Gas Utilization and Flared on Yearly Basis (mscf) (2002 – 2010)

The Associated Gas utilization and flared by companies operating in the study area is presented in Table1.

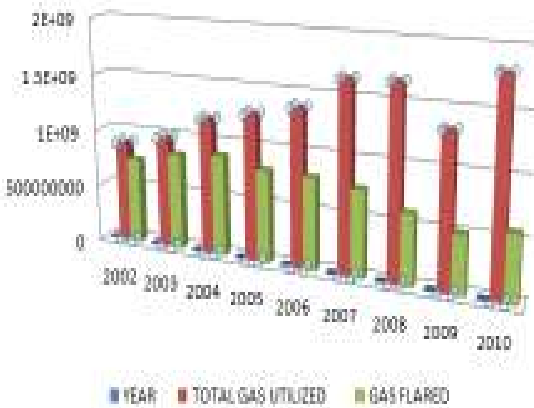
Table 1: Total gas utilization and flared by companies on yearly basis (mscf) 2002 – 2010

Year	Total Gas Utilized	Gas Flared	% Gas Flared	Value Of Gas Flared In Dolas [\$]	Value Of Gas Flared In Naira [N]
2002	897,789,582	753,801,906	45.64	9,166,231,176.96	1,374,934,676,544
2003	983,562,969	844,978,886	46.21	10,274,943,010.50	1,541,241,451,575
2004	1,195,742,993	886,540,196	42.58	10,780,328,455.00	1,617,049,268,250
2005	1,282,313,082	811,315,777	38.75	9,865,599,848.32	1,479,839,977,248
2006	1,378,770,261	803,661,823	36.82	9,772,527,767.68	1,465,879,165,152
2007	1,655,960,315	759,688,726	31.45	9,237,814,908.16	1,385,672,236,224
2008	1,668,148,489	619,389,854	27.08	7,531,780,624.64	1,129,767,093,696
2009	1,327,926,402	509,351,905	27.72	6,193,719,164.80	929,057,874,720
2010	1,811,279,545	581,568,354	24.30	7,071,871,184.64	1,060,780,677,696

NB: Gas is measured in Million Standard Cubit Feet (MMSCF) which has present market value of \$1.216 per Million Standard Cubit Feet (MMSCF) of gas.

The equivalent naira value of the dollars is obtained by the corresponding exchange rate of 1\$ = N150:00K as at 2012.

FIG.1: ASSOCIATED GAS UTILIZED AND FLARED



From the Table 1 and figure 1, the following can be deduced:

- i. Total quantity of Associated Gas (AG) produced from 2002 to 2010 amount to 18,771,791,065 mscf valued at \$22,826,497,935.00 and Naira equivalent of N3, 423,974,690,250.00.
- ii. Total quantity of Associated Gas (AG) utilized from 2002 to 2010 amount to 12,201,493,638 mscf valued at \$14,837,016,263.80 and Naira equivalent of N2, 225,552,439,570.00.
- iii. Total quantity of Associated Gas (AG) flared from 2002 to 2010 amount to 6,570,297,427 mscf valued at \$7,989,481,671.23 and Naira equivalent of N1, 198,422,250,680.00.
- iv. Though the percentage of flared gas reduces in quantity from 2004 to 2010, there was no evidence that it was channel to meet domestic energy needs.

Disposal of associated gas has been a major problem for the Nigerian oil and gas industry. Most of this associated gas is flared because of lack of commercial outlets. For example, according to Oyekunle (1999), Escravos gas plant which produces about 140 mmscf/d of treated gas, send about 100 mmscf/d of this gas to NGC and flares the remaining 40mmscf/d. At the same time also, SPDC flared almost 1,092 mmscf/d of its associated gas which was 80% of gas production in 2000. Ajao (2000) has earlier observed that the lack of political will on the part of the Nigerian Government to reduce the amount of gas flared has not encouraged potential investors to recover the gas for utilization. Apart from the Gas Re-injection Decree of 1979 with amendment in 1985 to discourage gas flaring, no much was done if not the Nigerian Liquefied Natural Gas Project meant for export of Gas.

The study shows that some companies flare associated gas more than other oil companies. This is as a result of

those companies having many oil and gas producing fields in Nigeria. Shell, the biggest flarer of associated gas in Nigeria claims that only 50% of all associated gas is burnt off via flaring presently. However, this statistics is accepted by few. The World Bank reported in 2004 that Nigeria currently flares 75% of the gas it produces (McLennan and Stewart, 2005). From the results, flaring of associated gas decreased from 2004 to 2010 despite new fields are being discovered. This could be due to the introduction of modern technologies that facilitates the utilization of associated at the fields.

Consequences of Continuous Gas Flaring in Nigeria

Nigeria, which according to UN economic commission for Africa is categorized as a gas – surplus country, still has limited associated gas sales as 68% of the gas is flared and as a result has been associated with climate change and related warning, deforestation and acid rain with attendant impact on agriculture and other physical infrastructure (Onosode, 1996). Heat and noxious gases may contribute to environmental health problem. Also, there has been timely warming and an increasing global awareness on the need to protect our environment and improve our economy. Typical gas flare in Nigeria field are located at ground level and surrounded by thick vegetation, farmland and villages 20m – 30m from the flare. The heat radiation is a function of the flare temperature, gas flow rate and geometrical design of flare stack. There is a great physiological impact on crops planted in the vicinity of the gas flare. The soil mantle of the earth is indispensable for the maintenance of the plant life, affording mechanical support and supplying nutrient and water.

Adoption of Associated Gas as a Form of Domestic Energy in Nigeria

It is evident that considerable amount of Associated Gas is been flared on daily basis at various oil producing site in Nigeria causing resources wastage as well as atmospheric pollution. With the formulation of appropriate policy and the adoption of Associated Gas as a form of domestic energy in Nigeria, the problem of poor standard of living of the citizens majorly caused by inadequate domestic energy availability will be a thing of the past as well as other associated problems like petroleum products adulteration, deforestation as a result of the use of alternative source of domestic energy and pipeline vandalization of petroleum products. In 2010, it was reported that vandals have being the single most critical challenge facing the industry for it has hindered the flow of petroleum products leading to products losses and repairs worth 1.2 billion US dollars over a ten years period caused (Adukwu-Bolujoko, 2011).

CONCLUSION AND RECOMMENDATIONS

Conclusion

From the study findings, the following conclusions are drawn:

1. The link between needs and supply as far as domestic energy is concern is still weak and there is lack of realistic policy in meeting this in Nigeria.
2. The value of Associated Gas (AG) flared from 2002 to 2010 is enormous and it has become a form of resources wastage and source of atmospheric pollution.
3. If the Associated Gas being flared on a daily basis is properly harnessed as a form of domestic energy in Nigeria, it will invariably put to end the frequent domestic energy problem being experience in the country.

Recommendations

1. There is need for support for change by the government by enforcing the various regulatory laws and procedure guides to ensure effective and efficient oil and gas practices.
2. It is recommended that the government and other stakeholders should ensure zero gas flare and as well encourage the utilization of harnessed associated gas to earn foreign exchange and as well improve Gross Domestic Product (GDP) and the standard of living of the Nigerian citizens. Also, power generation in Nigeria could be improved by the harnessing and the utilization of the gas to generate steady power supply and as well actualize the Federal Government of Nigeria (FGN) vision 20:2020.
3. Nigerian government should formulate appropriate policy for the construction of new gas pipelines for distribution to domestic, residential and commercial users while they should be mindful of Gas pipeline attacks that could cause disruption in gas supplies to the desire destination. In this way the nation can optimize the use of associated gas for the benefit of the Nigerian citizens, reduce pollution as well enhance the economy of the country. Proper implementation of such policy will bring an end to the domestic energy crisis being faced by the country.

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AN ISLAMIC OVERVIEW OF THE IMPACT OF SOCIAL NETWORKING ON YOUTH TOWARDS NATIONAL DEVELOPMENT: A CASE STUDY OF FACULTY OF HUMANITIES NORTHWEST UNIVERSITY STUDENTS

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ABSTRACT

The invention of social networking comes along with great advantages and has help in turning the world into a global village. However, bringing the whole world together into communication has brought different civilizations, different ideologies, different upbringing, and different moral values into unison. This entanglement has its pros and cons. The youth, who have a great role in national building, have been affected as well and this is a threat to national development. Islam on the other hand has made newly invented things permissible apart from those prohibited for us. However, there are certain guidelines we must follow. This paper finds out the impacts of Social Networking on youth which will eventually affect national development whether positively or otherwise as the youths are the building blocks of every society. The paper then attempts an Islamic evaluation of the findings looking at the Islamic standpoint on the issues raised. Questionnaires method of research was used to find out how the youth especially of the Faculty of Humanities, Northwest University Kano were affected by social networking especially regarding their use of time and productivity. The research finds out that majority of the youth of Faculty of Humanities, Northwest University Kano were not excessively affected by social networking, however, a valuable amount were affected. Finally, recommendations are proffered on how to harmonize social networking with Islamic teachings.

KEYWORDS: islamic, social networking, youth, impact, national development

INTRODCUTION

The 21st century has seen the web evolved from a limited network used to share bits of information to a global phenomenon offering more information resources and social connections than ever before in history. Since their inception, Social Networking Sites (SNS) have attracted millions of users worldwide, many of whom have integrated these sites into their daily activities as these sites offer services that allow one to connect with other people of similar interests or backgrounds. The world has now become a global village such that information is now easily shared regardless of location distance. This paper attempts discussing what social networking is, social networking sites, as well as who are the youth, what their role is in nation building, and the pros and cons of social networking on the youth. The paper also tries Islamically assessing the impacts of social networking on the youth who are the bedrock of every society and once they are not productive, the society is doomed. Conclusively, recommendations were made to make social networking in compatibility with Islamic teachings.

SOCIAL NETWORK VS SOCIAL NETWORKING

Social network is defined by the Oxford dictionaries as 'A dedicated website or other application which enables

users to communicate with each other by posting information, comments, messages, images etc.'⁵

Social Networking Service, on the other hand is defined by Wikipedia, The Free Encyclopedia as "a platform to build social networks or social relations among people who share interests, activities, backgrounds or real life connections"⁶.

According to Danah and Nicole, the terms social network and social networking are used interchangeably to mean the same thing⁷.

The main objective of social networking is to encourage communication between different types of people from different backgrounds. It consists of creating user profile, various ways to interact with other users, ability to setup groups, etc.

⁵ <http://www.oxforddictionaries.com/definition/english/social-network>

⁶ http://wikipedia.org/wiki/social_networking_service

⁷ Social Network Sites: Definition, History, and Scholarship by Danah m. boyd and Nicole B. Ellison from www.danah.org/papers/jcmcintro.pdf

SOCIAL NETWORKING SITES

With the emergence of SixDegrees.com social networking sites in 1997, more sites began to develop and today there are a lot of social networking websites⁸. However, I selected only three social networking sites to make reference to in this work. They are: Facebook, Twitter, and Instagram. This is because as I have observed, these sites are more popular in Northern Nigeria where the research is being conducted.

FACEBOOK

This is an online social networking service headquartered in Menlo Park, California. Its website was launched in February 2004 by Mark Zuckerberg with his roommates and Harvard University students. They initially named it 'thefacebook' and limited the website's membership to Harvard students only, later to colleges in the Boston area and gradually kept adding from students of other universities to high school students and currently to anyone who claims to be at least 13 years old. It now had over 1.3 billion active users as of June 2014. To access the site, one has to make a registration which includes filling information like user's name, email address, date of birth, gender and password. Thereafter, one can create a user profile, add other users as friends, exchange messages, post status updates and photos, share videos and receive notifications when others update their profiles, join common interest user groups and categorize their friends⁹. It has now in 2014 been reported as the largest social network¹⁰.

INSTAGRAM

This is an online mobile photo-sharing, video sharing and social networking service that enables its users to take pictures and videos and share them on a variety of social networking platforms. It was created by Kevin Systrom and Mike Krieger and launched in 2010. The service rapidly gained popularity with over 100 million active users as of April 2012 and over 300 million as of December 2014. It is ranked as the 5th globally used social networking site. It has a distinctive feature which confines photos to a square shape, similar to Kodak instamatic and Polaroid images, in contrast to the 4:3 aspect ratio typically used by mobile device cameras. Users can also apply digital filters to their images. The maximum duration of Instagram videos is 15 seconds.¹¹

TWITTER

Described as 'the SMS of the Internet', this is an online social networking service that enables users to send and

read short 140-character messages called 'tweets'. It was created and launched in July 2006 by Jack Dorsey, Evan Williams, Biz Stone and Noah Glass. It gained a rapid worldwide popularity with more than 100 million users who in 2012 posted 340 million tweets per day. Currently, it is ranked as the 6th most visited website and as of December 2014, Twitter has more than 500 million users, out of which more than 284 million are active users.

Users may subscribe to other users' tweets known as "following" and subscribers are known as "followers" or "tweeps". Tweets are publicly visible by default but senders can restrict message delivery to just their followers. This tweeting can be done via the Twitter website, compatible external application (such as smartphones) or by short message service (SMS) available in certain countries. It also allows users to update their profile via their mobile phones either by text messaging or by apps released for certain smartphones and tablets¹².

YOUTH

The term 'youth' is defined as "a period of transition from the dependence of childhood to adulthood's independence"¹³. It has been difficult to specify exact age group for the youth as it varies from one society to another much especially in the case of underdeveloped and developing countries whereby unemployment and the cost of setting up an independent household puts many young people into a prolonged period of dependency. Therefore, different age groups for determining youth were set by different age organizations in different parts of the world. For example:

United Nations Secretariat, United Nations Educational, Scientific and Cultural Organization (UNESCO) and International Labor Organization (ILO) specified the age of 15-24 as youth determining factor; UN Habitat (youth fund) specified the age group of 15-32 as a factor for determining youth; whereas African Youth Charter sees youth as a person between the age of 15 and 35¹⁴. For the purpose of this work, I will use the African Youth Charter definition as it is more suitable to our location.

Islamically, youth are seen with much importance and are given due consideration. The youth age is the period in which the deeds of the humans are taken into record. As such it is a vital stage of human life and as one scholar puts it, "young people have the physical and

⁸ en.wikipedia.org/wiki/social_networking_service

⁹ en.wikipedia.org/wiki/Facebook

¹⁰ www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/

¹¹ en.wikipedia.org/wiki/Instagram

¹² en.wikipedia.org/wiki/Twitter

¹³ www.unesco.org/new/en/social-and-human-sciences/themes/youth/youth-definition/

¹⁴ www.un.org/esa/socdev/documents/youth/fact-sheets/youth-definition.pdf

mental abilities for being mindful of Allah in all aspects of life. As human beings get older, they start losing the enthusiasm and the power of their good old years¹⁵.

Islam, therefore, urge the youth to make a good use of their period and this can be seen in several Prophetic traditions. For example, the Prophet (peace be upon him) was reported to have said “the son of Adam will not pass away from Allah until he is asked about five things: how he lived his life, how he utilized his youth, with what means did he earn his wealth, how did he spend his money and what did he do with his knowledge¹⁶. In another hadith, the Prophet was reported to have said that seven kinds of people will be sheltered under the shade of Allah on the Day of Judgment; among them is a young man who passed his youth in the worship and service of Allah¹⁷. And in another hadith, the Prophet was reported to have said that we should take care of five matters before other five matters and among them is to take care of our youth before we become old¹⁸. These traditions show us how Islam cares for the morality of its youth.

THE ROLE OF THE YOUTH IN NATION BUILDING

Nation is defined by Carolyn Stephenson as a group or race of people who shared history, traditions and culture, sometimes religion and usually language. Nation building refers to the process of constructing or structuring a national identity using the power of the state. This process aims at the unification of the people within the state so that it remains politically stable and viable in the long run. It involves the use of propaganda or major infrastructure development to foster social harmony and economic growth¹⁹.

According to Akintokumbo Adejumo, Nation building and the associated developmental issues require men and women of deep vision, sincerity of purpose, selflessness, genuine love for their country and their people, hardworking, of conscience, integrity, credibility, trustworthiness, honesty, reliable and able, people who do not think that getting to position of authority is a do-or-die affair, people who understand the meaning of nation building, leadership, good governance, rule of law, political emancipation, equality, human and civic rights, civility, freedom of speech, diversity and religious tolerance, people who

will shun and will not tolerate tribalism, corruption and nepotism. These are people who can build nations²⁰.

The role of youth in nation building occupies a central place. This is because the youth are not only the leaders of tomorrow but also the partners of today. For a country to be more developed, it has to utilize its youth in the right direction. And as Rizwan Anwar puts it

“Developed countries are totally aware of the worth of their youth. They consider their youth as an asset²¹

And he later continued

“The energy and brightness of the minds of the youth act as torch-bearer for a nation. On the contrary, the countries which fail to realize the importance of the youth lag behind in every department of life. Likewise, if the youth are morally degraded and unconcerned about the future of the nation, that nation is doomed and cannot play any productive role.”²²

The youth have many roles to play in the development of their nation. This includes the necessity for them to get proper education and spread it to the masses so that they will be aware of their rights and responsibilities. It is the youth’s role also to promote a fair worldview of the country’s image by serving the country with their skills and talents and preventing the country from evils that can damage the refutation of the nation. It is also the role of the youth to help the government in the implementation of policies. Moreover, young people are full of vibrant ideas and have energy to try out new things, if these factors are put into consideration, it will pave a way for the country’s prosperity.

IMPACTS OF SOCIAL NETWORKING ON THE YOUTH

The internet, by its nature, raises a lot of ethical questions. This partially has to do with the way many of its applications relate directly with the human mind. Of the most recent development in the field of internet is the Social Networking Services which is equally having both positive and negative impacts on the society most especially the youth. Here are some of the advantages and disadvantages of SNS to the youth and the Islamic stand on them.

¹⁵ www.awqaf.gov.ae/jumaa.aspx

¹⁶ Tirmidhi 2417

¹⁷ Sahih Muslim Book 5 Number 2248

¹⁸ Musnad Imam Ahmad

¹⁹ en.wikipedia.org/wiki/nation-building

²⁰ Akintokumbo Adejumo, The Role of the Youths in Nation Building in Nigeria, from www.transparancynigeria.com/index.php/members/13-akintokumbo-adejumo/2808-the-role-of-the-youth-in-nation-building-in-nigeria

²¹ www.yourcommonwealth.org/2014/04/30/youths-responsibilities-in-a-countrys-progress/

²² ibid

ADVANTAGES

Worldwide connectivity: one of the most outstanding benefits of the social networking services is their ability to form a web of connections of peoples with common interest throughout the globe. It also gives the opportunity of sharing one's life with the rest of the world. Moreover, social networking connects old acquaintances which if not for the social network one may end up his life without meeting others. These connections give a lot of leverages once one uses it for good. Islamically, this is something permissible and encouraging as far as it is used in the right path. This is because Islam encourages interaction between one another. As Allah said in the Quran:

يَا أَيُّهَا النَّاسُ إِنَّا خَلَقْنَاكُمْ مِنْ ذَكَرٍ وَأُنْثَىٰ وَجَعَلْنَاكُمْ شُعُوبًا وَقَبَائِلَ لِتَعْرِفُوا إِنَّ أَكْرَمَكُمْ عِنْدَ اللَّهِ أَتَقْوَىٰ إِنَّ اللَّهَ عَلِيمٌ خَبِيرٌ

O mankind! We have created you from a male and a female, and made you into nations and tribes that you may know one another. Verily, the most honorable of you with Allah is that (believer) who has At-Taqwa. Verily, Allah is All-Knowing, All-Aware.²³

Moreover, this trend presents a huge opportunity for Muslims to reach out to people who may not know about Islam or Muslims. According to Javeria Salman, "thousands of Americans have never met a Muslim but they have access to us through social media"²⁴.

Low cost and free advertisement: for both personal and business use, social networking tends to be very cheap and sometimes at no cost because most of it is usually free. One can advertise his product and reach it to unimaginable location from his phone or system. This is encouraging in Islam as far as it fulfills the conditions of Islam as Allah says in the Quran

الَّذِينَ يَأْكُلُونَ الرِّبَا لَا يَقُومُونَ إِلَّا كَمَا يَقُومُ الَّذِي يَتَخَبَّطُهُ الشَّيْطَانُ مِنَ الْمَسِّ ذَلِكَ بِأَنَّهُمْ قَالُوا إِنَّمَا الْبَيْعُ مِثْلَ الرِّبَا وَأَحَلَّ اللَّهُ الْبَيْعَ وَحَرَّمَ الرِّبَا فَمَنْ جَاءَهُ مَوْعِظَةٌ مِنْ رَبِّهِ فَانْتَهَىٰ فَلَهُ مَا سَلَفَ وَأَمْرُهُ إِلَى اللَّهِ وَمَنْ عَادَ فَأُولَٰئِكَ أَصْحَابُ النَّارِ هُمْ فِيهَا خَالِدُونَ

Those who eat Riba will not stand (on the Day of Resurrection) except like the standing of a person beaten by Shaytan leading him to insanity. That is because they say: "Trading is only like Riba," whereas Allah has permitted trading and forbidden Riba. So whosoever receives an admonition from his Lord and stops eating Riba, shall not be

punished for the past; his case is for Allah (to judge); but whoever returns (to Riba), such are the dwellers of the Fire -they will Abide therein.²⁵

Increases learning opportunity: the worldwide connectivity social networking provides to the people also comes with other opportunities as well. This includes the increase in opportunities such as learning and business. With social networking, one can gain a lot in carrier guidance and other fields of learning as well. You can find different groups of intellectuals which one can join and benefit there from. One can also friend, follow, or subscribe to a well known scholar from whom he can gain a lot. Islamically, seeking for knowledge is treated with much emphasis and seen as a must. In the Quran, Allah in several places encourages knowledge and knowledge seeking and also praises those who have been bestowed with knowledge.

إنما يخشى الله من عباده العلماء...

It is only those who have knowledge among His servants that fear Allah...²⁶

...و قل رب زدني علما

...and say: "My Lord! Increase me in knowledge."²⁷

...و علمناه من لدنا علما

...and whom We had taught knowledge from Us.²⁸

Additionally, the prophetic traditions also gave emphasis to seeking for knowledge. For example:

طلب العلم فريضة على كل مسلم²⁹

Seeking for knowledge is obligatory upon every Muslim.

من سلك طريقا يلتمس فيه علما سهل الله له طريقا إلى الجنة³⁰

For him who embarks on the path of seeking knowledge, Allah will ease for him the way to paradise.

Mobilizing opinion of people: social networking is a good center for mobilization of people's opinion. With just few clicks and keystrokes, ideas are aired to the world in a short time and also one can undo or falsify a lot of allegations done to damage the image of some things. Concerning this, Javeria Salman had this to say:

With SNS, we can change the perception of Islam from that of an Old-fashioned, authoritarian religion to one people can comprehend and relate to ... if we develop better reference points for others on Islam, the irrational

²⁵ Baqarah v. 275

²⁶ Faatir v. 28

²⁷ Taahaa v. 114

²⁸ Kahf v. 65

²⁹ Albani A. M.,nd, Sahih Ibn Majah, np. vol. 44, p. 183

³⁰ Ibn Hambal A. S., ND, Musnad Ahmad bn Hambal, MuassasatuQurtubah, AlQahira, Vol. 2, P. 325, No. 8299

²³ Hujuraat v. 13

²⁴ Javeria Salman, Impact of Media and Social Media on Islam and Muslims, from <http://islamicstudies.islammessage.com/ResearchPaper.aspx?aid=678>

claims and hateful rhetoric will be washed away to the empty corners of the internet.³¹

According to Tim et.al 2001, Social media which social networking is part of also acts as powerful agency capable of shaping and directing public and private understanding of the world and awareness of its social, economic, moral, cultural, technological and political affairs. That is in providing images, interpretations, and explanations of events occurring in the wider world, and actively encouraging us to see and understand it in particular ways and in certain terms³².

Immediacy: one of the advantages of social networking is its capability of virtually instantaneous responses. One can get a lot of response as soon as he makes a post contrary to other means of communication.

DISADVANTAGES

With all these advantages social networking has, it also comes along with great challenges and disadvantages which some see as far outweighing the advantages. This can be seen in the comments of people like Abubakr2009 who said “the beautiful attractions of the media have been rubbished and what we feel these days is the negative impact. Major illicit acts are promoted and encouraged, such as homosexuality, obscene movies, and music promoting indecency like gambling, robbery and alcoholism among others”³³. Also according to Syahmi Fauzi “Social networking sites have had a huge negative impact on our mental and social health and will continue to do so in the future. It is also now evident that social networking sites facilitate all these problems and without them they would cease to exist. Therefore it is undeniably true that Facebook, Twitter, MySpace, and the like do in fact cause more harm than good”³⁴. Below are some of the disadvantages of social networking.

Identity theft and invasion of privacy: social networking sites facilitate identity theft via information disclosure and privacy setting. Through the information disclosure, the sites request one to edit his profile by providing personal details like full names, phone numbers, email address, relationship status, where one lives, etc. “the more information you have on your profile the easier it is for identity thieves to verify themselves as being

you”³⁵. The way the privacy setting is set also on these sites enables unreliable ones to steal one’s identity. Even though there are features that allow users to change their privacy settings and not allow other users to view ones personal details, the settings are never default and as such one is unaware of how much information he is sharing not only with friends, but with the rest of the world.

Islam is no way in support of one using others’ property except with their will and consent and identity theft is not different from material theft because both of them are properties of others taken without their consent. Allah also said in the Quran:

يَا أَيُّهَا الَّذِينَ ءَامَنُوا لَا تَدْخُلُوا بُيُوتًا غَيْرَ بُيُوتِكُمْ حَتَّى تَسْتَأْذِنُوا وَتُسَلِّمُوا عَلَى أَهْلِهَا ذَلِكُمْ خَيْرٌ لَّكُمْ لَعَلَّكُمْ تَذَكَّرُونَ - فَإِن لَّمْ تَجِدُوا فِيهَا أَحَدًا فَلَا تَدْخُلُوهَا حَتَّى يُؤْذَنَ لَكُمْ وَإِن قِيلَ لَكُمْ ارْجِعُوا فَارْجِعُوا هُوَ أَزْكَى لَكُمْ وَاللَّهُ بِمَا تَعْمَلُونَ عَلِيمٌ

O you who believe! Enter not houses other than your own, until you have asked permission and greeted those in them; that is better for you, in order that you may remember. And if you find no one therein, still enter not until permission has been given. And if you are asked to go back, go back, for it is purer for you. And Allah is All-Knower of what you do. Allah knows best.³⁶

Cyber bullying: cyber bullying refers to “bullying through information and communication technologies”³⁷. Social networking sites have increase the ease and prominence of cyber bullying and other cyber crimes against children. This is because bullies often feel more confident online and they can contact their victims anytime, anywhere, day or night, not just in the school yard. Even though cyber bullying is not physical, its emotional and psychological effects are devastating for the victim and can often lead to suicide and depression³⁸.

Islam is against any kind of ill treatment to any individual man or woman, young or old and regardless of the way that ill treatment is done. Allah said in the Quran

...ولا تعتدوا إن الله لا يحب المعتدين

...but transgress not the limits. Truly, Allah likes not the transgressors

إنه لا يفلح الظالمون

...Verily, the wrongdoers will not be successful.³⁹

And in a hadith, the prophet (peace be upon him) was reported by Abdullah bn Umar to have said

³¹ Javeria Salman op.cit

³² Sullivan T., et.al, 2001, Studying the Media, Arnold Publishers, London

³³ Abubakr A., 2009, Muslims and the Threats of the media, Islamic Heritage Foundation, Nigeria

³⁴ Syahmi F. Advantages and disadvantages of Social Networking, from www.scribd.com/doc/86569401/The-Advantages-and-Disadvantages-of-Social-Networking

³⁵ ibid

³⁶ Nur v. 27

³⁷ ibid

³⁸ ibid

³⁹ Al Qasas v. 37

“A Muslim is a brother of another Muslim, so he should not oppress him, nor should he hand him over to an oppressor. ...”⁴⁰

Yusha’u2004 stated that: “whatever leads to the welfare of the individual is morally good in Islam and whatever is injurious is morally bad”⁴¹

Time wasting: one of the negative effects of social networking is its time consuming factor. Time is a precious factor and its wastage is considered more dangerous than squandering property as time cannot be compensated. However, people tend to spend so much time on social networking without considering the precious time being wasted on it. This goes to the extent that it tends to affect ones productivity. According to Donna Cosmato

“A Nielsen report explains that social networking can be a big waste of time that sucks 17 percent of our Internet time down the non-productivity drain. While it is true that some of that time is likely spent in making and maintaining important business, social or professional connections, it is also true that it is easy to become distracted and end up spending valuable time on games, chats or other non-related activities.”⁴²

It is also reported that Facebook users spend about six hours each month on the site, while social networkers spend three times as much time on those communities as they do on other online activities like email.⁴³

However, Islam values time and abhors its wastage. The prophet (peace be upon him) encourages utilization of free time before the time will come when we will be preoccupied. Allah swears by time in surah al-Asr in order to show us its importance. Moreover, the prophet (peace be upon him) was reported to have said “There are two blessings which many people lose, (they are) health and free time for doing good”⁴⁴. This shows how blessed a free time is; unfortunately, it is overlooked and not appreciated.

Weakening strong ties and isolation: whilst social networking strengthens weak ties with acquaintances and people not seen often, it also weakens strong ties and also brings about physical social isolation. “The term ‘social networking’ misleads people into believing they are being social” “nowadays, the urge to contact each other over the phone or even face to face is not as important because we feel like we are still connected via social network” said Syahmi Fauzi.⁴⁵ The rise of social networking has increased social and emotional isolation and diluted the strength our human relationships. And he, Syahmi Fauzi added that the “idea of being constantly connected is awful in the way that personal interactions between friends are more superficial than they were before Facebook and other social networking sites”.

Freedom of expression: social networking grants its users right to express themselves in the way they wanted, however, this opportunity is being misused and it becomes a center for castigating others, tarnishing images with false claims, gossiping, vain talking, raising baseless allegations in order to defame others or their religion... as Galadanci2004 puts it “those who want to cast a negative light on Islam easily perpetuate stereotypes about Muslims through their posts, tweets and videos”⁴⁶. However, even though Islam has given us freedom of expressing our views, there are some guidelines concerning that. Galadanci 2004 has this to say: “freedom of expression is an inalienable right in Islam, but it is not absolute and has limits and borders”.⁴⁷ And Allah said in the Glorious Quran (وَلَا تَقْفُ مَا لَيْسَ لَكَ بِهِ عِلْمٌ إِنَّ السَّمْعَ وَالْبَصَرَ وَالْفُؤَادَ كُلُّ أُولَئِكَ كَانَ عَنْهُ مَسْئُولًا)

And follow not that of which you have no knowledge. Verily, the hearing, and the sight, and the heart of each of those ones will be questioned (by Allah).⁴⁸

Regarding gossiping and vain talking, these are also unacceptable in Islam, Allah has in the Glorious Quran asked us to stay away from gossiping, mockery, and talking unnecessarily, this can be seen in

...
يَا أَيُّهَا الَّذِينَ ءَامَنُوا لَا يَسْخَرْ قَوْمٌ مِّن قَوْمٍ عَسَىٰ أَن يَكُونُوا خَيْرًا مِّنْهُمْ وَلَا نِسَاءٌ مِّن نِّسَاءٍ عَسَىٰ أَن يَكُنَّ خَيْرًا مِّنْهُنَّ

O you who believe! Let not a group scoff at another group, it may be that the latter are better than the former. Nor let (some)

⁴⁰ Sahih Bukhari, book 43 no. 622

⁴¹Yusha’u M. J, “Media Biased Reporting: Islam and Information Control”, in the journal of Al-Ijtihad, Vol. 5, no. 1, p. 99

⁴² Donna Cosmato, Advantages and disadvantages of social networking, from socialnetworking.loveto-know.com/Advantages_and_Disadvantages_of_Social_Networking

⁴³ Ibid

⁴⁴ Bukhari vol. 8 no. 421

⁴⁵ Syahmi Fauzi, op.cit

⁴⁶ Galadanci B. S, “Internet and Ethics: Outlines for an Islamic Perspective” in the journal of Al- Ijtihad, vol. 12, No. 1, p. 5

⁴⁷ Ibid

⁴⁸ Isra’ v. 36

women scoff at other women, it may be that the latter are better than the former.⁴⁹
يَا أَيُّهَا الَّذِينَ ءَامَنُوا اجْتَنِبُوا كَثِيرًا مِّنَ الظَّنِّ إِنَّ بَعْضَ الظَّنِّ إِثْمٌ وَلَا تَجَسَّسُوا وَلَا يَغْتَب بَّعْضُكُم بَعْضًا أَن يَحِبُّ أَحَدُكُمْ أَن يَأْكُلَ لَحْمَ أَخِيهِ مَيْتًا فَكَرِهْنَاهُ وَأَتَّقُوا اللَّهَ إِنَّ اللَّهَ تَوَّابٌ رَّحِيمٌ
O you who believe! Avoid much suspicion; indeed some suspicion is sin. And spy not, neither backbite one another. Would one of you like to eat the flesh of his dead brother You would hate it. And have Taqwa of Allah. Verily, Allah is the One Who forgives and accepts repentance, Most Merciful.⁵⁰

And in a hadith, the prophet (peace be upon him) was reported to have said “and whoever believes in Allah and the Last Day, should talk what is good or keep quite”⁵¹

According to Dr. Syed Muneeb gossiping and talking about unnecessary things is called *lagwu* in Arabic and Allah has asked us to stay away from it⁵² in Surah Al-Mu’minoan where Allah said

والذين هم عن اللغو معرضون

And those who turn away from Al-Laghw.⁵³

Absence of copyright: in social networking, author has no authority over his work, by the time one makes a post, it is likely that others copy it directly and paste it on their walls without identifying the owner, sometimes he may even claim the ownership of what he has not own. This is unacceptable Islamically and especially in intellectual properties, sheikh Muhammad Umar Baazmool said “no one may use his work except after obtaining his permission and they must then relay everything precisely and reference it to the owner”⁵⁴

Circulating false information: one of the disadvantages of social networking is how false information is circulated therein without verification of its authenticity. News disseminated in the social network is often unreliable. Islam has made stern warning against hiding the truth and spreading rumors and has ordered us to verify news before acting upon it. This can be seen in chapter 49 verse 6 where Allah said

إن جاءكم فاسق بنبأ فتبينوا...

Yusha’u2004 stated that: “verifying all and any news item before approving it for

printing or broadcasting by other means is an obligation”⁵⁵

Spreading immorality: it is one of the ill effects of social networking its ability to spread immorality especially among the youth. Social network has become a center for the intermingling of men and women and this gave way for exchange of pictures and videos which gave increase in phonography, homosexuality, lesbianism, adultery, fornication and the rest. Now there are groups for all those vices in social networking sites. Lesbians, adulterers and the rest are not ashamed of opening groups in the names of their evil acts and others follow as well. Users also update their profile pictures and this gave rise to a long look at the opposite sex. This is abhorred in Islam and Islam has called upon us to only meet for something beneficial. This can be seen in the following verse:

فَلِئَلَّ الْمُؤْمِنِينَ بَعْضُوا مِّنْ أَبْصَارِهِمْ وَيَحْفَظُوا فُرُوجَهُمْ ذَلِكَ أَزْكَى لَهُمْ إِنَّ اللَّهَ خَبِيرٌ بِمَا يَصْنَعُونَ

Tell the believing men to lower their gaze, and protect their private parts. That is purer for them. Verily, Allah is All-Aware of what they do.⁵⁶

إِنَّ الَّذِينَ يُحِبُّونَ أَن تَشِيعَ الْفَاحِشَةُ فِي الَّذِينَ ءَامَنُوا لَهُمْ عَذَابٌ أَلِيمٌ فِي الدُّنْيَا وَالْآخِرَةِ وَاللَّهُ يَعْلَمُ وَأَنْتُمْ لَا تَعْلَمُونَ

Verily, those who like that Fahishah should be circulated among those who believe, they will have a painful torment in this world and in the Hereafter. And Allah knows and you know not.⁵⁷

Use of pictures and videos for defamation: the sharing of pictures has come along with its problem. This is how others take pictures of others edit it and use it in objectionable places. Those whose pictures are used may not even know about it.

Another problem with social networking is that its users are unrestricted. They can do whatever they wanted without others knowledge, therefore, there is no limitation and as such the young ones can be misguided by others. However, Allah the All-Knowing knows what everyone is doing and it is only Allah’s consciousness that will guide social networkers. Allah said in the Glorious Quran

يَا أَيُّهَا الَّذِينَ ءَامَنُوا إِذَا تَنَاجَيْتُمْ فَلَا تَنَاجَوْا بِالْإِثْمِ وَالْعُدْوَانِ وَمَعْصِيَةِ الرَّسُولِ وَتَنَاجَوْا بِالْبَيِّنَاتِ وَالنَّقْوَى وَأَتَّقُوا اللَّهَ الَّذِي إِلَيْهِ تُحْشَرُونَ

O you who believe! When you hold secret counsel, do it not for sin and wrongdoing, and disobedience to the Messenger, but do

⁴⁹ Hujuraat v. 11

⁵⁰ Hujuraat v. 12

⁵¹ Sahih Bukhari, vol. 8, book 73, No. 158

⁵² Syed Muneeb social networking an Islamic perspective

⁵³ Mu’minoan v. 3

⁵⁴ Galadanci B. S., op.cit, p. 6

⁵⁵ Yusha’u M. J., op.cit, p. 99

⁵⁶ Nur v. 30

⁵⁷ Nur v. 19

it for Al-Birr and Taqwa; and have Taqwa of Allah unto Whom you shall be gathered.⁵⁸
(وَلَقَدْ خَلَقْنَا الْإِنْسَانَ وَنَعْلَمُ مَا تُوَسْوِسُ بِهِ نَفْسُهُ وَنَحْنُ أَقْرَبُ إِلَيْهِ مِنْ حَبْلِ الْوَرِيدِ - إِذْ يَتَلَقَّى الْمُتَلَقِّيَانِ عَنِ الْيَمِينِ وَعَنِ الشَّمَالِ قَعِيدٌ - مَا يَلْفِظُ مِنْ قَوْلٍ إِلَّا لَدَيْهِ رَقِيبٌ عَتِيدٌ

And indeed We have created man, and We know what his self whispers to him. And We are nearer to him than his jugular vein. (Remember) that the two receivers (recording angels) receive (each human being), one sitting on the right and one on the left. Not a word does he (or she) utter but there is a watcher by him ready (to record it)⁵⁹

METHODOLOGY

The study is an opinion survey designed to assess how social networking affects the lives of the youth especially regarding their use of time and productivity. Data was obtained through the use of simple random sampling questionnaire having both close and open ended questions. A sample size of hundred respondents was picked out from the students of Humanities, Northwest University Kano ranging from the age of fifteen to thirty five and of which fifty percent are male while fifty percent are female. The questionnaire elicited information on personal characteristics of the respondents as to their gender, age and favorite social networking site. Their response was then sought regarding how they conduct their social networking activities with reference to the time spent, maintenance and above all how it affects their lives. Data collected was then sorted and analyzed using descriptive statistics of frequency counts and percentages.

RESULT

Table 1: Personal Data/Information of the respondents

SN	CHARACTERISTICS	FREQUENCY	PERCENTAGE
1	Gender		
	Male	50	50
	Female	50	50
2	Age		
	15-20	44	44
	21-25	30	30
	26-30	20	20
	31-35	06	06

Table 1 portrays the respondents' genders and ages. The respondents are equally selected to be 50% males 50% females. Majority of the respondents are under the age of twenty (44%) followed by those ranging from 21-25 with 30%. 20% of the respondents age between twenty six and thirty while the remaining 6% are thirty one to thirty five years. The age range of fifteen to thirty five was selected because it is one of the age group specified

as youth age and as I have observed, this age range is more attached to social networking than any other age group.

Table 2: Respondents personal outlook on social networking

SN	ITEMS	FREQUENCY	PERCENTAGE
3	What is your favorite social networking site?		
	Facebook	67	67
	Instagram	25	25
	Twitter	08	08
4	What is your main purpose for social networking?		
	News	29	29
	Chatting	59	59
	Exchanging pictures and videos	03	03
	Religious inspiration	09	09

Table 2 shows that the majority of the youth in Faculty of Humanities, Northwest University Kano prefer Facebook more than other social networking sites leading with 67% of the respondents. This is followed up by Instagram with 25% while the remaining 8% incline to twitter. These three sites were selected based on the observation that they are very popular in this site of the country being well-known and accepted by social networkers.

The table also brings into light the main purpose of social networking for the majority of the youth of Faculty of Humanities, Northwest University Kano is to chat with family and friends as 59% answered so. 29% listed getting news as their main purpose for social networking, 09% visit social networking sites for religious inspirations whereas only 03% select exchanging pictures and videos as their main purpose for social networking.

Table 3: Maintenance

SN	ITEMS	FREQUENCY	PERCENTAGE
5	How do you get the data for surfing the web?		
	I buy data bundle	81	81
	Someone buys it for me	11	11
	Free	07	07
	Borrow from friends	01	01
6	Are you able to cater your minor financial responsibilities independently?		
	Yes	49	49
	No	10	10
	Sometimes	41	41

⁵⁸ Mujadalah v. 9

⁵⁹ Qaaf v. 18

The above table tries to figure out how the social network affects the respondents in terms of maintenance. Question was asked on how they maintain social networking and 81% of them answered that they used to buy data bundle. 11% are being sponsored by others, 07% depend on the free data given by network service providers while the remaining 01% borrows from friends. This same people were asked whether they can handle their minor financial responsibilities independently and while the majority consisting of 49% answered in the affirmative, 41% responded that it is not all the time they are able to do so while 10% replied with 'no'. However, out of the 81% of the respondents who buy data by themselves, the research shows that while 46% of them were able to cater for their minor financial needs, 42% of them are not always being able to do so whereas 12% of them are not capable at all. This shows a valuable impact of social networking on people owing to the fact that those who are unable to cater for their needs always or at all manage to buy data in order to engage in social networking.

Table 4: Time factor

SN	ITEM	FREQUENCY	PERCENTAGE%
7	How much time do you dedicate on the site daily?		
	Less than three hours	30	30
	Always online	16	16
	Not everyday	43	43
	6-12 hours daily	11	11
8	Do you consider reducing the time you spend online?		
	Yes	71	71
	Sometimes	15	15
	No	14	14

Table 4 above is trying to analyze the time spent by the respondents on social networking and their concern towards it so that we can know if they realize the importance of time to their lives in such a way that they will think of reducing its wastage or not. The result shows that the majority with 43% is not logging in everyday, 30% spend less than three hours daily, 16% are always online whereas the remaining 11% spend 6-12 hours online daily. Moreover, the table shows that 71% of them are thinking of reducing the time they spend online, while 15% sometimes think of that, 14% are not thinking of reducing the time being spent.

The below table is designed to investigate on how social networking affects some parts of the lives of the youth. Four questions were asked to see the degree of changes in the respondents after engaging in social networking. The first question was asked to see the impact of social networking on the studies of the youth. Majority of

them consisting of 80% responded that they concentrate fully on their studies as they used to do before while 20% of them were not able to concentrate fully because of social networking. The second question was asked to see whether they sleep as early as they used to do before social networking. Here, 50% of them responded that they still sleep as early as they used to do before they start social networking whereas the remaining 50% maintained that their sleep was affected by social networking as they do not sleep as early as they used to do before engaging in social networking. The third question was whether they think they can contribute more to nation building if they are not social networking and majority of them 55% replied with yes, 31% answered that may be they can contribute more to nation building in the absence of social networking whereas 14% replied with 'no'. The fourth and the last question asked whether social networking hinder them from doing something they used to do before. 70% of them replied in the negative while 30% of them answered positively.

Table 5: Effects

SN	ITEMS	FREQUENCY	PERCENTAGE
9	Do you fully concentrate on your studies as you used to do before engaging in social networking?		
	Yes	80	80
	No	20	20
10	Do you go to sleep as early as you used to do before social networking?		
	Yes	50	50
	No	50	50
11	Do you think you can contribute more to nation building in the absence of social networking?		
	Yes	55	55
	No	14	14
	May be	31	31
12	Did social networking hinder you from doing something you used to do before?		
	Yes	30	30
	No	70	70

If 'Yes' specify

The respondents who answered that social networking hinder them from doing something they used to do before were asked to specify and they made some responses which can be categorized into three viz. daily activities, studies, and sleep. 33% see that they are not

doing their daily activities like house chores, sitting together with family members etc. as before. 44% are of the view that the level of attention they used to give to their studies has been reduced as it is being distracted by social networking whereas 22% said that social networking hinder them from sleeping as they used to do before.

REMARKS ON THE FINDINGS

The research conducted has come to the conclusion that social networking has a great impact on the youth as it affects both their social, intellectual and productive life. While the majority of the youth of Faculty of Humanities, Northwest University Kano were not greatly affected by the influence of social networking, a valuable amount faced a negative impact of it. This is contrary to Islamic teachings.

RECOMMENDATIONS

When asked about the legality of social networking in Islam, Mufti Isma'il Menk responded that social networking is innocent like a knife, it is depending upon the kind of use one uses it. If one uses it for good then it is acceptable in Islam whereas if one abuses it then it is Islamically unacceptable⁶⁰. Dr. Syed Muneeb on the other hand said "an innovation is innocent, it cannot be blamed, social networking is not *haraam* but there are a lot of *haraam* in social networking. So one has to ask himself before every click and know that it is being recorded"⁶¹. Below are some recommendations that will guide the use of social networking so that it will be in conformity with Islamic teachings and its advantages will outweigh its disadvantages.

Lower your gaze: this is applicable to both men and women. The users of social network should stop looking at whatever is prohibited as Allah said in the Quran

قل للمؤمنين يغضوا من ابصارهم...

Check source's authenticity before acting upon it: Whenever one gets a message or news he should not forward it or spread it until he confirms its reliability. This is in accordance with the saying of Allah (SWT)

إن جاءكم فاسق بنبأ فتبينوا...

Set a time plan: one should set for himself a time plan regarding when to be online and when to do other things and he should abide by it strictly such that one does not waste his time unnecessarily. This is because time is a precious gift and it will be accounted for.

Be Allah's conscious: one should know that whatever he is doing even if nobody is seeing him Allah The All-Knowing is with him and knows what he is doing. As Allah says

ولقد خلقنا الإنسان و نعلم ما توسوس به نفسه...⁶⁴

And in another verse Allah said

ما يلفظ من قول إلا لديه رقيب عتيد...⁶⁵

Therefore, one should be cautious of what he read, view, and share because every click counts as Allah knows, and the angels are recording

Always follow and subscribe to those beneficial to you and your religion. This is in accordance to the verse of the Quran which says

وتعاونوا على البر والتقوي ولا تعاونوا على الإثم والعدوان

Help one another in righteousness and piety, but help not one another in sin and rancor⁶⁶

Unsubscribe and unfollow bad friends: certain people need to be blocked and deleted from ones friend list. These are those who are unbeneficial and can help in the increase in one's immorality. These are not supposed to be friends. As Mufti Isma'il Menk said " if they are coming in between you and Allah block them, if they are coming between you and your contentment block them, if they are trying to achieve something wrong from you block them. It will result in great happiness because you do not need them in your life"⁶⁷.

Set a trend of goodness: As others use social networking in doing something evil, one can initiate something good which will be beneficial to others. This will reverse its disadvantages into advantage

CONCLUSION

This research paper has identified the impact of social networking to the youth. Some of these impacts are cyber bullying, weakening strong ties, identity theft, circulating false information, spreading immorality, reducing productivity, time wastage etc. As the study sought to find out the effects of social networking to the youth in the Faculty of Humanities, Northwest University Kano, the finding shows that even though the majority of the youth in the Faculty of Humanities, Northwest University Kano were not affected, a valuable percentage of them were affected in one way or the other. Recommendations were therefore suggested in order to make social networking to be in

⁶⁰ Social networking- the Islamic Perspective by Mufti Isma'il Menk

⁶¹ Syed Muneeb, op.cit

⁶² See page11

⁶³ See page11

⁶⁴ See page 11

⁶⁵ See page 11

⁶⁶ Ma'idah v. 2

⁶⁷ Mufti Isma'il Menk, Op.cit

harmony with Islamic teachings as well as make it harmless to the youth's productivity.

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RURAL HOUSEHOLD FUEL WOOD CONSUMPTION: IMPLICATION FOR SUSTAINABLE PRODUCTION PRACTICES OF BIOMASS ENERGY RESOURCES IN NIGERIA

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ABSTRACT

Biomass source of energy is essential in human's life since man depends on it for cooking and heating. Fuel wood is one of the oldest biomass sources of energy known and used by man, now the population is increasing and the rate of consumption of fuelwood is increasing. This results in over dependence on the natural forest resources leading to deforestation. Available studies on fuelwood demand and supply support this assumption and indicate a continuously rising in demand of fuelwood, notably from natural forest. This paper seeks to identify energy sources of rural household, examine the effect of energy sources on rural household and describe sustainable biomass energy resources production practices to ameliorate problems of fuelwood shortage in the future. Evidence suggests that the demands for fuelwood in addition to other sources of energy are supplied from agroforestry, afforestation, short rotation coppice (SRC) and crop residue systems. In order to meet the requirements of various environments and different farmers there would be need to diversify and planted several fast-growing tree- species. It is concluded that the effect of fuelwood consumption could be minimized by producing fuelwood on agricultural land, degraded land and in forest plantation through species site matching and proper management. There should be a condition that would enable biomass wood energy policy and planning where fuelwood production strategy should be developed with prime objective of making each state in Nigeria self-sufficient, by decentralizing the area based on wood energy planning as wood energy situation and problems vary from one state to the other in Nigeria.

KEYWORDS: rural household, consumption, sustainable, production, biomass energy.

INTRODUCTION

The role of energy in the overall economic development of any nation cannot be over emphasized. Energy is one of the crucial factors needed in economic growth and development of any nation. It is indispensable both in our daily lives and industrial activities. It is the backbone of industrialization, thus the life blood of any society. The use of energy has greatly influenced man's activities since the advent of civilization leading to improvements in physical, comfort food supplies, transportation, communication and other forms of economic activities. (Mgbenu, *et al.*, 1995 Ogunwande, 2010). The position of energy in the management and general up keep of any family household cannot be over emphasized, it is so essential, as it is used for cooking heating and powering of some household gadgets. Nigeria is rich in energy resources and its only biomass resources that will be discussed in this paper.

Fuel wood, crop residue are the major form of biomass energy in Nigeria, contributing 75% of the national energy demand while about 94% of rural household use fuel wood either as fire wood or charcoal (Adeoti,*et al* 2001IIED,2010) fuel wood meets over 96% of rural household energy needs, while charcoal is the dominant fuel in urban households (Nwaigbo, 2003, Adeoti,*et al*

2001 IIED, 2010). Besides been the standard cooking fuel for the majority of Nigerian households fuel wood is also an important energy source for rural cottage industries. Fuel wood is not only an important source of energy, but also it's use in relation to public sector interests such as environment, public health, rural development, employment and source of foreign exchange earnings (Nwaigbo, 2003, Oladosu, *et al* 1997). Despite the importance of fuel wood energy in the country's economic development, fuel wood data on supply and demand are scarce and characterized by a high degree of uncertainty that makes it difficult to undertake relevant fuel wood energy planning and policy formulation. Human daily livelihood are basically on sustainability of food security. However, if biomass energy sources cannot be procured in livelihood activities', household feeding pattern would definitely be affected by malnutrition as a result of unbalance diet (Adeniji and Felix, 2011). Complete /balance human diet required application of energy source mainly for transformation through cooking, boiling, heating before it is palatable for healthy living(Amacher,*et al* 2004).Therefore, there is need for sustainable practices, as source of biomass energy that is going on extinction as a result indiscriminate clearing

of natural forest which is the main source of fuelwood (biomass energy). Rural inhabitant required adequate knowledge to produce biomass energy sources (fuelwood) apart from dependents on natural sources (forests) (Schr, 1995. Sargent, 1998). Information dissemination on how to integrate multipurpose trees (*Eucaplytus, Leucaena, Acacia, Moringa, Oleifera exotica*) is inevitable in agroforestry, afforestation, short rotation Coppice with crop and livestock production in order to be food secured (Amacher, 2004). This is basic responsibility of extension services to assist rural people and empowered them to provide solution to the identified problems on shortage, scarce, or extinction of biomass source of energy by planning through application of knowledge acquired from extension officer in all part of the country (Mgbenu, *et al.*, 1995 Sargent, 1998 Ogunwande, 2010 Adeniyi and Felix, 2011 Amacher, *et al* 2004).

In developing countries fuel wood is the major source of cooking and heating where about 2.5 billion people rely solely on fuel wood for cooking (FAO, 2005, Adeoti, *et al*, 2001). There is an urgent need for practical steps to be taken by agricultural extension officers to ensure sustainable production practices of biomass energy resources for maintaining and improving rural household's standard of living. This research aims at identifying biomass energy sources of rural household, examining the effect of energy sources on rural households and describing sustainable biomass energy resources production practices in Nigeria.

MATERIALS AND METHODS

A descriptive approach is used in this study to point out issues of sustainable biomass energy resources production practices involved in Nigeria to ensure adequate availability to rural household needs. The paper will describe biomass energy source of rural household, ascertain the effect of energy sources on rural household and mention sustainable biomass energy resources production practices.

Major Household Biomass Energy Resources

Fuel wood is one of the oldest sources of energy known and used by man since the discovery of fire (Ogunwande, *et al* 2010). Despite the advancement in the technology and industrialization over the centuries, wood has remained the most popular source of energy for cooking and domestic use all over the world and it may likely continue to play this major role for many years especially in developing countries, where wood is the major source of energy which constituting over 60% of the total energy consumption in Africa (Ogunwande, *et al*. 2010, Adeoti, *et al*, 2001).

According to Adeoti, *et al*, (2001) Ogunwande *et al* (2010) fuel wood provided about 54% of total energy consumed in the rural area of Nigeria in 2000. Fuel wood also forms about 80% of the total wood requirement and more than 60% of total energy consumed in tropical Africa (Ogunsanwo and Ajala 2002). Ogunwande *et al* (2010) asserted that charcoal is also one of the major energy resources in Nigeria. It is blackish residue consisting of impure carbon obtained by removing water and other volatile constituents from animals and vegetation substances. Production of charcoal takes place where there is an abundance of trees/wood. This charcoal is a product used for both domestic and industrial purpose. Amaechi (2000) and Ogunwande, *et al* (2010). reported that charcoal is cheaper and of high economic value than other biomass sources of energy apart from fuel wood. Generally, in comparing household consumption of charcoal to fuel wood little of charcoal is used for cooking in urban centers while it is vice versa in rural area. But its production may often results in greater deforestation than fuel wood collection due to whole wild trees that are often felled (Amaechi, 2000).

Alternative Biomass Energy Technologies Use

Other forms of biomass energy include gasification which is a thermal treatment of solid fuel into gaseous form while retaining, most of the energy in original fuel. Biodiesel is also another type of biomass energy from tree seed oil like croton megalocarpus, *Jatropha curcas* among others (Adeoti, *et al* 2001 IIED, 2010). Biomass energy can also be generated from wood wastes like briquettes which are made from sawdust or charcoal dust can be alternative option for charcoal (IIED, 2010). These are biomass energy sources which are gaining recognition in Kenya and their potential need to be explored.

Household Energy Crisis and Impact on Forest Resources

The importance of forest biomass (trees) as one of the highest source of energy in Nigeria is possibly due to the fact that the household sector dominated energy consumption in this country as conform with Adeoti, *et al* (2001), IIED, (2010) who reported that energy consumption in the household sector have had a share of 65% of total energy consumed in (1989). Also Ogunwande (2010) confirmed that energy consumption rate in the household level had a share of 72% of total energy consumed in 2005 followed by industrial sector (20%) other services (3%) and agriculture (1%).

Fuel wood is dominantly used by rural dwellers in tropical African countries mainly because it is cheap, readily available socially and culturally acceptable to rural people than any other forms of biomass energy

source Adeoti, *et al*(2001) and FAO (2005) observed that most or nearly all the world's fuel wood is used for cooking and this use will remain the priority of most wood energy consumers. This is due to the fact that most households are experiencing hard time in getting other energy sources to use as the alternative and substitutes for fuel wood are seasonal in availability such other sources include cow dung and crop residue which are often scarce, thereby leaving fuel wood as only option for rural people and results to serious forest trees or wood deficit.

The categorization of household energy showed that 82% of energy consumed was derived from wood and other biomass (Ikuponisi, 2004, Ogunwande, 2010). Contribution of forest and tree resources to household energy is high in Africa and will still remain so for the foreseeable future. (Sene, 2000) this is because nobody has not yet found an alternative to fuel wood or its derivative- charcoal as the source of household energy of African poor. The scarcity and exhaustions of fuel wood supply is inevitable, if the whole rural households in Nigeria should continue to use fuel wood as their source of energy, this will surely have a negative impact on our forests, as it may lead to deforestation, erosion, and desertification which will in turn leads to biodiversity loss and generic erosion of forest tree species (Ogunwande, *et al* 2010).

It will not be an overstatement to say that there is crisis in the sector of rural households as their source of energy which is fuel wood, is being collected at far distance compared to time past when housewives gathered/ collected fuel wood at their back yards (Ogunwande,*et al* 2010, Shamaki, 2010). This crisis exists in many parts in Nigeria today as indiscriminate tree removal results in rapid draw down of natural forests which leads to fuel wood scarcity and increase in price of charcoal. This situation has been experienced in Kebi, State, Sokoto State, Katsina State and Zamfara State where farmers indicated that they travel longer distances nowadays to procure fuel wood than they ever did in the past (Adeoti,*et al* 2001). This scarcity and exhaustions of fuel wood supply presents energy crisis which threatens the existence of most rural communities in Nigeria (Ladipo, *et al.*, 2002 Ogunwande,*et al* 2010) this is because as each rural household strives to meet their fuel wood energy need for food security purpose, they destroy many valuable forest resources that are essential for their own survival and required standard of living. They also expose many land areas to erosion and leaching that result in threatening the livelihood of many rural households.

Sustainable Production Practices of Biomass Energy Resources

The four decades have seen an apparent decline in forest wealth of Nigeria, which informed the banning of timber export by the Federal Government in 1976 (Nwaigbo, 2003). Despite a rising awareness of the environmental and economic implications, the Federal and State Governments are not keen in supporting forest creations through plantation developments. None the less private landowners can establish plantations of fast growing tree species based on practices that includes afforestation, agroforestry, Taungya, short rotation coppice (SRC) systems and use of crop residue.

Afforestation: This is the establishment of forest tree plantation or other woody cover (such as wind break) on land which has been devoid of forest cover for sometimes (Wiersum, 1984, Ayanwuyi, 1998). Afforestation techniques should involve the active support and participation of local people, because the technique (Afforestation) involve low cost and low technology for improving environmental quality and standard of living in farming community. According to Grainger (1983) plantations and wind breaks provide fuel wood and fodder that are often in short supply and protect both fields and villages from winds and dust storms.

Agroforestry: Agroforestry is a new name for old practices that holds substantial promise for ameliorating critical development and environmental problems in Kenya. Agroforestry which has been adopted in Nigeria is a land use system that combine the production of food, livestock and forest products preferably on the same unit of land on a sustained yield basis. Agroforestry offers potential for reducing the increasing conflicts between arable farming livestock keeping and forestry interests especially in the high potential area that are facing intense population growth (Kilewe , *et al*, 1989). Agroforestry offers the possibility of house hold access to a range of forest produce including food, fuel wood, building materials, medicine and animal fodder in addition to agricultural produce. (Kilewe, *et al* 1989). Furthermore, it offers the capacity for sustained yield production of these commodities because agroforestry systems properly conceive and practiced may enhanced organic- matter production, maintain soil fertility, reduce erosion and create a balance microclimate (Kilewe, *et al*, 1989).

For example British America Tobacco Company (BATC) obtained fuel wood for tobacco curing from natural forests. This exploitation led to the shortage of fuel wood in the tobacco growing areas. The company realized this situation and in 1974 initiated on- farm tree planting programmes by tobacco- growing farmers

(Gaitho, 1989). Moreso on- farm tree growing falls within the scope of agroforestry this indicated that the programme is a success and that agroforestry approaches can be used to produce fuel wood for household consumption (Gaitho 1989). Some of the tree species usually included in agroforestry programme are *Gmelina arborea*, *Albizia Spp.* *Calliandra calothyrsus*, *Acacia holosericea*, *Mimosa scabrella* and many others (Kilewe, *et al* 1989)

Use of Crop Residue

Crop residue can for convenience be divided into two categories these include field and process residues (Adeoti,*et al* 2001,IIED,2010).Field Residues are those that remain in the fields after harvesting of the crop. They are used for three essential functions: as a fertilizer, as fodder for livestock and fuel wood for rural household especially the roots and woody/ standing part of the crop (Adeoti,*et al* 2001IIED,2010). Processed residues are those that result from the processing of the crop. It is these residues that offer particular promise as an energy sources. Examples are rice husks, guinecorns stalks, maize husks, cob and stalks, palm nut shells, and husks among others. Some processing will be done in rural areas especially where the crop is produced by small scale farmers. (Adeoti,*et al*,2001and IIED,2010).

Short Rotation Coppice (SRC): is essentially a system of tree farming (*Gmelina arborea*) when trees are felled, sprouts will appear from dormant and suppressed buds in the stump. These sprouts are managed to produce the next crop (tree branches harvest for fuel wood) thus avoiding the need to replant. This process is known as coppicing which means to cut and “couper” in French language. Short rotation coppice (SRC) as the name implies is designed to have a shorter time period between planting and harvesting than conventional forestry plantations the interval period may vary from 3 to about 15 years for harvesting for fuel wood. (Nwaigbo, 2003). The main reasons supporting the production of fuel wood from SRC plantation are to:

- i. Produce biomass which may be utilized as a renewable source of energy.
- ii. Use of unproductive agricultural lands which can latter be used for agriculture (food production) after the restoration of soil fertility through organic matter accumulation.
- iii. Reduce environmental damage through creation of plantation which serves as carbon sink to minimize global warming and as wind breaker.
- iv. Produce fiber and raw materials for industry
- v. *Gmelina arborea* can survive where many other tree crops have failed (Onweluzo, 1973)
- vi. The wood produced can be used as a substitute for fossil fuels, this will result in lower

emissions of atmospheric pollutants and net reduction in carbon dioxide emissions.

Gmelina arborea (Roxb) plantations has been established in many states of Nigeria especially in southern Nigeria. This is because of its acceptance as a good pulping materials and industrial timber. It also has high heating value as fuel wood (Oladosu and Adegbulugbe 1997, Nwaigbo, 2003, Ogunwande, 2010). This means that *Gmelina arborea* (Roxb) plantation can be established solely for fuel wood supply and for land rehabilitation as it has high leafage production. The species has early vigorous growth and coppices easily to give second and subsequent rotations (Adeoti,*et al* 2001 IIED, 2010 Nwaigbo, 2003 Ogunwande, 2010).

CONCLUSION AND RECOMMENDATIONS

The study has shown that energy is one of the crucial factors needed in economic growth and development of any nation. It is the back bone of industrialization and it has greatly influenced man’s activities since advent of civilization. Biomass sources of energy(fuel wood, crop residue) are identified and described in the study as the common and available biomass source of energy for Rural Household Consumption in Nigeria, that need to be sustained by carrying out some sustainability practices like Agroforestry,Crop cultivation and Short Rotation Coppice.

There should be a condition that would enable biomass energy source (fuelwood) policy and planning, where biomass source of energy (fuelwood) production strategies should be developed with prime objective of making each state of the nation (Nigeria) be sufficient in biomass energy source (fuelwood) production. Also the biomass source of energy plans should be integrated with other decentralized planning activities at Federal and States development committees (FSDCS).

Biomass energy(fuelwood energy) database should be established at state and national level. This can be achieved through establishing regular field surveys for biomass energy supply and demand and data analyses to monitor the changes overtime through regular surveys that need to be undertaken preferably at five years intervals to enable updating of the data for future biomass energy (fuelwood) plans and policy formulations that need to be established.

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DOES EDUCATION REDUCE POVERTY IN RURAL HOUSEHOLDS?

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ABSTRACT

Qualitative education equips people from poor families with literacy, numeracy and problem solving skills, and lifts them out of poverty. This study presents empirical link between non-formal, primary, secondary, tertiary education and poverty using quantitative poverty assessment measure. Through the multi-stage sampling technique, 150 rural households were selected and primary data were obtained with the aid of questionnaire. Foster, Greer, Thorbecke quantitative poverty measure was employed to decompose and analyse the data. Result of analysis showed that the incidence of poverty was highest (61 percent) among household heads with no formal education and lowest (35 percent) among household heads with tertiary education. Findings also revealed that poverty gap and squared-poverty gap decreased with higher educational attainment. A test of difference in the poverty incidence of households heads without formal education versus secondary and tertiary education; and primary education versus secondary and tertiary education were significant ($p < 0.01$). Result showed that the incidence of poverty is largest among the illiterate households and declines consistently by increasing level of education. Results suggest that the incidence of poverty among households is strongly influenced by educational levels. Enhancing educational and training opportunities as a pathway out of poverty is a sensible policy option.

KEYWORDS: education, poverty, rural, households, Nigeria.

Poverty experienced by Nigerian is pervasive, multifaceted and chronic, affecting the lives of a large proportion of the populace (Omonona 2001). In Nigeria, poverty is essentially a rural phenomenon as the majority of those in poverty are disproportionately located in the rural areas, where they are primarily engaged in agricultural production and allied activities. IFAD (1993) documented that rural poverty is a dominant feature of life in all the regions of the world, affecting the lives of nearly 1 billion people and despite the high rate of urbanization, the majority of the poor will continue to live in the rural areas.

It is hard to overemphasize the importance of education for improving the welfare of individuals (Ahmed *et al.*, 2009). But, throughout the world it has been found that the probability of finding employment rises with higher levels of education, and that earnings are higher for people with higher levels of education. FERT (2001) reported that education is generally considered as the easiest means of breaking the vicious circle of poverty.

The level of education or literacy status of household head is very important in the reduction of poverty. According to Schubert (1994), people with low levels of human capital that is people among whom the rate of illiteracy is high, school education is low and the capacity for work is low, resulting from under-nourishment or illness, are particularly prone to be poor.

Thus, the relationship between human capital and poverty shows characteristics of vicious circle, which cannot be broken down generously.

It is widely agreed that the relationship between poverty and education operates in two directions. According to Tilak (2005), poor people are often unable to obtain access to an adequate education and without an adequate education; people are often constrained to a life of poverty. Education is rightly regarded as an important component of anti poverty programmes in many developing countries Nigeria inclusive. Studies by Coombs & Ahmed (1974); Noor, (1980); World Bank, (1993), seemed to have concentrated on analyzing the positive effects of literacy and only primary education on poverty. Inconsistency and unsustainable policies, programmes and macro-economic imbalance are part of the causes of the present "hemorrhage in education". Any keen watcher of the political activities in Nigeria knows that every leader that comes on stage often discards previous programmes and policies. Education is an important factor in economic growth and sustainable development. It helps to broaden the base of understanding among the people and therefore helps to strengthen the democratic process which paves way to the promotion of sustainable development through better understanding of the intimate relationship between environment, ecology and sustainable development. Education in Nigeria is overseen by the

Ministry of Education and the educational system is divided into kindergarten, primary education, secondary education and tertiary education. Despite huge government investment in the educational sector and the increasing number of graduates from schools each year, the quality of life tends to move at a snail pace without significant improvement. It therefore becomes imperative to investigate the role of education in improving the living standard and promoting sustainable development of the rural populace. This study however focuses on the effect of non-formal, primary, secondary and tertiary education on poverty among rural households in Niger Delta region, Nigeria.

METHODOLOGY

Study Area, Sampling and Data Collection Procedure

This study was conducted in Akwa Ibom State, Niger Delta, Nigeria. The state is located at latitude 4°33' and 5°53' and longitude 7°25' and 8°25' East and occupies a total land areas of 7,246km². With an estimated population of about 3.9million (NPC, 2006), the state is bounded to the North by Abia State, to the East by Cross River State, to the West by Rivers State and to the South by the Atlantic River. Administratively, the state is divided into 31 Local Government Areas and has 6 Agricultural Development Project (ADP) Zones viz: Oron, Abak, Ikot Ekpene, Etinan, Eket and Uyo.

The study area is in the rainforest zone and has two distinct seasons viz: the rainy and the short dry season. The annual precipitation ranges from 2000 – 3000mm per annum. Most of the inhabitants of rural communities in the study area are farmers and the crops commonly cultivated include cassava, oil palm, yam, cocoyam, fluted pumpkin, okra, waterleaf, bitter-leaf, etc. In addition, some micro livestock are usually raised at backyards of most homesteads.

Primary data were used for this study. Farm-level intensive itinerary survey provided the basic cross-sectional data from 150 rural farming households in the study area. Data were collected from farm households using well structured questionnaire. Primary data included data on household income and expenditure, socio-economic characteristics of households and their heads, farm, specific variables.

Multistage sampling technique was used for selecting the representative farm households that were used for this study. The first stage was the random selection of 3 out of the 6 Agricultural Development Project Zones in Akwa Ibom State. The second stage sampling was the random selection of 5 villages per ADP zone to make a total of 15 villages. Furthermore, a total of 10 households were randomly selected to make a total of 150 farming households.

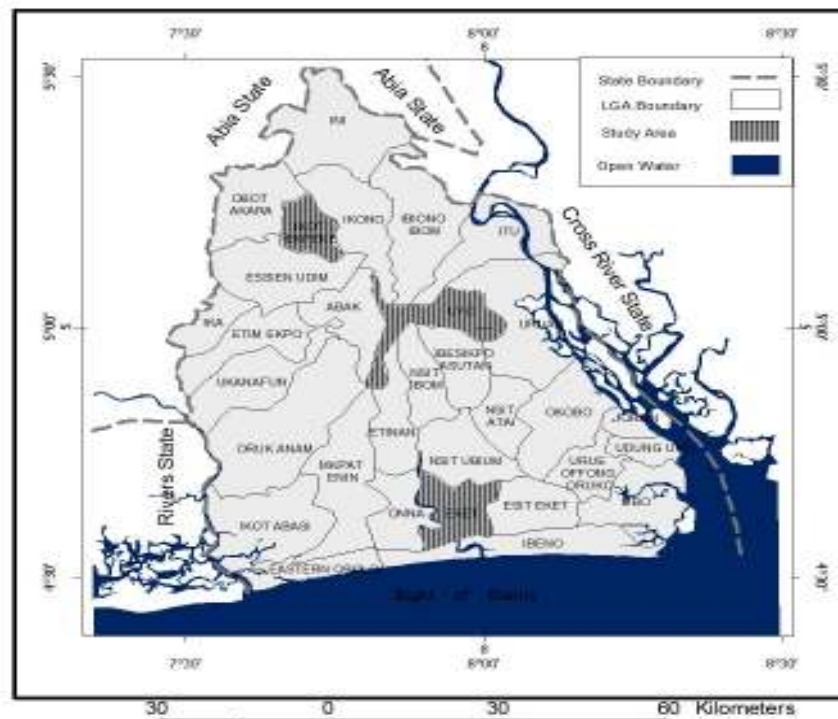


FIGURE 1: AKWA IBOM STATE SHOWING AGRIC. DEVT. PROJECT SAMPLED LOCAL GOVT. AREAS

Analytical Techniques

There are many poverty measures. The head count ratio or index is otherwise called poverty incidence. This type of application would be useful in testing the effectiveness, overtime, space or sub-group of policies intended to alleviate the relative number of poor people. If the percentage of the population in poverty decreases, then poverty is said to decline and vice versa. A major problem with the head count ratio is that it does not indicate the extent of poverty intensity. Another short coming of the head count index is that it implies that the distribution of income/expenditure is homogenous.

The poverty gap measure otherwise called poverty depth has a useful interpretation as the average fraction of the poverty-line income that would be required to be distributed in order to eradicate poverty under the assumption of perfect targeting. It shows the degree of immiseration. The short fall of the poverty depth as a measure is that it does not indicate the severity of the poverty problem in terms of the number of people who suffer. It also does not show income distribution among the poor.

The sen index has a major draw back: it is more responsive to improvements in the headcount than it is to reductions in the income gap or to improvements in the distribution of income among the poor. That is, the index indicates that the efficient way to reduce poverty is to help the least needy first and the most needy last. This is antithetical to egalitarianism.

The Foster, Greer and Thorbecke (FGT) weighted poverty index was used for the quantitative poverty assessment (Foster *et al*, 1984). The reason for this choice is due to its decomposability of the overall population into mutually exclusive sub-populations. This allows for comparison of poverty over the various mutually exclusive sub-groups. United Nations UN (2001) noted that the most important purpose of a poverty measure is to enable poverty comparisons.

The FGT measure for the subgroup i th $P\alpha_i$ is given as:

$$P\alpha_i = n^{-i} \sum_{j=1}^{q_i} \left(\frac{z - Y_{ji}}{z, Omax} \right)^\alpha \quad 1$$

Where $P\alpha_i$ is the weighted poverty index for the i th subgroup; n_i is the total number of households in the i th subgroup households in poverty; Y_{ji} is the per adult equivalent expenditure of household j in sub group i , z is the poverty line and α is the degree of concern. When α is equal to zero, it implies no concern and the equation gives the head count ratio for the incidence of

poverty (the proportion of the farming households that are poor).

That is

$$P\alpha_i = ni^{-1} \sum_{j=1}^{q_i} \left(\frac{z - Y_{ji}}{z, Omax} \right) = q_i / ni \quad 2$$

When α is equal to 1, it shows uniform concern and equation becomes

$$P_{1i} = ni^{-i} \sum_{j=1}^{q_i} \left(\frac{z - Y_{ji}}{z, Omax} \right)^1 \quad 3$$

This measures the depth of poverty (the proportion of expenditure shortfall from the poverty line) according to Hall and Patrinos (2005), it is otherwise called the poverty gap the average difference between the income of the poor and the poverty line.

When is equal to 2, distinction is made between the poor and the poorest (Foster *et al*, 1984; Assadzadeh and Paul, 2003). The equation become

$$P_{2i} = ni^{-i} \sum_{j=1}^{q_i} \left(\frac{z - Y_{ji}}{z, Omax} \right)^2 \quad 4$$

The equation gives a distribution sensitive FGT index called the severity of poverty. It tells us the extent of the distribution of expenditure among the poor.

The FGT measure for the whole group or population was obtained using:

$$P_\alpha = \sum_{i=1}^m \frac{P\alpha_i n_i}{n} \quad 5$$

Where $P\alpha$ is the weighted poverty index for the whole group, m is the number of subgroups while n and n_i are the total number of households in the whole group and the i th subgroup respectively.

The contribution (C_i) of each subgroups weighted poverty measure to the whole groups weighted poverty measure was determined using;

$$C_i = \frac{n_i P\alpha_i}{n P\alpha} \quad 6$$

The test of significance of $P\alpha_i$ (subgroup poverty measure) relative to the $P\alpha$ (whole group poverty measure) was given according to Kakwani (1993) by:

$$t = \frac{P_\alpha i - P_\alpha}{SE(P_\alpha i)} \quad 7$$

The above was used to test if significant difference exist between the $P\alpha$ measure of a subgroup i with another j .

The weighted poverty measures ($P\alpha$) and their corresponding standard errors were calculated using the Microsoft Excel Package.

RESULTS AND DISCUSSION

Figure 1 reveals that 23.33 percent of farm household heads had no formal education, 40 percent had primary education, 26 percent had secondary education while only 10.67 percent attended tertiary institutions. This finding suggests that the literacy level of the respondents was high as most of the household heads had post primary qualifications. The high literacy level by respondents could be attributed to high pupils and students enrolment and the presence or availability of greater number of schools in the area and the willingness of the household members to take advantage of the free and compulsory education policy of government.

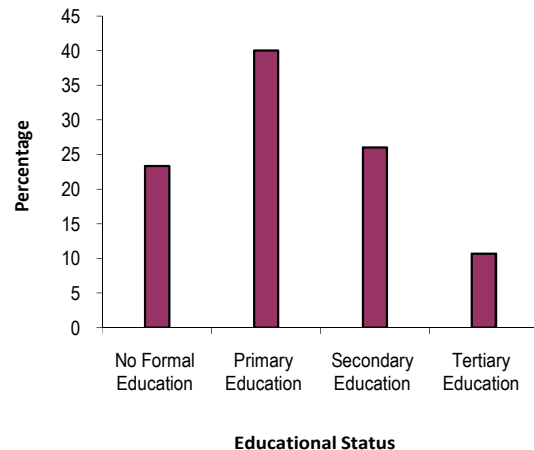


Fig. 1: Educational Status of Household Head

Table 1: Comparison of poverty by educational status of the household head

	Contribution to					
	P_0	P_1	P_2	P_0	P_1	P_2
No Formal Education	0.61 (1.84)*	0.55 (2.61)**	0.61 (2.15)**	0.49	0.53	0.55
Primary Education	0.55 (1.33)	0.39 (-0.07)	0.40 (-0.09)	0.27	0.27	0.25
Secondary Education	0.43 (-0.57)	0.34 (1.00)	0.40 (-0.62)	0.11	0.06	0.05
Tertiary Education	0.35 (-3.33)***	0.33 (-2.00)**	0.27 (-1.91)*	0.13	0.14	0.15
All	0.57	0.48	0.44	1.00	1.00	1.00

Figures in parentheses are t-values of $P\alpha$ *** significant at 1%, ** at 5%, * at 10%

Result on table 1 reveals that the incidence of poverty are highest (61 percent) among farm household heads without formal education and lowest (34 percent) among family heads with tertiary educational attainment. Similar findings were obtained by Schubert (1994) and FOS (1999) that people with low levels of human capital tend have higher incidence of poverty. The incidence of poverty is 55 and 43 percent among household heads with primary and secondary education respectively.

Whereas the poverty incidence among the farm households whose heads have no formal education and those having tertiary education is significant ($P < 0.1$), there is no significance in the poverty incidence experienced by farm households whose heads have either primary or secondary education ($P > 0.10$). A test of difference in the poverty incidence of households whose heads have no formal education and household heads with formal education are significant ($P < 0.01$) as shown in table 2.

Table 2: Poverty by educational status of household head

Educational Status of Household Head	P_0	P_1	P_2
No Formal Education vs. Primary	0.75	3.20***	5.25***
No Formal Education vs. Secondary	2.57***	0.36	0.28
No Formal Education vs. Tertiary	5.20***	0.38	0.28
Primary School vs. Secondary	-12.00***	0.08	0.00
Primary School vs. Tertiary	-6.67***	0.10	0.17
Secondary School vs. Tertiary	-4.00***	-1.00	6.50***

*** significant at 1%

There are significant differences ($P < 0.01$) in the poverty incidence between households whose heads have primary and secondary education on one hand and those heads who have tertiary education on the other hand. The only exception in the poverty incidence where there is no significant difference is between those households

whose heads have primary education and no formal education. Result implies that poverty incidence is influenced by the educational qualification of the household heads. Findings further show that 49 percent of the whole groups poverty incidence is contributed by households headed by persons without formal education. This is followed by heads having primary education (27 percent), tertiary education (13 percent), and secondary education (11 percent) as seen in table 1. In summary, the extent of poverty increases with decrease in the educational qualification of the heads of farming households. This may not be unconnected with the fact that rate of adoption of improved farming inputs increases with higher educational status which raises farm income with subsequent reduction of poverty (Etim, 2007).

CONCLUSION

This study empirically assessed the relationship between education and poverty. Results of the study confirm the importance of educational advancement in the improvement of welfare of rural households. The incidence, depth and severity of poverty seemed to decrease with increase with educational opportunities. Findings suggest that education should be of priority to government and its agencies. Increased budgetary allocation to the educational sector should be encouraged.

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UPTAKE OF PROFESSIONAL JOURNALISM IN THE COVERAGE OF INDIGENIZATION ISSUES IN THE MINING SECTOR BY THE *HERALD* AND THE *DAILY NEWS* IN ZIMBABWE FROM 2012 TO 2014

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ABSTRACT

The article seeks to examine the uptake of professional journalism in the coverage of indigenization issues in the mining sector by *The Herald* and the privately owned *daily news* mainstream print media in Zimbabwe from 2012 to 2014. Professional journalism is a concept that requires news reporters to adhere to strict journalistic standards and practices such as the code of ethics in their everyday business of news gathering, processing and distribution. The Act in Zimbabwe defines “indigenization” to mean a deliberate involvement of indigenous Zimbabweans in the economic activities of the country to which they had no access, so as to ensure the equitable ownership of the nation’s resources. Data gathering methods used in the study are structured interviews, questionnaires and critical discourse analysis. These were subjected to both qualitative and quantitative methods of data analysis. Various newspaper articles from the two mainstream print media (*The Herald* and *daily News*) were analyzed and subjected to an intense critical discourse analysis. The crux of the article is to establish how the two mainstream print media have contesting views when it comes to national policy framing, taking into account the elements of professionalism in news writing that determine ethical issues that affects the news outcome.

KEYWORDS: professional journalism, indigenization, coverage, mining, antinomianism, absolutist and situationist

The study seeks to assess the uptake to professional journalism in the coverage of Indigenization issues in the mining industry in Zimbabwe from 2012 to 2014. This study is relevant to media studies as professional journalism is key to the media fraternity. The study would make use of qualitative research in its methodology as it would assist extensively in the gathering of the required data. By carrying out interviews with various news editors, journalists and the general public the researcher would be equipped on the uptake of professional journalism in the coverage of the indigenization issues in the mining sector in Zimbabwe. Questionnaires would assist in the analysis of the information that would have been obtained during the course of the research. The researcher settled for these data collection methods due to the in-depth information that they provide.

The study focused on the Uptake of Professional journalism in the coverage of Indigenisation issues in the mining industry by *The Herald* and *daily news* and would narrow its cast from the period ranging from 2012 to 2014. To make this study possible the researcher would be guided by the following theories agenda setting theory, framing concept and development media theory. These three theories proved to be relevant to the study as they serve to understand the role of professional journalism in the coverage of

national issues such as the Indigenization of the mining sector an issue that generates national debate.

BACKGROUND OF THE STUDY

The Indigenization and Economic Empowerment Act (Chapter 14:33), is a Zimbabwean law which was enacted in 2007. Under the law all non-indigenous enterprises operating in Zimbabwe to dispose of at least 51 percent shareholding to indigenous entities and this supports Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZIMASSET). The Act was introduced by Parliament as a measure of correcting the historical economic imbalances that resulted in the marginalization of indigenous Zimbabweans prior to the country’s independence. Furthermore, the law stresses that such colonial legacy has continued to deprive the socio-economic aspirations and prosperity of indigenous Zimbabweans.

The origins of *The Herald* dates back to the 19th century. Its forerunner was launched on June 27, 1891 by William Earnest Fairbridge for the Argus group of South Africa. Named the *Mashonaland Herald* and *Zambesian Times*, it was a weekly, hand-written news sheet produced using the cyclostyle duplicating process. In October the following year it became a printed newspaper and changed its name to *The Rhodesia Herald*, (Roberts, 1970). The operations at *The Herald* clearly spell out that you cannot bite the hand that feeds

you as it is owned by Zimpapers which is government owned. Furthermore, the situation was worsened by the minister of information who has in-ordinate powers to appoint and fire editors and to punish those who violate government policy or fail to use the media to promote government policy and propaganda or who publicize the views of government officials, (Rusike, 1990)

The *daily news* is a Zimbabwean independent daily newspaper published in Harare. The paper was established in 1999 by Geoffrey Nyarota, a former editor of the *Bulawayo Chronicle*. Owing to the Zimbabwe's government strangle hold on the public media the *daily news* swiftly became Zimbabwe's most popular daily independent newspaper. The paper's heavy criticism of the ZANU (PF) government led to its bombings allegedly by Zimbabwean security forces. Zimbabweans often do not see the mainstream media articulating dynamic issues that are of relevance to them (Mukasa, 2000). Thus, with such a polarized media operating in the country it is of great sense that such a research that looks at how that law is being represented is carried out.

Ownership and Control of the Mainstream Print Media in Zimbabwe

The link between ownership of news organisations and the character of news coverage is not easy to determine and it grows more difficult by the day as public and commercial system of ownership mix and blend and intersect in a growing variety of ways (Noami, 1991, p. 4). Journalist operate within constraints among them the constraint of having to write "accurately" about objectively real occurrences in the world, whoever planned them and however they came to the media notice (Schudson,2002, p.255). *The Herald* is owned and controlled by the government who command an outright majority 51percent of the shares. On the other hand, *daily news* is owned by Associated Newspapers of Zimbabwe (ANZ), which is a privately owned entity with no links to the government. ANZ was set up with 60 percent of shareholding under the Africa Media Trust which is owned by British, South African, and New Zealand companies. Thus, making use of the phenomena of political control of the print media this study would aim to capture to what extent the area of professional journalism has been affected in the coverage of indigenization issues particularly in the mining sector in Zimbabwe since its inception in 2010.

Professional Journalism as a Site of Contestation

Journalists are there to report news. This lends the work of journalists an aura of instantaneity and immediatism, as news stresses the novelty of information as its defining principles (Deuze, 2005, p.449). On the other hand, the ongoing professionalization process and the

corresponding development of a shared occupational ideology is perceived as a period of high modernism journalism (Hallin, 1992, p.112). According to (Bantugan, 2009,p.3) traditional journalist perspective defines news as things that people need to and shall know about their surrounding so they can "debate their responses to it and reach informed decision about what courses of action to adopt". The private media on the other hand, particularly the *daily news* has been accused of being turned into an opposition mouth piece especially for the oppositional political party Movement for Democratic Change (MDC). It is relevant for this study that to assess how objectivity is achieved in the coverage of indigenisation issues in the mining sector.

The currently state of the print media environment in Zimbabwe can be safely categorized as polarized. The political, economic and professional problems that are bedeviling the country has precipitated the media to be undemocratic (Mano, 2005). Both the private and the public media have been on the rise in creating agendas that undermine and ignore the ethical roles of journalism. Journalism now can be conceptualized as an ideology (Deuze, 2005, p.56). The institution now focuses primarily on how journalists give meaning to their news work.

METHODOLOGY

The study examined the Uptake of professional journalism in the coverage of indigenization issues in the mining sector by *the Herald and the daily News* in Zimbabwe from 2012 to 2014. In this regard, qualitative and quantitative research methods were applied in order to check on the accuracy of conclusion arrived at. The study used questionnaires, interviews and content analysis derived from *the Herald and daily News* from 2012 to 2014, particularly those that dealt with indigenization issues in the mining sector in Zimbabwe. From the twenty questionnaires distributed to *the Herald and daily News*, four were from the editorial team from each newspaper and six each from *the Herald and the daily news* reporters. Out of twenty, only sixteen were returned as some of the editors and news reporters were tied up. Sixty other responses were drawn from the readers of the two newspapers in Gweru urban. Fifty of them completed the questionnaires and the other ten were not returned as the readers had no time to attend to the questionnaires. Overall, sixty-six out of eighty, thus 83% of the questionnaires distributed were filled and returned. The main questions respondents needed to answer were whether indigenization was given a fair coverage by *the Herald and daily news* in Zimbabwe. Secondly, they had to assess the extent to which mainstream print media in Zimbabwe is guided by professional journalism in their news coverage on indigenization particularly by the

mining sector. The study made use of face to face interviews to obtain information from the editors, readers, reporters, and publishers of *The Herald* and *daily news* pertaining to their perception on the uptake of professional journalism concerning the indigenization policy of the mining sector as represented and framed in the papers under study. Out of twenty respondents that were targeted the researcher managed to interview sixteen of them thus achieving more than 80% response rate of the actual target. These consist of two editors and two reporters from *the Herald* and two editors and two reporters from the *daily news*. In addition, the researcher interviewed eight readers for the two newspapers *the Herald* and *daily news*. Critical discourse analysis and content analysis was explored to pay attention to the linguistic component of language used in *the Herald* and *daily news*.

RESEARCH FINDINGS

The Print Media Is Not Guided By Professional Journalism In The Reportage On The Indigenization Of The Mining Sector

The findings from the study reflect that professionalism is not entirely profitable especially when covering indigenization stories. Whereas journalists are required to submit figures and facts that are required to be appropriate and true. It is not always the case that comments which are given are to be honest. In any newsroom ethics are enshrined in the code of conduct (McQuail, 2010). Therefore, it is up to the journalist to adhere to these codes of ethics, which refer to a set of principles of professional conduct that are adopted at a personal level by the journalists themselves. Results gathered through interviews with the news reporters indicate that the Zimbabwean press is heavily partisan in its dissemination of information.

In addition, four editors and four reporters of the two newspapers under study indicated in the interviews that they uphold professionalism in the reportage of their stories about indigenization on the mining sector in Zimbabwe. However, the study also found out that most editors and journalists emphasized that there is need to uphold ethics more than need to make a profit. However, by making use of content analysis it became clear that with regards to the *daily news* it became clear that when the paper portrays Zimbabwe African National Union Patriotic Front (ZANU PF) in good light the sales of the newspaper are low. The readers of the newspaper are mostly MDC supporters so for the paper to sale the editor and the journalists write stories that guarantee them their jobs and advertising revenue thus they write good about the MDC and paint a generally bad picture of the government.

Finding from the questionnaires and interviews concur that, the *daily news* is mostly read by people who are opposed to the ideas of ZANU (PF) and generally hate the policies of the party. Therefore, in order to retain and satisfy its readers the newspaper has to report in a way that is mostly critical of the state. This explains why the paper chose to take that slant when they covered the story in the same light that it did. The Zimbabwean print media landscape unlike the in the broadcasting area has witnessed some form of democracy as there is a number of privately owned newspapers in the country that have been licensed.

The Herald through their reportage frames the indigenization policy in a way that makes it ignorant of the implications it could have on the economy and on the potential to scare away potential investors. In an article published in *The Herald* of September, 6 2013 titled *Reckless or savvy — Zim’s indigenization policy analyzed* the reporter puts forward his argument of the law by arguing that the two main political parties in the country have different definitions to the law. On one hand, the main opposition which is the MDC-T reckons that the policy is ill conceived and lacks the idea of fostering the idea of production to the development of the country.

The reality on the ground is that the indigenization policy since its inception companies such as ZimPlats, which is one of the biggest producer of platinum in Zimbabwe and in the region, are being subjected to a tight squeeze which is requiring them to produce the same amount of platinum as before, as argued by various economists the only reason why they are still around is the lack of other investment destinations. The marketing at *The Herald* makes the assertion that without revenue generated from advertising it is difficult if not impossible for the newspaper to.

News Values about indiginisation by the Herald and daily news from 2012-2014

The table below gives further explanations basing on the results that were collected using questionnaires and face-to-face interviews to the values that is placed on news values especially with regards to the Indigenization policy.

Newspaper	The Herald	Daily News
Pro-Indenisation	10	0
Anti-Indigenisation	0	8

Fig1. How the two papers frame the policy

The above table illustrates and further explains the values that are placed on news values especially with regards to the Indigenization policy in Zimbabwe by *the Herald* and *daily news*. The beginning of 2011 mapped

the beginning of the indigenization policy being fully adopted into the media as a newsworthy item. The study also established that of all the stories analysed from *the Herald and daily news* the two newspapers have different approach and editorial slant in their news coverage to the public about indigenization in Zimbabwe. The approach by *daily News* is that of being totally opposed to the policy as they view it as the beginning of the end of luring in foreign investment which is key to the resuscitation of the economy. On the other hand, *The Herald* takes the approach of the being the chief publicist of the policy. This is largely due to the fact that the policy was implemented by the government which has direct control of the newspaper. The main reason is most likely that the MDC has been the party that the government views as being there to derail the indigenisation policy. On the other hand, the private owned entity the attack is always on ZANU PF and the MDC are given a good picture as they have been opposed to the policy.

Framing of Indigenisation Policy Has Led to Its Rejection by the Public

Critical Discourse Analysis is another research method that was used by the researcher. The manner in which the press has framed the policy has led to it being accepted by ZANU (PF) supporters and being rejected by those opposed to the rule of the government. A good example of its rejection is by looking at how other political players in Zimbabwe reflected on it. Enillia Mukarati, the vice president of the Zimbabwe People's Union (ZAPU) condemnation on the Indigenisation mining policy has been one, in which leaders of opposition political parties have been on record critically complaining about indigenisation policy to the mining sector. The policy has been likened to the disastrous land reform programme in that it will bring more harm than good to the economy of the country. In articles published by most private media organizations, in this instance, the *daily news* being one of them, the law of the Indigenization of mines was used to as gimmick employed by the ruling party to win votes in the last election which ZANU (PF) won resoundingly. In an article published by the newspaper on the 13th of April 2014 titled *Scrap indigenisation policy: The* article stresses how most of the economic analysts in the country have urged the government to either abandon the whole process or put it on hold and implement measures that would resuscitate the economy and not spook investors the same way the law is doing.

Influence of the Herald and Daily News in the Rejection and Embracing of Indigenization Policy

Results obtained through questionnaires and interviews with the readers of the two newspapers in Zimbabwe, establishes that *The Herald* plays a very pivotal role in

advocating policies for the state. The publication has been on record to be regarded as a mouth piece of the government rather than a public entity that serves the needs of the public. The discourse being noted in the paper is that of being in full support of the policy to fully indigenize the mines. The newspaper has been very supportive of the policy claiming that the policy could be what Zimbabwe needed to right the colonial wrongs that left the local people with nothing to show off as their own.

The study findings from both questionnaires and face-to-face interviews with the readers of the two newspapers in Gweru also indicate that, the policy of the indigenisation of the mining sector in Zimbabwe has been hijacked by the country's politicians, thus for journalists to report it from a professional stand point is very difficult. As proven by the *daily news*' reportage the policy has been used campaigning tool that seeks to counter the hegemonic projects that are being done by other oppositional political parties. What makes the issue difficult to report on in a professional manner is how the country's politicians are heavily contested on the issue. Both the private and public media can be noted as to having failed to perform its role of being professional when it comes to the coverage of the policy. Reporters who were interviewed by the researcher from both *the Herald and daily news* argued that politicians have used this policy to further their own interests thus it is difficult to remain professional when covering the policy to indigenize the mining sector.

CONCLUSION

The study has proved that it is an impossible if not difficult for a journalist in Zimbabwean mainstream print media to follow ethics and adhere to a set of code of conduct in a polarized media environment. The two newspapers under study have proven that there is a biased coverage of political events and different economic events in Zimbabwe. Ownership and control coupled with the pressure that arises from regulation and advertisers form a major hindrance of the reporting of journalists at both *The Herald* and the *daily news*. The mining indigenisation policy was crafted by ZANU (PF) and was passed into law after intense lobbying from the party. To collect information from the field, the researcher used questionnaires and carried out face to face interviews with the targeted audiences. Questionnaires were distributed to the reporters and the general populace whom the researcher managed to meet and interact with. However, some questionnaires could not be returned to the researcher as the targeted population had valid reasons that hindered them from attending to them. The study findings prompted the researcher to suggest that both *the Herald* and the *daily news* should be guided by media ethics and

professionalism in their daily conduct in the dissemination of news. The two newspapers in Zimbabwe should be able to draw the line and know the real story behind the indigenization of the mining sector.

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THE PERILS OF POLITICAL CORRUPTION IN THE FEDERAL SYSTEM OF GOVERNMENT IN NIGERIA (1999-2009)

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ABSTRACT

The paper tries to assess the prevalent nature of corruption in Nigeria's nascent democratic governance in the fourth republic. The country experienced for the first time after independence long period of democratic regime that lasted for thirteen years of PDP government at the center without interruption. Corruption generally leads to unemployment, poverty, diseases, and lack of health services and amenities which ultimately have effect on Nigeria's socio-economic and political development. Corruption in Nigeria seems to defy various efforts and strategies by the 'state' to reverse same. The elites and social exchange paradigms revealed that material gain granted or canvassed for by individuals at most strata of governance is one of the factor responsible for the proliferation of corruption in Nigeria. Hence, unless the trend is checked and reversed it will continue to cause disorder on the country's search light for good governance. The paper suggests that the three arms of government need to function optimally in order to minimize cases of corruption in Nigeria. To arrive at this conclusion, a qualitative source of data was employed to analyze secondary data on the subject in matter.

KEYWORDS: political corruption, poverty, good governance and sustainable development

Political corruption involves political office holders in grand corruption or subvention of political and electoral processes with the aim of capturing power in order to remain in it. Political corruption is not a new phenomenon it is as old as man himself. The emergence of Nigeria State from the protocol of Berlin Conference which gave birth to Nigeria as a country in 1960 cannot be said to have wholly safe from the incidence of political corruption. However, the rate at which political corruption has become endemic and has become a cankerworm is located within the military regimes to the present democratic governments 1999 to date. The political, judicial, economic, education and Business domain are filled with this social malady. However this paper seeks to cover some aspects of political corruption.

The British left behind the parliamentary system of government which the Nigerian political elites could not operate very well soon after independence. In 1979 they opted for presidential system but albeit with flaws, (Ologbenla, 2007). The fight against corruption has remained problematic one throughout the successive governments and very little to show of it. This has been the trend especially since the return to civil rule in 1999. The Transparency International 2010 reported a four-point drop below the 2009 rating Nigeria. In 2010 Nigeria was ranked 134th out of 178 countries with a score of 2.4. The situation has placed the country in the list of countries with high poverty record (70% of the

population) despite vast economic resources. The Report of African Peer Review Mechanism attributed the poverty and instability to scourge of corruption. This has hindered good governance and sustainable development. Political corruptions have robbed millions of Nigerians basic goods and services. It had retarded Nigeria's development in many areas of endeavor. Technologically Nigeria cannot march with the Asian tigers, India among other which they started almost at the same footing. The returns of democratic governance continued to show sign of societal decay and inadequacy in the process of coping with political corruption and dynamics of developing society in the process of democratization.

Only good governance can counteract the prevailing image of Nigeria's governments as paradigms of sloth and corruption. To provide good governance, leaders must modify their behavior and recalibrate their moral compasses to observe more consistently the rule of law and constraints on their powers. They must use their powers wisely and responsibly and should at all times be motivated not by conceit, self-interest or hubris, but only by the desire for public good and national interest. They must also rescind efforts at personalizing government and give primacy to the needs and welfare of citizens by whose authority and on whose behalf they hold and exercise their powers and authority, (Oko, 2009).

The effects of political corruption on sustainable development are enormous. These include widespread decayed infrastructure, unemployment, poverty, insecurity, conflicts and crisis; Niger Delta and North East crisis, among other things may not necessarily be caused by corruption but aggravated by it. The paper seeks to situate the current mismatch of the democratic governments and good governance in Nigeria to political corruption as one among other factors.

The paper is divided into five (5) sections, section one covers introduction, two conceptualization and theoretical explanation, three structure of Nigeria's Federalism and cases, four causes of corruption, and its effects, section five is conclusion and recommendations.

The objective of the paper is to review the dangers associated with political corruption as well as ascertain how such perilous practices can be averted. Similarly, the relevance of the paper to the conference theme cannot be overemphasized as discussions and findings will trigger for further research into related issues of political corruption in Nigeria.

Corruption Defined

The word corruption has no universally accepted definition however; some scholars have presented their view about what it refers to corruption. Otite (1986:12) refers to corruption a pervasion of integrity or state of affairs through bribery, favour, or moral depravity...when at least two parties have interacted to change the structure or processes of society or the behavior of functioning in order to produce dishonest, unfaithful or defiled situation. Corruption with cognizance of Khans (1996) definition is an act which deviates from the famous rules and conduct governing the actions of someone in a position of public authority because of private motive such as wealth, power or status, Odunuga (2000:56). Corruption involves the injection or additional but improper transactions aimed at changing the normal course of events and altering judgments and positions of trust it consist in the doers and receivers' use of informal, extra-legal or illegal acts to facilitate matters. Corruption is found in various spheres and stages of development-political, economic judicial etcetera.

A renowned social scientist, Ogunlana, (2007) expatiates further on the UN and World Bank view on corruption. The United Nations clearly highlighted bribery, embezzlement, illicit enrichment, abuse of office, laundering of proceeds of corruption, obstruction of justice etcetera as corrupt practices. The World Bank 1997 defined corruption as "the abuse of public power for private benefit". The Transparency International (TI)

defined it as "the abuse of entrusted power for private gain". The Government of the Federal Republic of Nigeria is also opposed to corruption. Hence section 15 (5) of the 1999 constitution provides that "the state shall abolish all corrupt practices and abuse of power". The Independent Corrupt Practices Commission (ICPC) Act 2000 defines corrupt act as to include "bribery, fraud and other related offences".

Corruption also have various types and its classification can be done through parameters such as the amount of money involved, the degree of incidence, location of the event and controlled and uncontrolled, Ogunlana, (2007:6). They include Grand corruption, political corruption, Bureaucratic corruption, judicial corruption, moral corruption, petty corruption, religious corruption, corruption in aid, controlled corruption and uncontrolled corruption. However, our concern in this paper is centered on political corruption hence the need to focus on what is political corruption though synonymous with bureaucratic corruption.

CONCEPTUALIZING POLITICAL CORRUPTION

Political corruption refers to any act or omission by individual which tend to defy the set of rules and conduct of a particular state or society. The most commonly shared definition by most political scientist include any transaction between private and public sector actors through which collective goods are illegitimately converted into private- regarding payoffs (Amundsen, 1999:2). This definition does not distinguish clearly between political and bureaucratic corruption. It establishes the necessary involvement of the state and the state agents in corruption, without any notion as to the level of authority where corruption takes place.

Similarly, Otite (1986:14) posited that the two main areas in which political corruption is manifested are the activities connected with election and succession, and the manipulation of people and institutions in order to retain power and office. Political positions are scarce and the prizes of office are high. Hence, the competition for such resource-positions involves every possible extra-legal mean-through corruption-in order to overcome obstacles and position. In the same vein Ogunlana, (2007:7) re-iterated that "political corruption involves political office holders who also are usually involved in grand corruption. It may manifest in the form of subversion of political and electoral processes and it is aimed at capturing power for determining the rules of economic and political engagements.

Political corruption to Amundsen, (1999:3) does not only leads to the misallocation of resources, but also

affects the manner in which decisions are made. Political corruption is the manipulation of the political institutions and the rules of procedure, and therefore it influences the institutions of government and the political system, and it frequently leads to institutional decay. Political corruption is more than a deviation from the formal and written legal norms from professional codes of ethics and court rulings. Political corruption is when laws and regulations are more or less systematically abused by the rulers, side-stepped, ignored, or even tailored to fit their interest.

Similarly, political corruption is therefore a deviation from the rational-legal values and principles of the modern state and the basic problem is the weak accountability between the governors and the governed. Amundsen, (1999) revealed that bureaucratic corruption normally can be dealt with through auditing, legislation and institutional arrangement whereas the effects of political corruption cannot be counteracted by an administrative approach alone. Endemic political corruption calls for radical political reforms.

CORRUPTION AND POVERTY: THE NEXUS

Corruption has been a constant obstacle for countries trying to bring about the political, economic and social changes desired for their development. Across different country corruption has been a cause and consequence of poverty. Corruption on the part of governments, the private sector and citizens affects development initiatives at their very root by skewing decision-making, budgeting and implementation processes. When these actors abuse their entrusted power for private gain, corruption denies the participation of citizens and diverts public resources into private hands. The poor find themselves at the losing end of this corruption chain — without state support and the services they demand. At the same time, corruption is a by-product of poverty. Already marginalised, the poor tend to suffer a double level of exclusion in countries where corruption characterises the rules of the game. In a corrupt environment, wealth is captured, income inequality is increased and a state's governing capacity is reduced, particularly when it comes to attending to the needs of the poor. For citizens, these outcomes create a scenario that leaves the poor trapped and development stalled. For a country, increased corruption reduced sustainable growth and slower rates of poverty reduction. As the World Bank has aptly warned, corruption is 'the greatest obstacle to reducing poverty'. (Transparency International, 2008)

It should be noted that corruption alone does not directly relate poverty but rather indecently. Several literature points to the conclusion that corruption, by itself, does not produce poverty. Rather, corruption has

direct consequences on economic and governance factors, intermediaries that in turn produce poverty. Thus, the relationship examined by researchers is an indirect one. There are two major models explaining linkage and relations between poverty and corruption. They are economic model and governance model. This paper discusses and adapted major a governance model, (Transparency International, 2008). The Governance model according to Chetwynd, et al (2003), corruption affects poverty by influencing governance factors, which, in turn, impact poverty levels. First, corruption reduces governance capacity, that is, it weakens political institutions and citizen participation and leads to lower quality government services and infrastructure. The poor suffer disproportionately from reduced public services. When health and basic education expenditures are given lower priority, for example, in favour of capital intensive programs that offer more opportunities for high-level rent taking, lower income groups lose services on which they depend. Corruption is consistently correlated with higher school dropout rates and high levels of infant mortality. Secondly, impaired governance increases poverty by restricting economic growth and, coming full circle, by its inability to control corruption. Thirdly, corruption that reduces governance capacity also may inflict critical collateral damage: reduced public trust in government institutions. As trust -- an important element of social capital -- declines, research has shown that vulnerability of the poor increases as their economic productivity is affected. When people perceive that the social system is untrustworthy and inequitable, their incentive to engage in productive economic activities declines (Chetwynd, et al 2003).

Some of the major link between poverty and corruption according to Chetwynd, et al (2003) are as follows:

Corruption increases government expenditures; Corruption reduces public sector productivity; Corruption distorts the composition of government expenditure, away from services directly beneficial to the poor and the growth process, e.g., education, health, and operation and maintenance; Corruption reduces government revenues; Corruption lowers the quality of public infrastructure; Corruption lowers spending on social sectors; Corruption increases income inequality; Better governance is associated with lower corruption and lower poverty levels.; Corruption undermines trust and thereby undermines social capital.

Christine Lagarde (2014) the head of the International Monetary Fund, IMF observed that Africa must deal with chronic corruption if it must eradicate poverty; she said poverty thrives in an atmosphere of lack of transparency and accountability.

THEORETICAL EXPLANATIONS OF POLITICAL CORRUPTION IN NIGERIA

The theoretical guide in this paper can be reduced to two paradigms. They include elites and social exchange theory. Nigeria in spite of its endowed natural and human resources is bedeviled by poor socio-economic development over the years in spite of its huge oil wealth accruing to the country year in year out could not yield the much needed development. Political corruption among others has been the focus of considerable attention over the years by internal-external, local and international agencies such as Transparency Interaction and etcetera. To borrow a word of Odinkalu, (2010) the good news is that having got there as a people (54 years after Independence), we have it in ourselves to get out of it. The bad news is that it will not be easy and the situation admits of no magic wand or quick fixes. The society in which we live in to social exchange theorist is a contributing factor.

Political office holders engage in exchange of services and goods with followers in anticipation of driving benefits or aimed to manipulate the rules in favour of the former. The basic tenet of social exchange theory is that relationships evolve over time into trusting, loyalty and mutual commitment. Cropanzano & Mitchell (2005) revealed that although different views of social exchange have emerged, theorist agree that social exchange involves a series of interactions that generate obligations. Among the leading scholars of these perspectives include Emerson, 1976, Blau 1964. In this process, people who give much get much in return and those who receive much are under a strong obligation to give equally. This is akin to gift in African culture whose the recipient is obliged to express gratitude and reciprocate in same manner. If we relate this element of reciprocity in the reward system to Nigerian politics, the points being made become explicit, Emerelwaonu, and Ejionye, (1982:274). Party members who give much in time, money, obedience, plan, excreta to the party, do this in expectation that if it wins an election, will reciprocate by appointing them to boards, even if they are not professionally qualified to serve in those boards and by awarding the contract even if they are not competent enough to execute the contract. This is one of the reasons behind abandoning contracts whose contractors are given mobilization fees. Thus, exchange of goods and services between the giver and the recipient have succeeded in building and strengthen political corruption in Nigeria where services are sacrificed in favour of cronies and loyalist.

Elite's theory on the other hand originally developed in the field of sociology to explain the behavior of men in a social setting. Broadly speaking the elites theories are of the view that every society consists of two categories

of men; the elites or the minority within the society collectivity which exercises a preponderant influence within that collectivity or state or society and the masses or the majority which is governed by the elite, Gauba, (2007:400).

In Nigeria the elites in power are the special people everybody wants to be. They are the envy of all members of the society. Their power and privileges are limitless. In a situation in which access to economic wealth, political power, education and professional expertise are not evenly distributed, many especially the ambitious and the unscrupulous, would resort to the use of corrupt practices to achieve this ends, Emereuwaonu, and Ejionye, (1986:274).

According to Abbas, (2007:5) with the enormous power wielded by the elites in any given society, they are usually expected to use such powers productively for the societal good directed at the attainment of the state objectives towards the provision of goods and services to its citizens. There is no doubt that the expected roles of the Nigerian elites, over time, have not produced expected positive impacts on the lives of the people and thus their responsibilities to the people and nations have continued to cast doubt about their roles. The elites in Nigeria, through their words and deeds, have invariably transformed themselves as exploiters and oppressors of the very people they claim to represent or protect. It is against this background they carry out their exploitation and oppression of the people through various forms and manifestations of corrupt practices. It is through these acts of official corruption undertaken or operated by the political office holders that have become a longstanding concern in Nigerian democratic politics; characterized with crises and scandals.

The situation in Nigeria enables the elites who have the wherewithal to subjugate the followers to the detriment of the letters in the spirit of give and take to perpetuate themselves at the corridors of powers at different strata.

CAUSES OF CORRUPTION

Most theories on the causes and effect of political corruption (corruption) are mixture of issues bordering on poverty, greed, opportunity or perception of associated risk. Therefore there is no universally accepted cause of corruption generally. Ogunlana, (2007) revealed that while some held a view that bad governance creates the bases for corruption to which this paper humbly submits it position, some others see corruption arising from Neo-liberal policies of Multilateral Institutions including the World Bank, the International Monetary Fund and World Trade Organization. Their dominant role in sales and privatization of state properties, lowering of wages, and

devaluation of the naira notes among other things left the citizenry poor and lacking. The other school of thought places much premium on culture and ethical moralism. In this case corruption is seen to be an outgrowth of weak social values, which manifest in greed and moral decadence.

In light of the above, the explanation for corruption in Nigeria cannot be divorced from all of the mentioned reasons. However, a review of chequered history of Nigeria politically and economically can be reduced to the following factors, which accounted for the endemic corruption in Nigeria, (Transparency International, National Integrity Systems, Country Study Report, Nigeria 2004; Ogunlana, 2007:9)

1. Prolonged military rule and the culture of impunity, which became institutionalized.
2. Absence of commitment on the part of government to fight corruption evidenced by the 'sacred cow syndrome' as well as failure to investigate and persecute glaring cases of corruption.
3. Weak anti-corruption and watchdog agencies and other enforcement mechanism. ICPC, EFCC and the NPF.
4. The role of tribalism./ethnicity and religion in national and local politics. Ethnicity and religion breed divisive tendencies, making it difficult to nurture true cohesion and to build resistance to corruption within the polity.
5. Immunity granted some public office holders from prosecution while in office.
6. Mismanagement of oil resources evidenced by the ostentatious lifestyle and flaunting of wealth by the political elite and their apologists.
7. Elastic tolerance for corruption fostered by socio-cultural norms and attitudes towards public office holders that amass wealth are given recognition and award of chieftaincy/traditional titles.
8. African principles of hospitality and exchange of gifts.

Federal Structure and Political Corruption in Nigeria

The Executive, Legislative and Judicial arms of government are saddled with specific responsibilities by the 1999 constitution at all tiers of government. However, although the principles of separation of powers among, legislative and judicial branches are in place to check the abuse of power; its operation has been problematic, in particular with regard to relation between the executive and the legislature. A study by the late Gani Fawehinmi revealed that the elected president under the 1999 constitution is more powerful

than any other democratically elected president or prime minister elsewhere in the world.

The legislative is also provided for in Chapter five of the 1999 constitution of the Federal Republic of Nigeria. They are vested with primary and oversight function to ensure proper execution of projects and policies. However these are not always the case since 1999 to date where issues and differences are often dashed or forfeited in the guise of mutual link between the two institutions. For instance, in 2000 Senate set up a panel to investigate allegations of misappropriation of fund, financial impropriety and inflation of contract by the leadership of the Senate. The then Senate president Dr. Chuba Okadigbo was impeached when he fail to step down voluntarily to allow for a thorough investigation of the allegation against him. Unfortunately the Senate quashed the reports of the panel in the spirit of forgiveness and reconciliation. The pardon meant that the Senators were free from the threat of prosecution and subsequent disqualification in the electoral commission (Transparency International, National Integrity System, and Country Study Report 2004:26)

Similarly, the national Assembly frequently engaged and challenged the executive on various issues. But the issue was resolved after intense lobbying and settlement to each member to senate to settle the impeachment plan.

In judiciary the issue of corruption has been much discussed under military regime. During the Obasanjo's Administration, the recommendation of the report of Babalakin panel was carried out hence, some erring members were dismissed.

Similarly, the former Nigerian President, late Musa Yar Adua, a man of equable temperament and a scion of privilege from the state of Katsina, have behaved much like his predecessor. He was perhaps more restrained and honest than Obasanjo, but in substance he was the same. He lacked the bravery to reverse the errors of the past administration and introduce innovative and transformative changes that would have moved Nigeria further out of the doldrums of corruption. Up to the time he died he couldn't meaningfully and energetically attacked corruption and has been unable to address the most intractable social ills that scourge the citizens such as poverty, unemployment, and corruption, (Oko, 2009).

CASES OF POLITICAL CORRUPTION

The widespread cases of corruption since independence to 1999 had led to quest for solution from various quarters. With the return of Nigeria to democratic governance in 1999, considerable hopes were raised

from all quarters. The Obasanjo's Administration set up anti-corruption commission to combat the scourge of corruption. By the provision of section 15 (5) of the 1999 constitution, the National Assembly in 2000 enacted an Act establishing the ICPC under the chairmanship of Justice Akanbi and the EFCC leader by Mallam Nuhu Ribadu.

However, in spite of the above two institutions to combat all sorts of corruption the country is bedeviled by all kinds of social vices. The most common of this include bribe for budget approval by the national assembly, payment of large sum of money prior to being confirmed as ministerial nominees by legislator, use of executive money during election both states and federal governments. Mallam Nasr El-Rufai alleged that prominent Senators demanded the sum of N54 million (Naira) from him to guarantee his scaling through the Senate screening, Ologbenla, (2007:100).

Nigeria is one of the wealthiest countries in Africa, given its vast natural and human resources. Nigeria is the largest producer of oil in Africa and the fifth largest producer of oil in the world. However, allegations of financial misappropriation have dogged even the NNPC for years. As a result income of sizeable percentage of the income from oil is believed to have been diverted into the wrong hands through corrupt practices and wastages.

Below are some of the reviewed cases of Political Corruption in Nigeria at different ministries and parastatals and strata of governments. Transparency International, (2004) and Ologbenla, (2007) have the following insights into few though not exhaustive:

1. Within the NNPC particularly at the early stage of Obasanjo's administration there has been allegation of massive corruption by its staff and top politicians, leading to huge revenue losses. One of the most serious allegation has been illegal operation of oil well by top members of the NNPC resulting in a revenue loss of N140 billion.
2. The former Group Managing Director of the NNPC ran up a bill of approximately N240 million during the four years he lived in the NICON NUGA Hotel, Abuja.
3. By the 1st quarter of 2012, oil subsidy which hitherto enjoyed by Nigerians were removed the proceeds of which citizens were made to believe will enhance development, infrastructures and social amenities. But at the time of this study no account of such fund can be made to the public and nor the culprits brought to book.
4. In 2000, it was alleged that the then Senate President, Dr. Chuba Okadigbo had committed various financial irregularities for instance in the

award of contract. His resignation was called for resulting in his removal from office and the setting of committee made up of seven men. He was to refund the sum of N35 million and N39 million differences for the over-priced contract N5million allegedly collected by Members of Parliament instead of N3.5million as the public was made to believe.

5. In 2001 a permanent secretary of the ministry of Defense, Makanjuola was accused of embezzling fund amounting to N420 million. He was arraigned but later dropped in court.
6. In the first quarter of 2003, Dipreye Alamieseyigha the former governor of Bayelsa state, Chinwoke Mbadinuju former governor of Anambra State and Abubakar Audu former governor of Kogi State were investigated by ICPC for financial indiscipline and other accusation of corruption. The former governor of Bayelsa state demanded the chief Justice of the Federation obtain court injunction to halt. The case remains open to date. Audu and Mbadinuju did not go further investigation.
7. During a press conference on 7th November, 2002 Senator Arthur Nzeribe declared that he had received money from the presidency to distribute to some Senators, in order to settle the impeachment of president Obasanjo. He was subsequently suspended from the Senate for misappropriation of fund. Since then he has been reelected to the Senate, however, the bribery allegation has not been mentioned again.
8. Anyim allegedly build a N800 million edifice in Abuja and spent N500 million at his mothers' burial.

EFFECTS OF POLITICAL CORRUPTION IN NIGERIA

The attendant consequences of political corruption on Socio-economic development of Nigeria in the recent years have been on the increase, (McCulley, 2011; Egwemi, 2012; Okechukwu and Inya, 2011) have captured basic effects of political corruption in Nigeria. Some of the identified effects are outline below though not exhaustive:

- ❖ Political corruption hinders sustainable development. It erodes confidence in democratic institutions and facilities. It prevents provision of necessary public services.
- ❖ It weakens the potential of a country for economic growth.
- ❖ Lack of basic public services for the population has become magnet for crime and terrorism. They can become hubs for trafficking in persons, drugs and weapons which ultimately export/import violence far beyond borders.

❖ When public contracts are procured through a corrupt system, it results in lower quality of infrastructure and public services. Political corruption has impacted on the education sector. As a result of poor wages and general erosion of values, examination leakages and malpractices are rampant, from primary through university levels. In health and education sectors personnel are poorly motivated and plagued by incessant strikes.

CONCLUSION

Nigeria's struggle to ensure good governance, political stability among other things has been oblique by numerous domestic and external factors. One of the invisible hands in the clog but undeniably visible effects and consequence is political corruption. The monster after putting the necessary strategies and policies but defiled numerous attempts and tactics. The elites particularly the ruling class squandered Nigeria's resources in spite of endowed natural and human resources is poor amidst affluence has contributed immensely to this quagmire of political and economic underdevelopment from within. Hence, Nigerians should put off the shackles of religious and ethnic chauvinism and political differences which have hampered on the past efforts to confront the common enemy. Its effects have retarded Nigeria's development and hindered good governance to flourish and poverty on the increase.

RECOMMENDATIONS

The following measures are suggested in order to mitigate the havocs of political corruption in Nigeria. Ologbenla, (2007) provides some of the following:

1. Aggressive public campaign and enlightenment about political corruption.
2. The two anti-corruption commissions ICPC and EFCC must be totally independent of the executive and devoid of external power. Removal of the immunity clause protecting the President, Vice-President, Governors and Deputy- Governors from the Constitution.
3. Independence of Judiciary should be guaranteed and strengthened.
4. Government must ensure that individuals indicted for corrupt practices must not be allowed to hold any public office.
5. Declaration of asset before taking up and leaving public office should be strengthened and followed.
6. Religious bodies must provide framework for cultivating core values of honesty, integrity, hard work and moral conduct required in the fight against corruption.
7. Societal Reforms and incentives for anti-corruption culture such as reward for honesty, transparent, accountability should be encouraged.

8. Societal recognition and conferment of titles on persons of unproved integrity either serving public servant or ex-public servant should be discontinued.

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ISLAM: A PANACEA TO POVERTY ERADICATION AND SUSTAINABLE DEVELOPMENT

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ABSTRACT

Poverty has been rampant and consistently increasing in the world, for some of them one can say “there is no wonder” but for Muslim nations one can ask “why” this question arises because Islam has enjoyed the concept of brotherhood (*al- amr bil ma;aruf wa nahy an an munkar*). The purpose of this research is to disclose and elaborate the strategies laid down by Islam as a divine religion as a bid to eradicate poverty and towards sustainable development. Islam has played a vital role towards contribution of a better life and enjoins good relationship with Allah and one another as well, and Islam discourages, dislikes hatred and enmity between one another. In order to eradicate poverty between Muslims, Allah the almighty has laid down some rules as a strategy of reducing poverty as well as channel for good relationship between the rich and the poor. This paper will examine these ways as a solution to eradicate poverty.

KEYWORDS: poverty, strategies, eradicate, sustainable development, reduction

INTRODUCTION

Poverty according to Webster new collegiate dictionary is the state of one who lacks a usual or socially accepted amount of money or material possession. The World Bank has defined poverty as unacceptable human deprivation in terms of economic opportunity, education, health and nutrition as well as lack of empowerment and security (Egwaatu 2002). In other word absolute poverty, otherwise called extreme poverty describes a situation in which people barely survive, where the next meal may literally be a matter of life and death. Relative poverty on the other hand where there is lack of income necessary to satisfy essential non- food needs such as clothing, energy, and shelter, and exist as long as there is equality in income and wealth distribution (Dogarawa 2009).

CAUSES OF POVERTY

On the bases of the various survey carried out on poverty and findings from a study on the voice of poor, the main causes of poverty especially in African countries are unemployment, ignorance, corruption and environmental degradation inadequate access to employment opportunities for the poor are particularly serious problems , moreover, inadequate access to market for goods and services and deplorable conditions of natural resources endowment which has potential for enhanced productivity especially in the agricultural sector, is a major cause of ecological poverty.(ajakaiye 2002).

THE EFFECTS OF POVERTY

If the available resources of a community are so unevenly distributed that certain groups within it live in affluence while the majority of the people are forced to use up all their energies in search of their daily bread, (asad 1980), poverty become the most dangerous enemy of spiritual progress, and occasionally drives whole community away from God consciousness and into the arms of soul destroying materialism. It is undoubtedly this that prophet (PBUH) had in minded when he uttered the warning words “poverty may sometimes turn into unbelief (kufr)”.

POVERTY ERADICATION AND SUSTAINABLE DEVELOPMENT IN ISLAM

Islam as a divine religion is a comprehensive way of life based on Allah’s injunctions derived from his revealed books which are Qur’an and Sunnah.

Islam encourages the concept of brother hood and enjoying what is right and forbidden what is wrong. Allah says in the Qur’an

You are the best of the nations raised up for (the benefit of) men; you enjoin what is right and forbid the wrong and believe in Allah; and if the followers of the Book had believed it would have been better for them; of them (some) are believers and most of them are transgressors. Q.3:110

Also Allah said

The believers are but brethren, therefore make peace between your brethren and be careful of (your duty to) Allah that mercy may be had on you. Q 49:10

It has been reported in a prophetic tradition that the prophet said:

The faithful are to one another like (parts of) a building each part strengthening the other. Every Muslim is a brother to a Muslim, neither wronged him nor allowing him to if removes a calamity from another Muslim Allah will remove from him some of the calamities of the day of resurrection, and if any one shield another Muslim from disgrace, Allah will shield him from disgrace on the day of resurrection. (Bukhari & muslim). Since 1435 years ago Islam has put in place some institutions to fight the spread of poverty in the society. The following are the injunctions pertaining the eradicating of poverty and enhancing the social well being of a society:

- Zakat (alms giving)
- Waqf (endowment)
- Mirath (inheritance)
- Sadaqa (voluntary gift)
- Kaffara (expiation)

Zakat

Zakat is an Arabic word means to purify to grow, in Islamic law zakat refers to the determine share of wealth prescribed by Allah to be distributed among the categories of those entitle to received it. It's a compulsory payment by the wealthy to the economically under privilege (dogarawa 2009).

Allah has made it compulsory on wealthy and rich people to transfer certain percentage (2.5) of their wealth to the poor annually; it does not only enhance economic and social development but also promotes unity, solidarity and harmony between Muslims.

It has been clearly stated in the Qur'an and Sunnah as follows:

And they were not enjoined anything except that they should serve Allah, being sincere to Him in obedience, upright, and keep up prayer and pay the poor-rate, and that is the right religion 98:5

And those in whose wealth there is a fixed portion.

For him who begs and for him who is denied (good) Q70:24-25

The prophet (PBUH) said that: it shall be taking from the rich among them and turned over the poor among them. (Bukhari & Muslim)

There is zakat on gold, silver, currency, agricultural produce and live stock.

Almighty Allah has listed 8 categories of people who are eligible for zakat.

1. Faqir (destitute)
2. Miskin (poor)
3. The collectors of zakat
4. Those whose hearts are to be drawn close with a hope to accept Islam

5. To free slaves or to ransom Muslim prisoners of war
6. Debtors who are unable to settled their debts
7. In the way of Allah, e.g propagation of Islam, building the mosque, schools and funding the Islamic activities
8. The way farer that is the person traveling from one land to another and does not have the means to complete his journey.

Conditions for the payment of zakat

1. Full ownership, there is no zakat on public property and endowments.
2. It should be paid on the properties that are liable to grow (not properties used for personal use such as cars and houses)
3. The property must be in possession for complete one year
4. The property must reach nisab
5. The person must be free from debts

Waqf (Endowment)

Waqf is an Arabic word literally means hold, confinement or prohibition. In Islam awqaf is perpetual charity that means holding certain property and preserving it for the confined benefit of certain purposes. It also means of assisting community especially for alleviating hardship.

Almighty Allah says

O you who believe! Shall I lead you to merchandise which may deliver you from a painful chastisement?

You shall believe in Allah and His Messenger, and struggle hard in Allah's way with your property and your lives; that is better for you, did you but know!

He will forgive you your faults and cause you to enter into gardens, beneath which rivers flow, and goodly dwellings in gardens of perpetuity; that is the mighty achievement;

And yet another (blessing) that you love: help from Allah and a victory near at hand; and give good news to the believers.

O you who believe! Be helpers (in the cause) of Allah, as~ Isa son of Mariam said to (his) disciples: Who are my helpers in the cause of Allah? The disciples said: We are helpers (in the cause) of Allah. So a party of the children of Israel believed and another party disbelieved; then we aided those who believed against their enemy, and they became uppermost. Q61:10-14.

Kinds of awqaf

1. Religious awqaf, which focuses of building and maintaining the religious institutions such as mosques and schools

2. Philanthropic awqaf aims at providing support for the poor such as health services and education
3. Family awqaf is a kind of awqaf that are giving to the family members and descendents and the excess to be given to the poor.

Mirath (Inheritance)

Inheritance is another source of distributing wealth in Islam, Allah has made it categorically clear in the Qur'an that:

Allah enjoins you concerning your children: The male shall have the equal of the portion of two females; then if they are more than two females, they shall have two-thirds of what the deceased has left, and if there is one, she shall have the half; and as for his parents, each of them shall have the sixth of what he has left if he has a child, but if he has no child and (only) his two parents inherit him, then his mother shall have the third; but if he has brothers, then his mother shall have the sixth after (the payment of) a bequest he may have bequeathed or a debt; your parents and your children, you know not which of them is the nearer to you in usefulness; this is an ordinance from Allah: Surely Allah is Knowing, Wise.

And you shall have half of what your wives leave if they have no child, but if they have a child, then you shall have a fourth of what they leave after (payment of) any bequest they may have bequeathed or a debt; and they shall have the fourth of what you leave if you have no child, but if you have a child then they shall have the eighth of what you leave after (payment of) a bequest you may have bequeathed or a debt; and if a man or a woman leaves property to be inherited by neither parents nor offspring, and he (or she) has a brother or a sister, then each of them two shall have the sixth, but if they are more than that, they shall be sharers in the third after (payment of) any bequest that may have been bequeathed or a debt that does not harm (others); this is an ordinance from Allah: and Allah is Knowing, Forbearing. Q: 4:11-12

The Islam has laid the emphasis on concern for the poor and those in need, so with the strict adherence to the injunctions of inheritance poverty will be at minimal rate.

Sadaqa (Voluntary gift)

Almighty Allah in the glorious Qur'an has enjoined the Muslim Ummah to help and assist one another

And in their property was a portion due to him who begs and to him who is denied (good). Q 5:19

And serve Allah and do not associate anything with Him and be good to the parents and to the near of kin and the orphans and the needy and the neighbor of (your) kin and the alien neighbor, and the companion in a journey and the wayfarer and those whom your right hands possess; surely Allah does not love him who is proud, boastful; Q4:36

Have you considered him who calls the judgment a lie?

That is the one who treats the orphan with harshness, Q107:1-2

So the significance of sadaqa is paramount important, where as in different prophetic traditions, the prophet emphasized on the importance of giving out sadaqa to the poor and the needy.

Kaffara (Expiation)

In Islam there are certain things in which if a person did he has to pay expiation, there are several Qur'anic verses and prophetic Hadith that describe such incidences and the kinds of expiation one has to pay, examples of such incidences are as follows, a person who kill another person unintentionally, unfulfilled oath, diyat, vowing, unable to fast during Ramadan, assimilation of one's wife to his mother e.t.c. Allah says:

" O you who believe! retaliation is prescribed for you in the matter of the slain, the free for the free, and the slave for the slave, and the female for the female, but if any remission is made to any one by his (aggrieved) brother, then prosecution (for the bloodwit) should be made according to usage, and payment should be made to him in a good manner; this is an alleviation from your Lord and a mercy; so whoever exceeds the limit after this he shall have a painful chastisement." Q 2: 178

" And it does not behoove a believer to kill a believer except by mistake, and whoever kills a believer by mistake, he should free a believing slave, and blood-money should be paid to his people unless they remit it as alms; but if he be from a tribe hostile to you and he is a believer, the freeing of a believing slave (suffices), and if he is from a tribe between whom and you there is a covenant, the blood-money should be paid to his people along with the freeing of a believing slave; but he who cannot find (a slave) should fast for two months successively: a penance from Allah, and Allah is Knowing, Wise." 4:92

Also in a related prophetic tradition, the prophet (PBUH) said:

it was related from Malik that the messenger of Allah peace be upon him sent a letter to amr bin hazm about blood money he wrote that, it was a hundred camels for a life, one hundred camels for nose if he is completely removed, a third of a blood money for a wound in the brain, the same as that for the belly wound, fifty for one eye, fifty for a hand, fifty for a foot, ten camels for each finger, and five for a teeth and five for a head wound which laid bare the bone. With this laid down injunction if it will be followed accordingly it will reduced the poverty and enhanced the living standard of the Muslim Ummah.

PROBLEM STATEMENT

The above mentioned strategies laid down by Islam in ensuring poverty reduction towards the sustainable development leaves no one in doubt that Islam has laid emphasis on concern for the poor and the needy through its varied provisions. With this Islamic injunctions for wealth distributions, but still poverty exist and in constant increase especially in the Muslim nations. It is clearly means that both the wealthy people and Islamic institutions were not doing enough in collecting and distributions of the wealth to needy. Frequency of poverty among the Muslims is only indicative of their neglect of the injunctions of the almighty Allah and the Sunnah of the prophet Muhammad (PBUH).

Intensification Distribution of Wealth and Encouraging Entrepreneurship

The financial side of the business is very relevant for entrepreneurship, Islam dominate specific prohibition in the financing and investment of a business activities in a four step process, Allah gradually emphasis the taking of interest is prohibited in the Qur'anic verse 30:39 Allah stated, 'that which you give is usury (riba) in order that it may increase on people's property has no increase with Allah..... And Q4:161 say and because of taking usury when they were forbidden it Q3:130 says "O you who believe do not live on usury multiplying your interest many times over". Q2:275 established that "... Allah has permitted trade and forbidden usury".

Islam encourages certain entrepreneur financial partnerships such as Mudharabah and Musharakah. In Mudharabah partnership one party the rabb- ul- mal provides capital and the other the Mudharib entrepreneur labor. In musharakah the various parties provides capital and some also engages in the management side.

CONCLUSION

With the above mentioned provisions in Islam for wealth distribution that are analyzed, meaning ,causes and effects of poverty were pointed out, Islamic injunctions on distribution of wealth and the problems of why poverty is still in increase as well as how to strengthen distribution of wealth and encourages entrepreneurship.

It is with the view to eradicating destitution that the prophet Muhammad (PBUH) admonished us thus, "one of you goes to the bush, behind the rocks, cuts wood and sell it, this is preferred to his begging people perchance they give him or not"

The state and federal governments should establishes a social entrepreneurship scheme for human empowerment, by given some money to set up a small scale enterprise, similarly government and non-governmental organizations should established a vocational training centers across the country to train the youth and women in ways of establishing small and medium scale enterprises. Also we should establish large scale farming of various sorts, including livestock rearing, poultry, fisheries and horticulture as occupation for our teeming youth.

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**PEACE AND SUSTAINABLE DEVELOPMENT: REFLECTIONS ON SHELL
PETROLEUM DEVELOPMENT COMPANY'S (SPDC) NIGERIA CAPACITY
BUILDING STRATEGY FOR SUSTAINABLE DEVELOPMENT AND POVERTY
ALLEVIATION IN HER OPERATIONAL AREAS**

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ABSTRACT

This paper seeks to examine the history of the relationship between SPDC sustainable development strategies and peace in SPDC operational areas. This is to make for a better understanding of their business relevance, parameters, status and tools and approaches to manage social performance. The study is based on three detailed inquiry in three sustainable development portfolios that combined qualitative and quantitative research methodologies and included distinct operational, business and socio-economic contexts. The paper seems to build theory around the concept of social performance. Key findings include that: there exists a strong business case for social performance; SPDC has a good social performance which is fundamentally concerned with the identification and management of core business impacts and social issues which is identified and managed in a systematic manner; and SPDC is developing and implementing a range of tools and approaches to assist effective management of social issues. However, there are identified gaps, in the three sustainable developments portfolio considered, which to my mind, poses the sustainability question. The research is based on a limited number of portfolios from within SPDC Sustainable Development and Community Relations; further validation of findings could be achieved through similar research. Practically, this research has highlighted the business case for social performance, key 'ingredients' of social performance and provides a specific framework and tools for more effective management of social issues. This Paper should therefore, be of potential interest value to practitioners (e.g. Social performance and Government community relation managers), academics, policy makers and non-governmental organizations.

KEYWORDS: performance, management, social performance, sustainable development

INTRODUCTION

Peace is a precondition to sustainable development. The preceding assertion is predicated on the school of thought that maintains that without a peaceful and stable environment, development is out of the question for any society. A chaotic situation benefits no one. Thus, it should be the fervent aspiration of all peoples to live and develop in a secure and stable environment.

In this direction, the apparent state of tension and hostility between the oil bearing communities in the Niger Delta and SPDC calls to question the cause of peace and deployment of sustainable development strategies by SPDC. Practically, it is obvious in this paper that the search and place of peace in SPDC operational areas has continued to be ephemeral despite the deployment of SPDC sustainable community development strategies while its attendant effect on the development; production capacity and general output of Shell are quite grave. Nigeria's oil belt, the Niger Delta region which is SPDC host is persistently embroiled in resistance against the Nigerian state and SPDC. The region is generally restive, with pockets of insurrection and armed rebellion

AN OVERVIEW OF SPDC OPERATING ENVIRONMENT

The Niger Delta is a relatively small area in the Southern of Nigeria, with over six million people living in the region (Dappa-Biriye et al., 1992). The region has vast oil reserves but remains poor, underdeveloped and torn apart with conflict. It is the centre of oil exploration, exploitation and production in Nigeria since 1958. Nigeria is rich in oil mineral resources, with proven reserves of 35 billion barrels of oil.

However, in the Niger Delta, there has been increasing demands on multinational companies (MNCs) to provide community development programmes and assistance to their host communities, (Amaewhule, 1997). This is mainly because developmental projects and other social infrastructures are lacking in most of these communities and most of the time they are not provided by the government.

Thus, Nigeria's oil belt, the Niger Delta region which is SPDC operating area is embroiled in resistance against the Nigerian state and the multinational oil companies.

The region is generally restive, with pockets of insurrection and armed rebellion. Decades of oil exploitation, environmental degradation and state neglect has created an impoverished, marginalized and exploited citizenry which after more than two decades produced a resistance of which the youth has been a vanguard. A regime of state repression and corporate violence has further generated popular and criminal violence, lawlessness, illegal appropriations and insecurity. The Niger Delta is today a region of intense hostilities, violent confrontations and criminal violence. It is pervaded by a proliferation of arms, institutions and agencies of violence ranging from the Nigerian Armed Forces to community, ethnic and youth militias, armed gangs and networks, pirates, cultists and robbers.

(Subair & Adesanmi:2003) notes the consequent emergence of an economy of conflict characterised with an intense, violent and bloody struggle for the appropriation of oil resources and benefits from the oil economy and a thriving market of illegal trading and smuggling of arms, crude and refined oil. There are various estimates of the quantity of theft of crude oil stolen by or with the aid of armed gangs and militias. The Nigerian Economic Summit Group (NESG) estimates a daily theft of about 100,000 barrels of oil valued at about USD 2.8 million. Nigeria is the most populous country in Africa, with an estimated population of 155.2million occupying a land mass totaling 923,800 sq. Km. (Ofuani, 2012). The country is largely dependent on oil which constitutes about 95% of its export earnings and 80% of government revenue.

Hence, SPDC prides in delivery of sustainable benefits from its business and minimisation of associated risks in her host communities. Thus, SPDC Nigeria aligns with these aspirations as reflected in its sustainable development and community relations mission.

“Create a positive presence and legacy in the communities and societies where we operate, and so gain community acceptance for our business objectives.”(A social performance reference kit: 2011)

In practical demonstration of the fact above, SPDC operations in Nigeria is known to have generated billions of dollars for the national government that are important for the funding of national, social and economic development plans and programmes. For instance, the joint venture operated by the Shell Petroleum Development Company of Nigeria Limited (SPDC) has contributed about \$31 billion to the Nigerian government between 2006 and 2010. In addition, the Shell Nigeria Exploration and Production Company (SNEPCo) – which operates SPDC offshore

business in deepwater – has paid nearly \$3.8 billion in taxes and royalties over the same period.(Shell briefing notes 2011). SPDC is the pioneer and leader of the petroleum industry in Nigeria. It has the largest acreage in the country from which it produces some 39 per cent of the nation's oil.

SPDC has more than 6,000 kilometres of pipelines and flowlines, 68 flowstations, 10 gas plants and 1,000 producing wells. The company employs more than 4,500 people directly of whom 95 per cent are Nigerians. Some 66 per cent of the Nigerian staff members are from the Niger Delta. Another 20,000 people are employed indirectly through the network of companies that provide supplies and services.(Shell interest in Nigeria, 2011)

SPDC SUSTAINABLE DEVELOPMENT INITIATIVES IN THE NIGER DELTA

In Nigeria, SPDC operations as noted previously have been dogged by local unrest and criticism from the communities within the oil-producing areas, and drawn increasing condemnation from abroad. The case study of Shell and the Ogoni by Hummels (1998) reveals that host communities have continued to agitate for more and more support from the oil companies. In addition, the level of the demands and the methods adopted to achieve these has changed, with violence appearing to be the key weapon. Recourse to violence has resulted in a lot of damage to property, and casualties on both sides. In some instances, it has resulted in the withdrawal of operations by SPDC from some locations, while planned seismic and drilling activities have been abandoned in others.

In the past, SPDC approach was to help or appease the communities whenever the need arose through compensation and more recently, however, they have established a more proactive and thoughtful approach to community assistance. This has resulted in the “emergence of a fully developed community relations department in the company, solely set up to anticipate and plan the needs of the communities”.

However, it is pertinent to note that as population grew, infrastructure needs became increasingly reliant on SPDC to do more, especially in light of declining government resources. SPDC responses was the introduction of a community assistance(CA) programme, through which SPDC provided them with basic infrastructure such as roads, jetties, water, electricity and assistance in health care.

Following an internal review mechanism, SPDC realized that many of this interventions offered short-term benefits and did not reflect long-term community

needs. This led the company to initiate a change from community assistance to community development (CD) concepts. The CD approach was built on two major pillars; one is the use of participatory development techniques, the other, a focus on building community capacity to manage their own development.

SPDC realized that the fundamental issue of project ownership and sustainability was still to be sufficiently addressed. Thus, in 2003, developed the frame work for a new approach to social investment well know as the sustainable community development approach. (SCD) The cornerstone of the SCD approach to sustainability which requires that projects must not only serve to identify needs of beneficiary community, but is also maintained by them. Thus this way, the communities are also able to continue enjoying the benefits of the projects, long after they are completed.

Global Memorandum of Understanding (GMOU)

SPDC introduced a new way of working with communities called Global Memorandum of Understanding (GMOU) concept in 2006. It represented an important shift in approach, placing emphasis on more transparent and accountable processes, regular communication with the grass roots, sustainability and conflict prevention. A community leader notes that GMOU has engendered better ownership and a stronger sense of pride amongst communities as they are responsible for identifying development projects and implementing them.

A GMOU is an agreement that runs for five years, and it is between SPDC and a cluster or group of communities. Clusters are based on local government or clan/ affinity lines as advised by the relevant state Government. The governing structures are well defined, with a 10-person Community Trust (at community level), Cluster Development Board(CDB) and a starring committee chaired by the state government. The Cluster Development Board functions as a main supervisory and administrative organ, ensuring implementation of projects and setting out plans and programmes. The GMOU brings communities together with representatives of state and local governments, SPDC and non-profit organizations, such as development NGOs, in a decision-making committee called the cluster Development Board.(CDB). The community also plays a role in electing the representatives who sit on these boards. Under the terms of the GMOU, the communities decide the projects they want while SPDC and its joint venture partners provide funding. The CDB awards the contracts and monitors execution of the project. This enables communities to take ownership of their projects. Over 69% of projects executed by GMOU's are infrastructural projects as communities

recognize the role infrastructure plays in the economic development of the community. Infrastructure development is essential to enable, sustain, or enhance societal living conditions and supports the achievement of the millennium development goals especially as it relates to poverty reduction, access to education, water supply and sanitation. For instance, the Nembe city foundation has established over 70 infrastructural projects. This includes the Nembe GMoU land and marine company- Kala-kuleama line which boast of a modern motor park, land and marine vehicles, the Nembe cyber cafe, teachers quarters Eweleso and the Nembe creek concrete foot bridge

These projects executed by the foundation have transformed both Nembe and its satellite communities addressing community needs for all weather roads to improve accessibility in and around the community reliable safe and accessible transportation system to their riverine communities and improved learning facilities

The Iduwini Development foundation has also invested in numerous infrastructure developments in the 6 component communities that are covered in the cluster. These projects include town halls, concrete walkways, public toilets, school buildings, teacher's quarters, cultural centers. The construction of teacher's quarter/ youth corps member's quarters in the community's addressee's accommodation constraint which discourage teachers/ corper's from rendering services in the communities. The cluster has also carried out the renovation of school buildings improving the quality of learning environment for pupils and teachers

By the end of 2011, SPDC had signed and implemented agreements with 27 clusters, covering 290 communities. The GMOU's have successfully completed 523 infrastructure projects at the cost of 5.2 billion

The Livewire Nigeria programme

LiveWIRE is a Shell Global Community Investment Programme established to create opportunity for young people to grow and realize their potentials through the creation and development of their own businesses. The programme is targeted at youths aged between 18 to 30 years. Young people brimming with ideas often lack the know-how to turn their business dreams into reality. Shell liveWIRE programme has helped bridge that gap, by encouraging young people to establish their businesses and providing support to help them sustain their businesses. LiveWIRE Nigeria has positively contributed to the sustainable development of the Niger Delta Region. To date, the programme has trained 3208 Niger Delta youths in enterprise development and management and has gone further to assist 708 to set up

their dream businesses through Business Start-up Awards. They go through a 5day Enterprise Development Training and at the end of the Training, they are given Business start –up award (fund) to enable them establish their own businesses.

Government Relations

Apparently, Shell is business oriented and must pursue robust profitability, Shell operates in host communities (On shore and off shore) while Government is in charge of the Land. Government is critical in Shell's business objective. Hence, I opine that Government connects SPDC to Host.

FINDINGS/CHALLENGES OF SPDC SUSTAINABLE DEVELOPMENT INITIATIVES IN THE NIGER DELTA

The SPDC sustainable development strategies are good demonstration of how development could be provided at the grassroots to complement traditional macro support in such initiatives. However, there are observed gaps depicted in lack of definite strategy, which takes into account the local context and culture embedded in intervention plans for effective delivery. Historically Shell's approach to social performance has been more concerned with social investment and philanthropy than social impact management and strategic social investment.

Sustainable Relationships and Sustainable Developments

It is argued that sustainable development can be evidently hampered by inter personal relationships of SP practitioner's, SPDC employees and host communities. Famously, the Brundtland report (United Nations 1987) defined sustainable development as meeting the needs of today's generation without compromising the needs of the future generations. What this definition presumes is that individuals from today's generation are getting along. But are they? Specifically, are relationships among development stakeholders sustainable? The aim here is to assert that there is an interpersonal dimension to sustainable development and that it has received no attention in SPDC. The assertion above is predicated on my believe that although SPDC in its Sustainable development strategies acknowledge the interdependence of social, environmental, economic and cultural factors in sustainable development, there is apparent lack of acknowledgement of how their interdependence must ultimately depend on every day, face to face relationships amongst actual people.

Based on my one year research internship and focusing on observed everyday relationships between Sustainable Development practitioners, I found strained interpersonal relationships across the development line

and this I affirm ought to be known to be a key driver in producing unsustainable development.

SPDC'S GMOU GAP ANALYSES

Operating Principles

Key principles in the design of the GMoU process are participation and equity. Bottom up planning is negligible but it will only be more meaningful if a wide section of community members – beyond Community Trust members – can participate. Hence a wide range of community constituents should have the opportunity, separately, to identify issues affecting their livelihoods and access to capital – natural, financial, physical, human and social. Community constituents include the larger groupings of women, youth, men, elders, and councils of chiefs, as well as other groups such as farmers, fishers, hunters, okada riders (commercial motorcyclists), widows, young mothers, single-headed households, teachers, parent/teacher associations, students, community health workers, market associations and traditional birth attendants.

NGO under-capacity and SPDC's Contracting Culture

The GMoUs place high expectations on the civil society sector, particularly NGOs. For SPDC, NGOs and Cluster Development Boards were to become the fulcrum of the GMoU, with the NGOs mentoring the Boards for one to two years and then exiting. But the technical capacity and skills base required to accomplish this ought to be assessed. This is because weak local NGO capacity can lead to NGO staff invariably following instructions from SPDC implementation staff. The NGOs are often unable to achieve an equal dialogue with SPDC and as a result essentially become contractor agents, doing what they are told. SPDC included, lacks mechanisms to partner with NGOs effectively. It categorizes NGOs as contractors, hired for services delivered in the same way that contractors may be hired to lay a pipe or construct a bridge.

Community Capacity

The capacity of community members is another limiting factor. For a GMoU to succeed, the community is expected to build up responsive, effective and responsible institutions able to conceive and deliver well-thought-out plans and projects. The usual way of doing business in the Niger Delta has been to award contracts to the elite to buy their favour, ensure they make some money and allow oil production to go on. GMoUs impact on opportunities for big contracts to key individuals and should put more power in the hands of the 'silent majority' of community members. This in itself is a challenge, with SPDC trying to introduce more transparent decision making and to open up space

for more people to participate. Technically, under the GMoU, contracts can still be awarded, but the client is the community and not SPDC. Therefore the institutions developed need to understand that they have the authority to enforce accountable practices by contractors. Unfortunately, communities are not familiar with these practices, which require active citizenship, which is weak in the Delta. Low levels of trust result in the more powerful community members holding on to the old way of doing business.

Elite and Gender Dominance

The initial negotiations alerted community elites to the large sums of money available to clusters and gave them the opportunity to sideline the poor and women. A majority of Community Trusts and Cluster Development Boards are dominated by men, elites and traditional rulers. The process has further marginalised other groups, including women and youth, contravening the original intentions.

Live Wire Gap Analyses

Mixed reaction trailed the impact the LiveWire portfolio is making in the communities, The programme is designed to promote self-help amongst community youths that is intended to 'teach them how to fish' but not to relieve them of any singular responsibility in their human development. It also seeks to challenge their faculties towards independence through the mindset programme. Hence, I argue that, it specifically calls for action towards self-reliance but indications from what is on ground suggest an approach that may need some review.

□ Most beneficiaries plead for improved allowance against displaying a willingness to acquire enabling skills as soon as possible

□ All beneficiaries interviewed indicated an eagerness to seek further University education leaving the research wondering whether the criteria employed in the selection was consistent with the set goal. Candidates are expected to be those that have resolved to seek livelihood through trade and other skills.

□ A good section of participants say they have procured basic skills required in their various vocation but need further training to hone these into usage. This leaves the impression that the programme needs improvement to effectively deliver its objectives. Otherwise a half baked workman may be of equal threat as the idle community youth since no employer would be willing to engage them, neither would they be able to engage themselves in a meaningful way.

□ The impacts of this programme are limited by factors related to empowerment. The terminal process of the programme leaves the issue of empowerment unresolved. Beneficiaries interviewed have indicated a preference for higher education, which in some way

questions the relevance of the skills they are acquiring. The programme is rather targeted providing the uneducated youth with artisan skills for self-reliance.

GOVERNMENT RELATIONS GAP ANALYSES

Absence of visible sustainability plan in Government relations development strategies would still leave overdependence of locals on business in the long-run. Christmas Hamper Gifts to unstable government officials who has little or no community respect instead of community people who are real potential risk to business ought to be reviewed. Within the period of this study for instance, the change in government of Timipreye Sylva to that of Seriake Dickson necessitated change in government officials and the ex hamper's went with them without actual value to business social impact management ascertained.

CONCLUSION AND THE WAY FORWARD

The SPDC sustainable development strategies are good demonstration of how development could be provided at the grassroots to complement traditional macro support in such initiatives. However, there are observed gaps depicted in lack of definite strategy, which takes into account the local context and culture embedded in intervention plans for effective delivery.

It is observable that Shell's approach to social performance has been more concerned with social investment and philanthropy than social impact management and strategic social investment.

In the light of the foregoing, SD strategies reviewed (GCR, Livewire, GMoU) is seen to lack a kind of community content in practice. SPDC seem to be in a hurry to implement sustainable development programmes. Hence, there is perceived lack of definite strategy, which takes into account the local context and culture of communities, which is vital and must be embedded in intervention plans for effective delivery for impact on peace. For instance, as highlighted previously, the selection criteria for the Live wire beneficiaries with no community sensitization or online advertisement of the Live wire programme reduces local content of the selection process.

BRIEF BIOGRAPHY ABOUT THE AUTHOR

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A MARATHON OF TWENTY YEARS OF ERADICATING POVERTY: IS SOUTH AFRICA MAKING PROGRESS

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ABSTRACT

Since the dawn of democracy, the eradication of poverty has been at the forefront of the South African government's programme of action. The South African government has put in place various measures to curb the scourge of poverty. These measures include: old age disability, foster care and child support grant. However, these measures seem to be insufficient as many people still find themselves vulnerable to poverty. To speed up the process of poverty eradication, this paper suggests that other institutions or entities should be encouraged to play a role. Poverty cannot be rooted out merely by the government's social grants. It also requires the creation of job opportunities by all those who are willing and able to participate in the process of rooting out poverty. This will, in the long run, help in establishing a society sustained by economic growth. If, for example, more employment opportunities are created and more people get employed, the constitutional obligation on the State to provide people with housing will be reduced as these individuals will be able to buy houses for themselves rather than relying on the State to build shelter for them. This will also relax government's already over-stretched social grants budget.

KEYWORDS: eradication, poverty, inequality, unemployment, measures.

INTRODCUTION

Since 1994, the South African economy has undergone significant changes with government adopting various pieces of legislation (Social Assistance Act, 2004 as amended by Social Assistance Act, 2008; Employment Equity Act, 1998; and Prevention of Unfair Discrimination Act, 2000) and policies aimed at redressing the injustices of the past; fleshing out the welfare system; and improving the country's competitiveness as it becomes increasingly integrated into the global economy. Examples of these policies include the Redistribution and Development Programme (RDP); the Growth, Empowerment, and Redistribution (GEAR) programme and the Accelerated Shared Growth Initiative for South Africa (ASGISA); and recently the National Planning Commission (NPC). These policies have directly or indirectly impacted on the lives of millions of South Africans (Bhorat, 2006). Many South Africans suffer from poverty as a result of unemployment; lack of education; illnesses; and other factors affecting their capacity to earn a living. A practical assessment of the lives of people or their standards of living generally shows that the political freedom achieved in 1994 is outweighed by the need for economic freedom. This places a burden on the state to help these destitute members of the society that it has committed to serving.

In this paper, the author argues that poverty affects people across all sectors of life: rich, poor, young and / or adult. It is argued that the democracy enjoyed by the people of South Africa enjoy today may seem imbalanced if a sizeable number of South Africans still suffer from the plight of poverty. Interventions by people and institutions that are well-off are necessary to rescue victims of poverty. This can be done through the creation of job opportunities and/or improving existing jobs. The State may play its role by providing support through the provision of basic income grants and the provision of basic food services to needy and deserving people (Constitution of SA, 1996).

THE EFFECTS OF THE PREVIOUSLY DISCRIMINATORY SOCIAL SECURITY SYSTEM

The depth of South Arica's poverty is attributable to its history of colonialism and apartheid that engulfed the country for decades. The previous social security system was characterized by huge disparities between different racial groups in respect of the provision of basic social services. This is one of the many legacies inherited from the apartheid government. During apartheid, many people were forced to register false and younger ages in order to avoid unwarranted attention from the government. The unforeseen consequence of this, however, is that such people are now unable to access

certain government services because they appear to be too young to access these grants.

The drafters of the Constitution appear to have noted the problem when they included a specific section to deal with and respond directly to deficiencies created by the previous regime. The need to change the previous social security system led the post-1994 government to adopt and implement a new social security system that attempted to address the pandemic of poverty. These attempts included the restructuring of the previous racially exclusive social security system that discriminated against particular groups to form a new social security system that is non-discriminatory.

THE CONSTITUTION OF 1996

The Constitution introduced a dedicated section on socio-economic rights to deal specifically with issues of poverty. These rights were included in the Constitution along with other key economic, social and cultural rights. However, during the drafting phase of the Constitution, the inclusion of socio economic rights in the Constitution met with a measure of resistance from various groups as there was no agreement on how they could be enforced by the courts.

The contestation of justiciability of these rights was dealt with and disposed of in the First Certification judgment (Ex parte Chairperson of the Constitutional Assembly: in re Certification of the Constitution, 1996). In this case, the Constitutional Court held that socio-economic rights were capable of judicial enforcement. It further held that the State is under a constitutional duty to comply with obligations inherent in these rights. The Constitutional Court in the *Government of the RSA v Grootboom* required that section 27(1) should be read in conjunction with section 27(2) of the Constitution which requires the state to take reasonable and other measures, given its available resources, to achieve the progressive realisation of socio-economic rights. In this case, the Constitutional Court held that the state has an obligation to provide people who are unable to support themselves and their dependants with shelter. It is important to note the qualification placed at subsection 27(2) as it implies that the State cannot do more than what it has or it can, which means that if there are no resources at its disposal, it cannot be expected to act.

Section 27 of the Constitution, however, compels the government to introduce and ensure the implementation of a social security system that is inclusive and non-discriminatory in its application. As evidence to this commitment, the Constitution begins most of its provisions with the word 'everyone' including section 27 which indicates that not only a certain category of people is entitled to social services provided by the

State, but 'everyone' or 'anyone' who meet the needs-test requirement (Mpedi & Kuppen, 2003). This is in sharp contrast to the previous social assistance system where access to social services was unfortunately skewed in favour of privileged white households. As a result, access to education, housing, transport, health, water and sanitation, for instance, depended on one's race, gender and location (Seekings, 2007).

POVERTY

Poverty is equated with illness and, like all other illnesses, manifests itself in a variety of ways in different historical situations. Poverty also has diverse causes. It manifests itself through a lack of access to income; a lack of employment opportunities, and a lack of normal internal entitlements by citizens to such things as freely determined consumption of goods and services, shelter and other basic needs of life (United Nations Economic Commission for Africa, 2002). Poverty has also been influenced by, amongst other things, recurrent drought, ill-health, crime and inequitable access to capital (Thompson M. (Ed). 1999). Poverty is also informed by deeply inscribed patterns of group discrimination, as argued by Gwen and Shelagh, 2005:

Seeing the group dimensions of poverty, and the layers of right infringements it causes and reflects, strengthens the claim that there is a social obligation to address. When we look at poverty through group-based equality lens we open up new opportunities to see that poverty is more than an individual problem because the patterns of who is poor are entrenched and reflect long-standing discrimination in the society. The analytical risk of failing to take account of the particular effects on disadvantaged groups is that the nature and extent of the harm of poverty-producing measures and their potential to reinforce existing disadvantage and compromise fundamental interests may not be fully appreciated. Purely individualistic and gender, race, and disability-neutral explanations of poverty are just too simplistic. Commentary about group based effects tells more of the truth of what is happening; it can show that there are qualitatively different impacts on certain groups; it may implicate a range of different constitutional rights and treaty provisions; and it can help to call into question the validity of the thesis that poverty is all about individual responsibility.

The Relationship Between Inequality and Poverty

The post 1994 government of South Africa inherited vast inequalities in education, health and basic infrastructure such as access to safe water, sanitation, and housing from the apartheid government (*Soobramoney v Minister of Health, KwaZulu-Natal*, 1998). For instance, while only a quarter of South

Africans had access to clean water in their houses, Asians and Whites had universal access to this service. Those who enjoyed better services during the apartheid regime remain better-off compared to those who were victims and also are still in need of basic services such as clean water, electricity, and sheltered schools, as some children still school under trees and mud-built structures. The prevalence of such conditions, especially HIV and AIDS, explains why South Africa has not achieved some targets for the Millennium Development Goals (MDGs) related to outcomes such as halving poverty in 2015, increasing employment and income levels and elevating life expectancy which is impacted by health conditions.

Disadvantaged and vulnerable groups usually experience a mix of inequalities in treatment and in the implementation of government programmes. Chaskalson P emphasized this in *Soobramoney v Minister of Health, KwaZulu-Natal*. Mr Soobramoney had chronic renal failure that required ongoing dialysis treatment. He sought dialysis treatment from Addington Hospital in Durban. In considering and refusing his application, the Court analyzed the following factors as inherited from the past political regime that: disparities in wealth; deplorable living conditions; unemployment; inadequate social security and access to clean water and other basic services.

The South African government is committed to deracialising the economy and empowering the broader South African population. This type of economic and social reconstruction philosophy is solidly based upon the Freedom Charter which espouses the principle of sharing, caring and empowering society without reference to race. If one looks at this principle of the Freedom Charter, it appears that it was never the intention of the present democratic government that economic advantage should pass from one minority group to another. This would simply amount to a mere changing of the guard in an economy that has failed to undergo any radical systematic transformation in respect of the ongoing democratisation of its previously segregated and exclusionist social institutions.

The Constitutional Court (in *Minister of Finance v Van Heerden*, 2004) has also pointed to the persistent 'social and economic disparities' that must be addressed if a commitment to the Constitution is to be realised. People, however, get discouraged in using the law to protect their interests because of legal complexities and financial burdens in applying it. It is in this light that the court's socio-economic rights jurisprudence has been criticized for failing to protect the interests of the poor as they consider access to justice and the law in general as only available to those who can afford to pay good

lawyers. Judicial remedies are critical for holding policy-makers accountable for the duties imposed upon them by the Constitution. In both the *Grootboom*, 2000 and the *Treatment Action Campaign*, 2002 cases, the Constitutional Court failed to include a requirement that a reasonable programme must make explicit provision for vulnerable groups in the application of the test of reasonableness. In its current form, this test rests on the incorrectly assumed premise that individuals are affected equally by poverty. Without such a requirement, inequalities might not be easily eliminated and vulnerable groups might not be afforded the sufficient protection that they deserve.

Fighting Poverty in the South African Context

Levels of poverty are still high in South Africa. Reducing the incidence of poverty is one of the major challenges facing not only the government but all South Africans. In the process, the government has taken the lead by committing itself to the creation of a poverty-free South Africa (Public Commission's Report, 2007). To achieve this, it has introduced and implemented social assistance system to fight poverty. Included in the social assistance system are various grants intended to cater for the basic needs of poor families. The provision of basic social services needed for human survival have also been strengthened in the past years. There has been an increase in the number of homes or houses with electricity, clean water, tarred roads, etc.

The existing social assistance system is, however, not an all-encompassing system. Its application is subject to a means-test approach. This implies that the institution that is responsible for the administration of the funds evaluates the income and assets of the person applying for assistance in order to determine whether the person's means are below a stipulated amount. This is done by capturing, *inter alia*, occupied property (municipal/market value of the property, outstanding bond); assets (cash/ investments, donations, etc.); and income (earnings, other income, private pension/ annuity, donations). According to Strydom, means-tested social assistance constitutes the last resort or the ultimate safety net against severe deprivation (Strydom, 2001). The 'means test' is a way of determining whether a person qualifies to receive a grant as these grants are meant for those in most need. In *Khosa and others v Minister of Social Development*, 2004. Mokgoro J stated that:

those who seek assistance must meet a stringent means test prescribed by regulations made under the Act. Grants are made available to those in need, including vulnerable persons..... the legislation is part of the government's strategy to combat poverty. It is directed at realizing the relevant objectives of the Constitution

and the Reconstruction and Development Programme, and giving effect to South Africa's international obligations

Social assistance, as one of the poverty eradication measures (with its multiple objectives), is concerned with poverty relief as well as poverty prevention (Nelissen, 1998). This is evidenced by the fact that social grants for the aged and disabled have become the main source of income in many of the rural and even urban households. Social assistance also serves as a poverty prevention measure in the sense that people plan and budget for the income they get from the government's social assistance system. For example, other families use this money to finance education for their children. Considering the various needs that the social grants serve, it is clear that it is insufficient to meet all the needs of each family, although it was not meant that the social grant would replace salaries or wages. This does not, however, mean that people are not appreciative of what government is currently doing. The fact remains that people are suffering and something more needs to be done.

Progress Made Thus Far and Deficiencies

The Constitution has committed itself to healing the divisions of the past, improving the quality of life of all citizens and freeing the potential of everyone. Great strides have been made in implementing the provisions of the Constitution relating to social security and social assistance in various ways. The government has, for instance, removed all racially discriminatory provisions relating to entitlement to social assistance introduced child-support grants; foster-care grants; as well as old age and disability grants. Important advances have been made in areas of social delivery and infrastructural development such as electrification, water, housing, education and social assistance. These measures attempt to enhance the standards of living of the people of South Africa. The Minister of Finance, in his 2002 Budget Speech, affirmed this when he indicated that the social grant system is the most effective tool in eliminating poverty. If the government's programmes are implemented properly, this will be in line with the objectives and goals of a social security system that is aimed at assisting destitute members of society.

Even though the South African economy has grown rapidly in the past twenty years and social spending comprises an increasingly larger share of the budget, several deficiencies in government social policies remain. The implementation of some current social policies has resulted in an inadequate provision of socio-economic rights to the people. For example, poverty has manifested itself in some areas of the Eastern Cape Province, where many people go to bed

without even a basic meal. A study by the Human Sciences Research Council and the African Strategic Research Corporation revealed that the Eastern Cape Province is trapped in poverty almost 20 years after the end of apartheid - a situation described as a "national disaster" (Trollip, 2011). The problem besetting the Province is compounded by poor subsistence agriculture and "systematic destruction of the rural economy", notes the report. The paper further reveals that the province's young and educated are fleeing to other provinces in dozens, leaving behind vast numbers of people dependent on state grants.

Furthermore, poverty has left scars on South African society which the government is trying to heal through its social assistance system and other measures. There is ample evidence that links poverty and HIV/ AIDS. The end-result of this is the increasing numbers of child headed households in areas such as Lusikisiki in the Eastern Cape Province. This unfortunate reality forces children to leave schools prematurely to seek employment and/or act as caregivers. Indeed, this occurrence is becoming so common that the South African society is in danger of accepting the tragedy of child-headed households as a normal fact of life. This is expected to change in the future as a result of the government policy on the provision of HIV drugs to affected people.

Although the South African government has responded reasonably well in instances where extreme poverty has been reported, it is uncertain how many such cases remain unreported. It is believed that many people suffer in silence as a result of a lack of knowledge that the government may assist them or, in some cases, they lack proper identity documents to gain access to government grants. Under these circumstances, people may feel ignored by the government and this would possibly undermine all efforts aimed at social upliftment. Therefore, relevant government agencies must be more vigilant and vigorous in the fight to eradicate poverty.

The author argues that if poverty is not addressed early, it will undermine human dignity with negative consequences for physical and mental health which, in turn, often results in increased mortality. The effects of poverty, if not confronted aggressively, may also spill-over to the relatively affluent communities in the form of communicable diseases, increased criminal activity, civil strife/wars and kindred problems.

The question that remains unanswered is whether South Africa will ever win this fight against poverty if corruption and the system of cadre deployment in key government positions still exist. People allege that "the

appointment of people to positions on the basis of political allegiance coupled with corruption has affected the delivery of services to communities and people are becoming more and more intolerant of this practice". An example of these is the various protest actions across the country against the lack of service delivery. These recent protests should stand as a warning to government officials that laziness, incompetence, corruption and generally, the failure to heed to peoples' call for service delivery is becoming intolerable. It shows that people are prepared to resort to violence if steps are not taken by the state to respond to their demands. The tune of government must change from making more promises to putting those promises into action.

THE WAY FORWARD

The Need to Address the Issue of Unemployment

Unemployment and poverty are inseparable and interlinked. As such, a lack of employment is a significant contributor to poverty while securing decent employment contributes to poverty alleviation. The strict definition of unemployment measures the number of people available and looking for work within a given specified period. It is generally accepted that South Africa's unemployment problems are structural rather than cyclical in nature, and that it is more difficult for employment policies to cure cyclical unemployment (Van Kerken & Olivier, 2003). Structural unemployment is defined as "the proportion of unemployed persons who cannot find work even when the economy is booming and which cannot be influenced in the short-term by macro-economic policies" (Walwei & Werner, 1998). Unemployment has a greater impact than the loss of income and has significant social costs in terms of the potential of violence and gender conflict. The unemployment rate increased by 0.2 of a percentage point and 0.7 of a percentage point in the first quarter of 2014 (Quarterly Labour Force Survey, 2014). Statistics further indicate that the increase in unemployment is driven by people previously classified as inactive in the job market now seeking employment and the increase in unemployment is not a result of job losses.

It is not only the unemployed that are affected by poverty but also those who are employed but earn insufficient wages or salaries. For most people, work is the primary source of income. In South Africa, like elsewhere in the world, the proximate cause of much poverty lies in the fact that the wages earned by men and women for the work they do are insufficient to cover basic needs for themselves and their dependants. An individual's employment status, in turn, directly impacts on his or her ability to sustain a livelihood and thus contribute towards the reduction of poverty. Poor people face the dual problems of unemployment and

underemployment. The challenge is therefore not only to create a large number of jobs, but also to ensure that better quality jobs are created and that existing jobs are retained. Evidence suggests that government's broad-based public works programme is failing South Africans. One of the criticisms of the programme is that, even though it creates employment opportunities for the disadvantaged, struggling people and people in rural areas through the construction of roads and rural development initiatives and the Expanded Public Works Programme (EWP), employ people as casuals and these positions are both menial and temporary. Relevant role players should know that quality employment is the most important point of departure in poverty alleviation.

The government has enjoyed some success in enhancing accessibility to resources such as housing, water and electricity. These programmes and initiatives are, however, often not well co-coordinated, and are sometimes not sufficiently comprehensive to reach all households. In those households where these services are available, one finds that municipalities (which are the main providers of these services) require people to pay for the services rendered by the government. This raises the question of affordability, considering the widespread unemployment and poverty leaves. When individuals are unable to afford basic services, it is generally expected that relief measures funded by the government will be put into action. An increase in the number of employed people implies that they will be able to look after their own needs (such as buying themselves houses rather than relying on the government to build houses for them), thereby relieving the State of such obligations. Therefore, the creation of employment opportunities will in the long run reduce the burden on the State as more people will be employed and not in need of government's assistance for survival or other basic amenities of life. If more people are gainfully employed and well enough, this will enable government's expenditure to shift to other areas of need which will in turn change the lives of the people.

Private Institutions must be Encouraged to Play an Active Role on Poverty Alleviation

President Jacob Zuma in his State of the Nation Address, said:

We urge every sector and every business entity, regardless of size, to focus on job creation... All government departments and State owned enterprises will align their programmes with job creation imperatives. We cannot create these jobs alone. We have to work with business, labour and community constituencies. Experience shows that we can succeed when we work together (State of the nation address, 2011).

Corporate social investment in South Africa has a short and dynamic history. Even during difficult economic times, South African organizations have understood the value of good corporate citizenship through assisting affected communities during times of disasters, such as floods. Corporate social investment should be more than just a handing over of large sums of money. Rather it would be a rewarding and mutually beneficial relationship for those involved. A number of community engagement initiatives that promote social responsibility as well as a sense of good citizenship should be well coordinated. This will give private organisations enough space to exploit with a view to assisting indigent people.

Some people may argue that the state should play no meaningful role in the provision of jobs. Let the market do the work, they say. Otherwise, the jobs that are created will not be self-sustaining and will simply increase the burden on the state, and ultimately on the tax-payer, until one day it becomes too heavy for the state to bear and everything then collapses (Wilson & Ramphela, 1991). Certainly, there is a danger of the state creating a bloated bureaucracy of people whose jobs are essentially unproductive and whose salary cheques from the government amount to little more than a welfare payment. This argument contains an important truth that should serve as a warning, a salutary reminder, that there are dangers inherent in any state-employment policy. Nevertheless, one could argue that under the conditions now pertaining to South Africa, with the level of unemployment already high and projected to rise still further, the state has a major role to play in the creation of employment.

In a developing country such as South Africa, social policy must be linked to economic policy. These two policy regimes must be complementary, mutually reinforcing and reflect the contributions of government. To enable policy-making to address social poverty and exclusions, the policy has to be multi-dimensional, through, *inter alia*: linking together social rights and welfare arrangements; introducing measures that would strengthen the links between social security and labour market incentives (such as job-seeking assistance, financial incentives to employ and skills training); and focusing on targeted involvement with particularly vulnerable groups (for example, through specifically targeted programmes reaching certain excluded groups, such as rural women or the young unemployed).

Experience suggests that public-private sector partnerships are vital to sustainable development and poverty alleviation. Such collaboration requires that opportunities be created for the poor to make their own good living rather than relying on government's contributions. Without the public-private sector backing

of poverty alleviation efforts, poverty will continue to be a dark cloud hanging over the State with little or no means at all to address it. Due to the large role that the private sector plays in South Africa, much still needs to be done with regard to the redistribution component of social security expenditure.

Taking Court Decisions Seriously As Guidelines Towards Winning The Fight Against Poverty

Since the dawn of democracy in South Africa, there have been a number of decisions that have dealt with the issue of socio economic rights and their impact on poverty. Some decisions have ordered the government to act positively to address the plight of the poor through the implementation of socio-economic rights. Some of the prominent cases in this regard include: (Soobramoney v Minister of Health; Khosa and Others v Minister of Social Development and Others; Mahaule and Another v Minister of Social Development; Joseph v City of Johannesburg, 2010; Minister of Health and others v Treatment Action Campaign and others [No 2]; Government of the RSA and others v Grootboom 2000; Mazibuko v City of Johannesburg 2010; and Kutumela v Member of the Executive Committee for Social Services, Culture, Arts and Sports in the North West Province 2003).

It is common knowledge that the Constitution and the Bill of Rights make provision for various categories of rights. These rights are justiciable and can be enforced by courts during the process of interpretation and application. However, not all rights stipulated in the Bill of Rights have found application and interpretation by the courts. There are areas of conflict of rights that have not been resolved and which appear to be left to the Constitutional Court (a body comprising eight individuals) to resolve.

It is at this juncture that the concept of 'justiciability' applies. Justiciability needs to be distinguished from implementing a court order. Once a court grants a remedy, it still needs to be implemented or given practical application. A court may, for example, declare that people are entitled to basic housing, but these people will remain without housing if the government does nothing to give effect to the court order (Viljoen, 2005). An example which clarifies the distinction between justifiability and implementing a court order is the *Grootboom* case. In this case, the Constitutional Court issued a declaratory order on the basis of sections 26 and 28 of the Constitution, requiring the state to devise and implement a programme of action, including measures to provide relief for destitute people not catered for in land management programmes. The Court held that all three spheres of government are collectively responsible for implementing the right to

housing and that they should provide shelter, water and sanitation for the claimant (a mother and her children who lived in dire conditions in a shack settlement which had no running water or sanitation). However, the orders were not heeded to by the respective respondents.

This shameful state of affairs can be attributed to the fact that not one of the three spheres of government was explicitly burdened by the court with the responsibility of providing the required service. The result could have been very different had the court *a quo*'s judgment been upheld. The trial judge ordered that the three spheres of government report back to court within a month, setting out clearly who would be doing what in giving effect to the claimant's right to a shelter.

To remedy this shortcoming, the Constitutional Court should be concerned with remedies that assist in realising the issue of socio-economic rights and should, therefore, prescribe primarily affirmative remedies including declarations, damages, reading-in, mandatory interdicts and structural interdicts. Of these constitutional remedies, damages and structural interdicts are particularly suitable as these measures would increase accountability on the part of government.

In response to accusations of a lack of service delivery, government commonly alleges a 'lack of available resources'. This defence burdens the Court with the responsibility of discerning the difference between a government's inability to implement a specific obligation or right and its plain unwillingness to do so. The fact of the matter is that the Court cannot order the government to do what it cannot do, which means that the order can only be made in situations where it is possible for the government to provide services to the people depending on the availability of resources. In this respect, the questions that the government needs to find answers to include, for example, how to ascertain whether government is going to reasonable lengths to meet its obligations in respect of poverty alleviation? What standard of review should be adopted to assess the constitutionality of legislative and executive action and inaction in resource allocation and priorities? For instance, in *Van Heerden v Minister of Finance, 2004* the Constitutional Court was asked to defend a positive measure that sought to equalise pension benefits by subsidising the contributions of members of a disadvantaged group. The Constitutional Court held, as per Moseneke J writing for the majority:

Legislative and other measures that properly fall within the requirements of section 9(2) were not presumptively unfair. Remedial measures were not a derogation from, but a substantive and composite part of section 9 and of

the Constitution as a whole. Their primary object was to promote the achievement of equality. To that end, the differentiation aimed at protecting or advancing persons disadvantaged by unfair discrimination was warranted, provided the measures were shown to conform to the internal test set by section 9(2). It was further held that if a restitutionary measure, even based on any of the grounds of discrimination listed in section 9(3), passes constitutional muster under section 9(2), it cannot be presumed to be unfairly discriminatory and to hold otherwise would mean that the scheme of section 9(2) were a mere interpretative aid or even surplusage.

This case suggests that the courts will largely defer to government measures (Albertyn & Goldblatt, 2002) therefore, it remains an open question as to how far courts may nudge government in more transformative and redistributive directions. In *Khosa v Minister of Social Development*, a case characterised by the conflation of equality and the right to social assistance, destitute permanent residents successfully claimed the extension of social benefits to them.

However, the Constitutional Court and other courts in general should not intervene in social and economic matters. This should be left to policy-makers and the people the policy intends to serve. The courts should only intervene in these matters in a very prudent and limited way, that is, if it is shown that the state is dragging its feet in as far as the realisation of the goals and ideals of the Constitution are concerned or if the state fails to comply with a compelling provision in the Constitution. As watchdogs of constitutional democracy, the courts are empowered to advise Parliament to act in a way that provides the building blocks towards achieving a better society. This goal has to be achieved through a system of checks and balances which is the key to most constitutional states. This system entails that each branch of government should in a way check the other branches of the same government vice versa.

CONCLUSION

Even though South Africa conquered apartheid twenty years ago, its populace remains hungry for economic freedom. This implies the need, for and the realization of, a significant reduction of current poverty levels. Notwithstanding the failings of South Africa's present social security system, its impact in improving the lives of the poor should not be underestimated. The poverty alleviating effects of, in particular, old age, disability and child support grants is well documented. The government, through its housing programme, has also improved the quality of lives of thousands of people who had no shelter in the past eighteen years. However, many people remain impatient, arguing that the system

fails to provide benefits to many people who fall outside its prescribed protective framework and provisions. This can be counter-argued by the fact that by putting in time-frames and targets, the government recognizes some of these gaps and the marathon miles that lie ahead.

South Africa is committed to fulfilling its constitutional obligations to deliver socio-economic rights within the context of its national plan of action, Vision 2015, and the MDGs. One of the indicators of progress towards the achievement of the MDGs is the effective and equitable delivery of public services (Millennium Development Goals Report, 2012).^{xxxix} It is therefore essential that poverty be understood in a social context; that it is not solely a consequence of individual misfortune; or an inevitable result of some pre-ordained natural economic order, but a product of how society and the economy is organised.

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YEMENI NARRATIVE IN POSTCOLONIAL WORLD

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ABSTRACT

Zayd Mutee Dammaj's *The Hostage* is one of the narratives that addresses the suffering and struggling of the Yemeni people under the imamate rule. This narrative does not come to express the life of one of the Yemeni hostages in the prison and later on as a servant in the palace of the Governor of Imam, but it comes to express the concerns of a nation oppressed to respond to the imamate demands pre-revolution. This article is an attempt to go through reconstructing of the identity of a hostage who still young and reshaping his identity may not take too much efforts. Through the reconstructing of the hostage identity and its manifestations in his life, this article traces impact of this sort of life in a life of a small hostage who has taken from his mother to enforce his family and tribe to respond positively to the imamate illegal demands. The life of the hostage reveals the corruption and absurdity of life in the palace of the Governor of Imam and his relatives who claim piety. It is found that the life of Governor's palace left a deep influence in the physical, psychological, cultural, sexual and religious life of the hostage. Eventually the hostage managed to escape from this life to unknown future

KEYWORDS: hostage- imamate- yemeni- reconstruction- identity

INTRODCUTION

Zayd Mutee Dammaj was born in Al Sayyani doctorate, Ibb Governorate, Yemen. His father is one of the people who did not accept the oppression and injustice. He was one of the people who stood against the Imamate rule. He was taken to the prison of Al Shabaqa in Taiz because of his daring situation towards oppression and corruption of the Imam and his relatives. In 1944, Mutee Dammaj, the father, escaped from the prison to Aden to initiate a new stage of struggle against the imamate rule through his political articles published in the magazine of '*Al Jazeerah Gir'*'. Later on, his struggle took another turn by founding *Al Hrar Party* which was founded in cooperation with his friends.

Zayd Mutee Dammaj was raised in a family which has unquestionable share in struggling against the Imam Yahya's Rule and his sons. His father set a good example to his son in struggling and in learning. He brought many books from Aden in history, politics and literature which open the gate before the son to read and develop his reading skills and educate him the real sense of life. Zayd joined Al Ahmadiyah School in Taiz and he obtained the primary school certificate in 1957. With the assistance of one of his father's friends, he moved to Egypt to accomplish his secondary school study. Then he joined the faculty of law, Cairo University in 1964. After two years, he left the faculty of law when he found his literary skills began to surface, he left the faculty of law to join the faculty of Arts, Press department, he initiated in writing in the New Yemen Magazine to begin his literary and political attempts in

that magazine. He left Cairo to respond to his father's request and came to Yemen. He was selected for Consultancy Council in 1970. His father's death left a deep scar in his personal and literary life. This short reading for the life of the author of *The Hostage* and recognizing the struggling history of his family make the reader understand the background of sufferings and sacrifices offered by Dammaj's family on the course of Yemen revolution and achieving the goals of the 26 September revolution 1962. Most of Zayd's literary works address in one way or another the influence of the imamate rule on Yemeni people and the influentials' domination on the lives of the simple people such tribal sheikhs appointed by Imam to control the lives of powerless people such as the short story: the *Returner From the Sea*, which is one of Dammaj's short stories that addresses the domination of Sheikhs on the lives of the people and how they intend to keep the people under their influence. His coming from struggling family which has unquestionable history in supporting the revolution makes the reader understand his literary works and their dimensions. His simple words come to touch the life of the simple people in Yemen in varied areas of life. The literary works of Zayd has expressed the concern of the ordinary people of Yemen and their aspiration for brilliant future. They have also uncovered the hidden part of the life of the palace during imam's rule and the corruption of his relatives who claimed piety while they were very far from the right track.

The Hostage is one of Dammaj's novels which leave the life of the palace open for the readers to realize the corruption and the absurdity of life in such palace. The Literary works of Zayd does not exceed the simple nature and the simple people of Yemen. He does not release the reins for his imagination to lead him to imaginary world but he managed to twist his imagination to reflect the reality of a people and a period of history does not easy to be forgotten or ignored. The characters and the setting you may smell the flavor of Yemen with its males and females, with its mountains and its hills, his style of writing attracts the reader to continue reading to discover a reality you may hear about or read about in the historical books. His setting does not exceed the nature of Yemen, whether, in the city or the countryside, whether indoors or outdoors. He keeps the palace of Imam and his governors a closed place to express the darkness they live in, that may go beyond the darkness of the ordinary people lives.

The Hostage is a journey of a boy taken from his mother to be raised, but jailed in the Al Qahira Fortress prison in Taiz. The Duwaydar (the young hostage who serves in the palace of Imam and his governors) in the palace of the Governor is supposed to serve males and females of the palace. He still a boy who does not reach the grown up age. It is very easy for Imam to enforce his family and his tribe to obey and respond to his demands and to stop struggling and leading the ordinary people against Imam's rule. It is very easy to control him and reconstruct his identity. The world of the palace opens a life before the hostage who remains nothing and an object in the eyes of the people of palace whether males or females, soldiers or servants. The people of power make another life for them away of ethics and principles of their religion. Abdel Aziz Al Maqaleh pointed (1983) out in his preface to the collection of Dammaj's short stories entitled the *Scorpion* that "Zayd Mutee Dammaj a novelist who is not interested in focusing on the forms and being influenced with the expression that relying on the trend of consciousness and unconsciousness because he is tied with what is more significant, he is busy with presenting the social and political reality through realistic persons and busy with recording the developed life symmetry positively or negatively" (9).

The significance of this article lies in its exposure of the early struggle of Yemenis to topple the imamate rule and change the fate of their country for better, to end the corruption and alleviate the poverty of a large segment of the people and to put an end to the privileges which were granted to the elites represented by the imamate family, his relatives and governors who were loyal to him. Yemenis have strived seriously to establish a national strategy that serve all segments of the people

with their varied religious doctrines, origins, regions and concerns. A lot of Yemenis worked hard to get the citizens out of the circle of poverty and oppression under a political regime that thought only with its own interests. They have called for living on terms of equity and equality, terms of rights and responsibilities that lead the people to sustainable development, away of regionalism and classism. For this reason, Dammaj's family has struggled to build a new Yemen and the hostage of his novel is an example of sacrifices and suffering under imamate regime, and the sensual pleasures of the imamate palace could not tempt him forever. When the opportunity comes, he leaves in searching for better future for himself and for his country.

THE RISE OF YEMENI NARRATIVE

The critics and scholars who are concerned with literature differ in specifying the real beginning of the Yemeni narrative. Some of the critics support the thought of Ahmad Abdullah Al Saqqaf's "*Qaroot Girl*", which appeared in 1927 and the second group of the critic support Mohammed Ali Luqman's "*Saeed*" as the first Yemeni narrative. To come back to the history of both of the writers, we may recognize the real and right view concerning the beginning of the Yemeni novel. Ahmad Al Saqqaf was born in Al Shehr in 1882 in a family known with education and *Dawah* (call people for the real and tolerant teachings of Islam), in 1908, Ahmad had to travel to Indonesia to join his elder brother who already traveled to Indonesia. It was not the only family which left their country to travel to Indonesia but there were many families traveled to Indonesia and other Asian countries in looking for better life. The Yemenis who traveled to Indonesia were concerned with spreading religious culture and education and they initiated in establishing schools as charitable schools in Suwar Baba in 1911 and the Islamic School in Solo. And he established another school in Jakarta, the capital of Indonesia.

Al Saqqaf is not only a teacher but also a journalist who established many magazines as 'Alawiyan League' in 1927, which was concerned with literary and religious issues. In 1950, he was passed away on one of the ships coming back to Yemen. He left very significant and creative literary works. One of those works '*Qaroot Girl*', 1927. The novel traces the relationship between a youth from Hadramout called Abdullah and an Indian girl from Qaroot called Niq. He met her coincidentally in one of the public parks with her parents. They find themselves attracted to each other. This love is developed between the two, but they start to suffer when one of the Netherlanders proposes to her and he has agreement from their parents. The mother of the girl refused the man's request and his brother Abdelqader

refused his request because the girl is different from their culture and race. Then he will move another province to marry one of his relatives but he will come back to his beloved to find out that the real name of the girl Niq but Efa as an Arabic replaced name of Sharifa and later on, Abdullah finds out the girl is one of his uncle's daughters who has married the mother of Efa and dies after three days of the marriage. At the end of the story the two families will respond to the reality of the situation and Abdullah will marry Efa to put a happy end to this romantic relationship.

Moving to the second novel which is in conflict with the Al Saqqaf's novel for the position of first Yemeni novel, it is Mohammed Ali Luqman's '*Saeed*'. Mohammed Ali was born in Aden 1898, where he had received his first stages of education. He was the first who obtained the high school certificate in Aden and he became the first Lawyer in Yemen. He worked as a reformer, and a journalist and a writer of literature. He established a daily journal entitled '*Al Jazeera Girl*,' 1940. Janan Mohammed Fare' argued that Luqman has an integrated enlightening and civilizing project through his published works throughout his life. (As cited in Rahim)

Saeed's novel it tells us about a Yemeni youth called Saeed. He lives in Aden, the place which is oppressed by the English colonizers. Saeed is concerned with education, particularly literature. He has a friend who shares the same concern which has been incarnated in calling the people to education and ethics. They are in conflict with the evil which is represented in Salem's character. The novel depicts the eternal conflict between the good and the evil, while at the end the good would be prevailed.

Some critics as Ibrahim Abu Talib and Amina Yusuf support the idea of *Saeed's* novel (1939) is the first novel in Yemen under the plea that Al Saqqaf's '*Qaroot Girl*' was written in *Al Mahjer* (outside of Yemen), however, the second group of critics as Abdelhakeem Saleh and Zaid Al Faqih have agreed with "Al Saqqaf's '*Qaroot Girl*' as the first Yemeni novel with considering the element of time, 1927. This is a reality, it is not easy to be ignored because the writer is Yemeni and what he addressed in his novel is concerned with the troubles faced with Yemenis abroad. At the end, Al Saqqaf's novel considers the first Yemeni novel, written by a Yemeni writer and the novel's major theme depicts the daily life troubles: love and living in *Al Mahjer*. The generation of writers who put a name for the Yemeni narrative is Ahmad Al Saqqaf, Mohammed Luqman, Ali Ahmad Baqathir, and Al Tayeb Arslan.

The first beginning of the Yemeni novel is stamped with romantic, national, historical and Islamic feelings. This beginning comes as a result of the literary stage demands. The second novel of Ahmad Al Saqqaf '*Patience and Endurance*' appeared in 1929. Ali Mohammed Abdu has written many novels: *The Horse of The Carriage* 1959, *A Worker Diaries* 1966. Mohammed Mahmoud Al Zaubairy wrote *Waq Al Waq Misery*, 1960. Abdrahim Al Sabalni wrote *Death Fighting* 1970. The second generation of Yemeni novelists are such as Zayd Mutee Dammaj, Mohammed Abdualwali, Saeed Awlaqi, Saleh Ba Amer, and Yahya Ali Al Aryani. They have developed the textuality and technicality of the text in writing the novel and get the novel out of the traditional circle. The third generation has represented his own narrative experience acquired by reading for many writers over the world such as Habib Abdelrab Sururi, Wajdi Al Ahdel, Nabila Al Zubaire, Abdelnaser Mujali, Mohammed Abdelwaqeel Jazem, Nadia Al Qawqabani, Ahmad Zain. Ali Al Muqri and others.

The Yemeni narrative has passed in three different stages as its counterparts in the Arab world. The Yemeni novel shares with its counterparts the concern with the title, type, and the themes. In brief, the Yemeni novel includes three significant stages: the romantic stage in which the romantic relationships have been prioritized and the name of the protagonist is included in the titles. This stage began at the end of the twenties, beginning with Al Saqqaf's '*Qaroot Girl*, 1927, '*Patience and Endurance*' in 1929 and Mohammed Ali Luqman's '*Saeed*', and continued to the end of sixties and the beginning of seventies. The second stage is the realistic narrative which its themes and setting concentrate on the people and the place of the writer's environment. Abdel Haqem Saleh (2012) pointed out that "the domination of the traditional titles of the place marked ideological motive which expresses the transformation of the narrative discourse to encompass the topics related with the Yemeni Environment" (33). The Third Stage is the modern Yemeni novel which started at the end of nineties and the beginning of the third millennium. Each stage of Yemeni narrative stages has its specialties concerning the themes and the titles, text and textuality, type and technicality. Abdel Aziz Al Maqalih (1994) pointed out in the literary background of the novel of *The Hostage* "the short story following modern critics was initially pioneered by Muhammed Abdel Wali and Zayd Dammaj ; the later was a student in Tanta high school in Egypt when he made his first attempts at the short story in the early sixties" (16). Messick (1998) pointed out "Southern writers were concerned with the challenges of identity issues posed by the west in the form of the colonial power, while a northern author such as Dammaj imaginatively reworks,

for republican era readership, the very different highland experience of rule by the twentieth century Zaydi Imams" (28).

DAMMAJ'S THE HOSTAGE

Zayed Mutee' Dammaj's *The Hostage* is the best Yemeni novel known locally, regionally and internationally. It puts a very good reputation for the Yemeni narrative in the mid of literary writers. It is classified as one of the most significant a hundred Arabic novels throughout twenties century according to the Arab Writers' Union. The first edition of *The Hostage* was published in Literature Housing in Beirut 1984. Zayd Dammaj's novel has obtained a global reputation and has been translated into many international languages such as English, French, Germanic, Russian, Indian, Chinese and Spanish. It is selected to be one of the creative literary works by UNESCO project: a book in a journal. The novel argues a period of history under the imamate rule when imam and his governors used to take the young children of the rebels to prison and to work in his palace as a servant to enforce their tribes and family to respond to his orders and show their obedience. It is a period of oppression, injustice, ignorance and backwardness, conflict and corruption. Abdel Aziz Al Maqalih (1999) argued "the works, in fact, an urgent cry" (16).

The Hostage becomes known locally and internationally and leads the Yemeni narrative out of the local circle, marks the Yemeni narrative with the global stamp and engraves a name for Yemeni narrative in the world of fiction. The title of the novel has reflected the text as any Arabic novel at that time which pay more attention to the names of the person as a protagonist and to the place he comes from or lives in. The Yemeni novel shares with the Arabic novel the same concern regarding the traditional title that supposes to maintain the strong bond between the title and the text. The title shows the reader to where he is going in the text and puts him on the first step of the right track. The narrator in *The Hostage* is the hostage himself who is a part of the events in this novel. Imamate rule used to take the young children of his opponents or from the tribes to subjugate their family and their people to reduce the dangers of rebellion of their parents and their tribes. Zayd Mutee Dammaj has written many literary works, most of his works still manuscripts and they have not been published or exceeded the borders of Yemen because they have not found required concern that present the literary works of Dammaj and the others to the international arena. Dammaj is distinguished in the area of novel and in the area of short story and he is one of the novelists who put a solid ground for the Yemeni short story. Before *The Hostage*, there was a novel '*Sultan Al khabl*' has been confiscated by Ahmad

Qamees, the head of the political security apparatus to silence the voices of criticism. That novel has been confiscated to be hidden forever. Dammaj has written many novels and short stories, some of the literary works still manuscripts. There are many other literary works as *Tahish Al Hawban*, 1975, *Al Agrab (The Scorpion)*, 1982) *The Bridge*, 1986, *Mabkhut Al Yemen*, *Killing of Al Faqih Moqbel*, *The Sorrows of the Girl Mayyasa*, 1990...etc.

The Yemeni novel competes with its counterparts in the Arab world for many prizes such as Dubai Cultural Prize, Arabic Pucker Prize and other local and regional prizes. Ali Al Muqri's novels: *The Handsome Jew* and *Black Taste and Black Odor* have reached to the list of competition. They have been translated into Italian language, French and the English translation is expected to appear soon. No local novel has reached a global concern and has been translated into many international languages as Dammaj's *The Hostage*. It puts the Yemeni narrative in line with the international standard novels. The second international area is Mohammed Abdelwali in his literary works such as *They Die Strangers*; *Sana'a is Open City...*, etc. Other modern literary works of modern writers, Wajdi Al Hadal's literary works such as '*A Donkey among the Songs*', which has been translated into Italian language and *A Country without Sky* is translated into English, it has obtained a prize. For translation 2013. Sameer Abdelfatah's *The Son of the Hawk* is translated into French language. In brief, the Yemeni novel initiates in stabilizing a remarkable position in the international literature. The main themes addressed in the Yemeni novel and literary works are the reality of situation in Yemen, identity problematic, political and religious conflicts, oppression and corruption, migration and its consequences.

THE HOSTAGE'S MOVEMENT TO A LARGER WORLD

Dammaj's *The Hostage* presents two different worlds: the world of adults with its sexual adventures and the world of hostages with its childhood's innocence that represents the limitation of understanding and beautiful look at life, it is the life in exile inside their country but they have not allowed leaving the prison or the governor's palace. The young hostages are easy to reconstruct their identity according to the concepts of the imamate rule which are in line with. The imamate rule would like to press on the hostages' families and their tribes to respond to his rule and at the same time to reshape the identity of the hostages, hoping in the future would not resist the imamate rule. From the beginning of the novel, the reader may see the innocent look at life from the hostage before his bitter experience in the fortress of al Qahira or the life of the palace among the adult men and women. "How beautiful the city was! I'd

seen first when I was taken from my village and imprisoned in the fortress of al Qahira as one of the hostages of the Imam. His Soldiers have come, in their blue uniform, and torn me from my mother's lap and the arms of the rest of my family, then not content with that, they'd seized my father's horse too, in accordance of the imam wishes" (*The Hostage*, p. 23).

The hostage's look to the city was beautiful, however, later; his look to life becomes darker. The innocence of the hostages in the fortress of al Qahira has made Faqih (the religious teacher) to explain the work they suppose to do in the palace of the governor as a Duwaydar (a smart boy employed by the governor in the palace), he explained to the hostages the sense of the word of Duwaydar many times, this to recognize the innocence of the young hostages and their simplicity of understanding and simplicity of their vision, the faqih had to go further to explain in different words the sense of Duwaydar " a boy who has not reached puberty" (24). " the faqih would tell us, such boys now did the work of *tawashiya*, or eunuchs, explained, we looked puzzled, that these were castrated slaves...they were slaves whose testicles had been removed" (24-25). From here the reader may realize the simple understanding of these innocents children whose life would be at risk because their incorporation into the world of adults that world which is controlled by sexual instincts and self interest. The hostages who represent the young are easy to be reconstructed in the palace. They are mild and the influence of the social medium which they are in contact with for a period of time would be irresistible and would leave its marks in the future life of the hostages.

RECONSTRUCTION OF THE HOSTAGE IDENTITY AND ITS MENIFESTAIONS

The imamate rule incarnates the doctrine of Zaydism that claims its connection with the prophet Mohammed. It is closer to the shii Islam. This is very clear even in the title that gives to the females of the palace a title as Sharifa Hafsa. The title 'Sharifa' means an honorable title for the people who claim their direct connection with the prophet Mohammed, peace be upon him. The hostage initiates to recognize something about the Duwaydar's work when he heard from the people who came earlier to the fortress and had spent a period of time in the palace of the governor. The hostages who spent a period time in the palace, they came again to the fortress of Al Qahira when they reached puberty. They came back with different identity that was very obvious in their appearance, and their acts and actions.

Some hostages who'd served as Duwaydar, and then returned to the fortress on attaining puberty (as the faqih called it), had the most amazing tales to tell. The features of most had, I noticed, changed. Their

faces were pale, while their bodies, on the other hand, had taken on a general smoothness to texture, and showed signs of premature flabbiness and weakness, and I noticed, too, the interest they aroused in the fortress guards because of their smooth skin and soft voices, and their spotless clothes mapping down to the floor, and their embroidered kerchiefs, woven for them by the women of the palace, which they wore in the head to hide their carefully combed, curly hair. (*The Hostage*, p. 25).

The life of the palace has changed the appearance and acts of the hostages, the hostage has confirmed what he himself noticed to bring to the readers' mind the real changes that make the people of the fortress being attracted to the hostages who came back from the governor's palace to fortress after spending a period of time in the palace to narrate the secrets and the amazing stories of the palace, most of these stories address the corruption of the women and the men of the palace who have gratified their sexual instincts and make use of the hostages in the palace for sexual purposes, whether by the women of the palace who are single or divorced or women just in search of sexual satisfaction even if it is with hostages who start to reach puberty. The young boys are not exploited only by women but also by men who are homosexual and have abnormal sexual desires who prefer to satisfy their sexual instincts with the hostages or even with the female animals. As a result, when those hostages came back became more attracted to the soldiers or even to the faqih of the fortress who found by the hostage, the narrator, attracted to them and treated them special treatment that indicate their sexual leaning to such hostages whose appearance have been changed, their identity become more mild and their appearance become more attracted. When the others initiate to show their refusal to such special treatment to those who came from the place, the faqih becomes angry and shouts at them " shut up, monsters, what physical mould and mannerisms do you have?!" (26).

The concern of the women of the palace does not come from vacuum; however, their interest comes from their sexual concern. "and I noticed, too, the interest they aroused in the fortress guards because of their smooth skin and soft voices, and their spotless clothes mapping down to the floor, and their embroidered kerchiefs, woven for them by the women of the palace, which they wore in the head to hide their carefully combed, curly hair" (*The Hostage*, p. 25).

The other marks that left their influence on their bodies are their physical weakness and the paleness of the faces bring into the readers' mind their unhealthy life inside the corridors of the governor's palace and such marks

reveal the sexual abuse occurred to them in the palace under the women's temptations or the men of the palace abnormality.

The first duwaydar who will lead the hostage to let him recognize the new p (a) lace corridors, the secrets entrances, rooms of the women and the men in the palace. The old duwaydar would lead him to see the place of animals kept by the governor. "All they leave behind is a few mules and donkeys. I can't see any donkeys at all. We're the donkeys- the two of us- and the rest" (29). Here the conversation between the old duwaydar and the new one takes the stamp of jokes which is rejected by the new hostage who still recognizes not too much about the secrets of the palace and its women and men. However, "we're the donkeys" here a mark of what they would be asked by the men and women of the palace to satisfy them. The duwaydars are the only persons who may enter to the Turkish bath of the woman because they are still young.

The people of the palace whether men or women they could not find that sexual satisfaction because of age or divorce or their marriage with more than a woman. When the first duwaydar, handsome Obadi as the women called him in the palace, takes the hostage, the second duwaydar in a tour inside the corridors of the palace and shows him the rooms of the women of the governor and his relatives, he told him about the beautiful sister of the governor, Sharifa Hafsa. When Duwaydar Obadi talked about her divorce "it wasn't just that; he said there are other pressing reasons too. For one thing he was so old and feeble; he could not have relations with her. He already had a lot of wives and countless children" (30). From here the reader may recognize well how the women attempt to satisfy their sexual desires with the hostages. The hostages inside the palace of the city governor have not been raised in a healthy sexual life among the temptations of the women of the palace. The hostages are young and weak to resist the illegal demands of the women or the men in the palace.

The first day of the hostage in the palace is sufficient to uncover the life of absurdity inside the palace. The room of his new friend is full of the pictures of foreign actresses with their golden hair and blue eyes, their beauty makes the hostage surprised" O I have never seen like them in my life", he has got such pictures from the magazines reached to the governor from abroad. In the night, the hostage heard a quiet voice called Obadi many times to recognize later she is one of the palace women came to Obadi in the mid of the night to satisfy her sexual desires, despite his friend's resistance under the plea of his friend in the same room but he could not resist too much. At the beginning, this sort of life seems

strange for a boy who may not recognize this sort of life. Obadi supposed to respond to many demands of the women of the palace without showing any objection or hesitation; later such actions have led Obadi to be sick and died at the end.

The author has not given the hostage a name to pay the attention to lack of the identity, he would be a different boy controlled by the power of the governor's palace represented by men and women of the palace, using for the hostages many names that ignore his identity and he has no identity, just the identity the palace has selected for him as a duwaydar, a hostage, a boy, a servant, and a tribe boy. All these names elucidate the hostage powerlessness to stand against the transformation that invades everything around him. By such names, the people of the palace like to remind the hostage of subservience to men and women of the palace, he has no identity or willingness but what they need of him, the men and women of the palace, even if such actions are not desirable by the hostage. Sometimes they called him duwaydar or the handsome as they address his friend who came to the palace before him. Sometimes if not all times they add the word of my duwaydar, my hostage, my servant or my boy to let him recognize that he has no right to decide his fate or to have options in his daily activities.

The hostage who narrates the story is Sharifa Hafsa's duwaydar who requires to respond to her demands in the day or the night, whatever their demands, he has to respond without showing any objection or even nagging. When the hostage initiates in questioning Sharifa Hafsa about her letter to the poet of Imam, he was punished verbally by bad words that asked him to shut up or by the shackling that are fixed on his legs. The hostage only requires carrying out the demands. The hostage at the beginning, he does not want to follow the footsteps of the first duwaydar who sees in his acts and actions exceeding the limits of ethics and religion. However, the temptations of Sharifa Hafsa would lead him to reconsider his decision. He could not stand her temptations. Sharifa Hafsa's phantom would not leave him in his day or night. "She holds my head and kissed me on my lips, a kiss squeezing from the honey of the virgin queen of the bees". This sort of kiss is not an innocent kiss as she wants to show him as it comes as reward for his perfect work which he has been requested; it directs his lips as a mark of hunger of sexual instincts.

Not only Sharifa Hafsa has aroused the feelings of love and lust in the heart of the boy but also she works for her as a go-between who takes her letters to the poet of imam who seems has a lot of letters and gifts from many women in the palace and returns back another

letter to her. The boy may realize the poet has no that concern about Sharifa Hafsa that makes the hostage telling her that her letters cannot change the situation, they are useless. Such words arouse the anger feeling of Sharifa Hafsa to order the soldiers to shackle his legs as a punishment for exceeding his limits as a duwaydar. The hostage has passed with many bitter sexual experiences in the palace. In one of his errands to the poet, the poet attempts to have an affair with the boy, putting his hand on the thigh of the hostage and when the hostage attempts to remove, the poet starts again to put his hand again on the thigh of the hostage to move to sensitive area while the boy tries to stop such impolite acts. However, the drink he has taken from the poet and the poet remains pouring many glasses of wine which make the hostage could not move normally that makes the poet follows him to find a very strong slap on his face that makes Sharifa Hafsa asked later on about the reason of that slap directed to the face of the imam's poet.

The third situation that left its influence in the sexual life of the hostage is the story of al Tabshi, that old man who has an affair with female mule of the governor called Za'frana and he received very strong hit from the legs of the mule that led him to the doctor and the story spread in the palace that makes the governor requests from the person in charge of the female mules to sew the female mules' pussies. The irony here the first duwaydar, Obadi, comments on such incident that "the governor has to request to sew the pussies of the women of the palace" this is a mark of sexual adventures of the women of the palace, and their chasing the duwaydars or the men of the palace to satisfy their sexual desires. Even sex in the palace is practiced illegitimately and the sexual desires could be satisfied by abnormal relationships.

The life in the palace is full of secrets which narrated and uncovered by the hostages who would spend a period of time in the palace, this sort of life reflects the corruption in the corridors of the governor's palace, the people who claim their connection to prophet Mohammed and their concern to teach the people the religion, the religion that springs up from their doctrine of Zaydism. This contradictory life stamps the life of the hostage to find himself as a part of such dualism and contradiction. They request from Faqih to teach the hostages the religion and mannerisms while they violate the teachings of Islam and live that obscene life that is very far from the core of Islam.

THE IRONY AND ITS PSYCHOLOGICAL IMPACT UPON THE HOSTAGE

The words that have been repeated by the soldiers as *zamel*: "oh Duwaydar, your mother is missing you,

missing you, her tears fall like rain", this *zamel* by itself revolts homesickness and it reminds the hostage his parents and his people. It is not easy to be exiled in your country and you would not be able to meet with your family. It is a sort of psychological torment which is practiced by such *zamel* everyday to arouse the feelings of homesickness of the boy and add a new burden to his physical and psychological sufferings. The hostage has no name in the story to indicate the inferior position among the people of the palace. This is a mark of lacking his identity and he has to live according to the identity selected by the people of the palace, as a duwaydar, as a boy, as a servant, as unknown identity, only the identity given to him by the power of the palace. Sharifa Hafsa from time to another always reminds him that he is her hostage, "you're' my hostage, my handsome hostage" he has no freedom to behave without her orders when he starts to violate this rules by proposing that there is no benefit from her letters to the Imam's poet, the hostage is punished by shackling his legs with the shackles as a physical punishment and by verbal bad words that ask him to shut up.

Another means of psychological torment, she always repeats that she wants to see him a man and he has to prove his manliness to her. These words bear the connotation that he is not a real man. "they have oppressed me and attacked my family seizing everything [my freedom and my name] and transforming me into a hostage, and a duwaydar in her governor's sister, and a servant of her brother, the governor" (7). The hostage is exposed for many types of oppression and humiliation, "don't think you can do as you like. You are here as a hostage and a duwaydar" (12). In another situation, the tone of the hostage, the narrator, is full of pain and grief when he hears the leader of the private soldiers speaking to the crown prince that the hostage is the boy of Sharifa Hafsa "a boy is a third word I'm stigmatized by" (38).

Buruzan attempts to recognize the reasons of his grief and addresses the question to the hostage" is she Sharifa Hafsa another time? I shaked my head and he said ...what did she tell you? Speech, just speech. Hard speech, he said. Shaked my head, she told you "you becomes a servant to the vice governor"? Shaked my head. And she told you" you are an idiot, a coward, and you will never be a man". I don't reply. Do you really love her? I have waited a little bit and he said: a disaster, a catastrophe fall on you." (58) Here the reader may touch the humiliation and oppression practiced upon the hostage. When he moved to work with the vice, she initiated mocking, "*Subhan Allah*, I thought you travelled! She said. I intended to... the hostage replies. To where? she said To my countryside. Odd, I know the hostage is not allowed to travel to his family

without bringing a substitute, ...she said 'you're an important duwaydar!! belongs to me before the vice has put his hand on you...and he told you that you become a man and you reach the puberty...and you have promoted from a handsome duwaydar to an obedient servant: wash *almatafil* (a tray which spit the water of their mouth in during chewing qat), and you fix the pipes and sweep the place and may do other works...is this what you consider a development in your life?" (67). She starts to mock his new job in the vice's place and she attempts to torture him by reminding him of the low works he has to do in the place of the vice. She practices the tone of humiliation and contempt to remind him he is a hostage and he has no power to change his fate, and his life is changed from worse to worst.

Sharifa Hafsa takes an advantage when the hostage comes to her in the mid of the night and when she heard his voice, he wants to leave and he could not get rid of her. He wants to hide his feelings and attempts to find a plea to see her and he claims that he is looking for something" Strange! If it is not important, you may wait to the morning and look for with the maids of the palace. She said. Excuse me, my mistress for inconvenience. Anyway it does not occur what bothers your sleeping. He replied. Polite, very polite!! However what you are looking for, May be, with one of my maids. She said" (56). She recognizes well what he is in search for. Every one of them understands the other. She addresses him in an ironic tone while he wants to apologize for inconvenience, but she addresses "do you like one of them [the maids]?"

CONTRADICTION AND DUALISM IN THE LIFE OF THE HOSTAGE

The hostage could not resist the unhealthy atmosphere of the life of the palace and its sexual temptations, women and wine. One of them will lead to the other. However, he could not withstand longer, the hostage finds himself indulged into the sexual adventures with the women of the palace although he finds himself more attracted to Sharifa Hafsa. He walks on the footsteps of his friend Obady, the first duwaydar. His sexual instincts which aroused by the sexual adventures of the palace women makes him called Hafsa as Za'frana Hafsa, both are full of femininity and sexuality.

Every one is a hostage in one way or another. Sharifa Hafsa is a hostage to her traditional and social conventions which she attempts to be loyal to before the women of the palace. She loves the hostage but she could not be opened to tell about this love hidden in her heart and attempts to tease the hostage to satisfy her love and lust. Many times, Sharifa Hafsa arouses the feelings of the hostage because she always repeats "I

want to see you as a man" this is indirect request to let the hostage have an affair with her. But her pride as a woman of the palace, she does not want to expose her feelings as sometimes she is not easy to her to curb her sexual instincts and her irresistible emotions, she finds its satisfaction with the hostage . "Because I have drunk to forget Sharifa Hafsa, I stayed awake all the night and she does not leave my imagination. How she is in this moment? Does she lye on her soft bed and her femininity embodied in her soft body, reveals her places of attractions through her transparent clothes stuck to her body and her coarse voice like snake rattles moving to hit my ear" (37).

The life of the hostage becomes an incarnation of contradictions, what he cursed yesterday he would practice today. "I recognized in the fortress the cigarette is prohibited and the one who smokes considers disbeliever or atheist , although I smoked many breaths with my fellows of hostages secretly and in places will not come into the minds of our teacher, faqih, or the guards" (46). The hostage torn between what he is taught by the faqih and what he sees around him. The violation by the men and the women of the palace and what he received from the faqih has caused this sort of contradictory situation in his life. He does not realize what is prohibited and what is allowable in a community full of contradictions between what their people said and what they practiced.

The hostage himself initiates practicing the same game with sharifa Hafsa. He could not stop thinking about her: her sexual attractions. Her beautiful voice, her beautiful face and body, however, he does not want to show the symptoms of his love for her and his thinking about her sexually. He could not sleep because she has captured his attention and emotions. Further, the hostage compares Sharifa Hafsa with the female mule, Za'frana, which hit the head of Al Tabshi. Contradictions become very explicit in the lives of many characters in the novel. The hostage at the beginning of his life, he does not want to do what his friend, Obady, the other duwaydar in the palace, goes through. Obady practices all the illegal affairs with the women of the palace, then got sick and died. Later, the hostage does not hesitate to follow his friend's footsteps in such illegal work. Eventually he becomes more requested by the women of the palace when his friend becomes physically sick and sexually powerless.

Faqih of the fortress intends to teach the hostages and the prisoners Islamic teachings but he becomes in a position of suspicion with his evil looks to the hostages who came back from the palace and when they become very weird in their clothes and their appearance. Women of the place are in search of sexual satisfaction

with the hostages of the palace where the women behave openly before them as they are duwaydars who are not reach puberty. Most of the characters are called by the names of their jobs: the vice governor, duwaydar, the poet of imam, Buruzan, and al Tabshi.

The hostage dualism is turned out when he was longing for seeing the city which was in his mind very beautiful, viewing from the fortress of the hostages while he is surprised when he observes directly and it is just " a place of fatal epidemic, full of sick and crazy men, handicapped and deformed, and full of unjust rulers. It is a miserable city, extremely desperate" (55). The hostage becomes practicing many contradictory actions, what he cursed yesterday, he becomes practicing today. He could not withstand the sexual adventures of the women of the palace. He finds himself drifted by the temptations around him, he would not be able to control his passions under the roof of the corrupting palace. Everyone in the palace is a slave of his lust in one way or another. " The shackled prisoner is more comfortable than those who are released without shackles in the city, but perhaps in the whole parts of the city" (67).

Regarding his religious attitude, he was not concerned about the rituals of prayers . "I have never recognized that I have practiced the rituals of prayers freely only since I recognized Sharifa Hafsa and loved her" (67). The death of his friends and very limited number of the people care to help in carrying his body to the grave, the death of his friend has awakened and enlightened him to survive before to reach to the same fate. The men, women and his friends spent his time satisfying them, they are careless of his death. The passer-by who is in search for the reward from God helps him in carrying the body of his friend to the grave. At that moment he decides to escape from the slavery of the palace and the control of the women to breathe the freedom he was deprived of in his living in the palace. " To where you go? To the hell, ...it is not your nature- you're always good. It is before this day...take me with you. She told him. To where, he replied. to the hell. Which hell? He replied. Any hell. You will go." (85). despite his love for her but he decides to run away without her to start a new life, a way of the unhealthy atmosphere of the palace.

She jumped standing and took a stone to through against me, however, I gave rains to my legs, I went far, and I was followed by the stones thrown by her. I did not stop despite my compassion towards her. And her coarse voice lovable to me got stronger and hit my ears... I have received by the darkness of the mountains, opposing the scary valley, directing my face to the unknown future. I expect her coarse voice or a throwing stone from her to

settle on my back, but I walked sufficient distance in a new road to the future, leaving her coarse voice loved to my heart and the memories of my late friend, Buruzan, Al Tabshi whose head is hurt by the female mule and his soldiers fellows repeating: O hostage, your mother is missing you, her tears fall like rain. (88)

The hostage is distracted between his love to Sharifa Hafsa and his dream of freedom, from the absurdity of the palace and its women. He decides to leave his passion and continues in his freedom road despite the darkness that overwhelmed his future.

CONCLUSION

The Hostage managed to reveal to the reader the hidden part of the lives of the palace and how they make use of everything around them for their interest. Dammaj in *The Hostage* would like to let the reader be familiar with the corruption that the lives of the palace are encompassed by. They work to ignore the identity and the personality of the hostages by addressing them with different names that certainly do not involve with their identity as they show their works that uncover their subjugation to the new life in the palace. They initiate a new identity for the hostages who are in the innocent days of their children and suddenly find themselves living with adults who recognize nothing but how to go through their sexual instincts satisfaction even if they come against their religion or ethics or even their social conventions. The hostage finds himself powerless and go through very hard experiences in varied aspects of his personality whether, psychologically, physically, religiously and socially.

The hostage lives a part of the lives of the palace which are full with contradiction and dualism. The hostage becomes a part of this contradiction and dualism, however, the death of his friend, Obady, awakes him from that long sleep in absurdity and nothingness. He is treated as an object form the people of the palace, when he attempts to stop the driver to have a look to the women in the car he shouts at him and the driver gets angry how a duwaydar dares giving himself the right to shout at him or stop him from looking to the women of the palace. The look of community to the hostage or the duwaydar is a miserable look that overwhelmed with contempt and carelessness.

The article found that the lives of the hostages are miserable in the palace and they are hopeless and helpless to change their daily lives inside the corridors of the palace, their identity is transformed intentionally by the men and women of the palace to be weak and obedient to their illegitimate demands. The hostage , the narrator of the story is indulged into such illegal works

and sexual adventures with the woman of the palace. Many sides of his personality have been changed to the worse but his faith in changing his situation remains a hope waiting for a better chance. However, his friend's death awakens his hope to listen to his inner voice to escape and initiate a new life, even if this new life is encompassed with scare and unknown future. Definitely this blurred future would not be worse than the life of the palace which is marked with corruption and absurdity.

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RURAL WOMEN AND SUSTAINABLE DEVELOPMENT: UNLOCKING CAPACITY BUILDING FOR POVERTY ALLEVIATION IN OHAJI/EGBEMA LOCAL GOVERNMENT AREA IN IMO STATE, NIGERIA

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ABSTRACT

This study looked at ways of unlocking the capacity of rural woman for poverty alleviation. The study was carried out in Ohaji/Egbema Local Government Area, Imo State which is made up of 16 autonomous communities and 131 villages. Eight out of 33 villages in the four autonomous communities randomly selected constitute the sample frame. The study drew a sample of 180 rural women which were selected through a multi-stage sampling technique and the data obtained through questionnaire. Interviews were conducted on women organizations engaged in community development initiatives. For the data analysis, descriptive statistics were used. The results of the findings include among others; that rural women lack a balanced knowledge of what sustainable development stood for. Recommendations include among others; the promotion of entrepreneurship among rural women; the capacity of women in Ohaji/Egbema area be built in functional areas such as empowerment in literacy areas, economic empowerment(financial freedom, marketing and production capabilities), environmental management, empowerment in democratic participation, access to justice and legal rights and managerial skills at all levels.

KEYWORDS: rural women, sustainable development, capacity building, poverty alleviation.

INTRODCUTION

Rural women as powerful catalysts for sustainable development and agents against poverty are incontrovertible (United Nations, 2012). The centrality of rural women to socio-economic wellbeing has been recognized as they actively support their households and communities in achieving food security and nutrition, generate income (from farm and non-farm activities), maintain bio-diversity and preserve traditional norms and knowledge. Findings from Food and Agricultural developing world, show that rural women represent approximately 43 percent of the agricultural labour force. With reference to Nigeria, rural women constitute 49.6 percent of the total population and are responsible for 60-80 percent of the food produced in the country to the additional traditional reproductive and community management (Jiggins, Olawoye, & Samata, 1997 in Oladapo, 2014).

Despite the acknowledged roles played by rural women, the conditions under which they have been participating in the development process have not been adequate. Rural women are faced with poverty, underemployment and often lack access to economy and other resources and opportunities to improve their qualities of lives and thus participate effectively in sustainable development (Grown & Sen, 1984, Dreze & Sen 1999 cited in Modi, 2012). Sustainable development according to World Commission in Environment and Development (1987) is a development that meets the needs of the present

without compromising the ability of future generations to meet their own needs. This implies that sustainable development emphasizes the creation of an enduring quality of life of people through increase in real income per capita, improvement in health and improvement in quality of natural and environmental resources. The full integration of rural women in the process and practice of sustainable development would strongly determine the level of success or failure (World Watch Institute, 2013). Gleaning from the above realities, it has become imperative to build the capacity of rural women in order to enhance their physical and intellectual energies in promoting sustainable development and poverty alleviation. The concept of capacity building entails the development of knowledge, skills and attitudes in individuals and groups of people relevant in the development and maintenance of institutional and operational infrastructure and processes that are locally meaningful (Groot & Molen, 2001). In developing countries, there has been plethora of works that x-rayed the relationship between capacity building of rural women and poverty alleviation. Such scholarly work like Konrad-Adenauer- Stiftung, SHDF (Self Help Development Foundation of Zimbabwe) (2008-2011) examined capacity building and poverty alleviation of marginalized rural women in Zimbabwe. The study showed that a total of 2,160 female leaders acquired skill necessary to advocate and lobby for improved local and regional policy frameworks permitting poor rural

families to pursue income generating activities and achieve higher living standard. Equally the study revealed that the SHDF has strengthened its internal democratic participation into its standard programmes, thereby becoming a key player in lobbying for the rights of rural women on the local, regional and national levels. Similarly, a United Nation’s expert panel on the theme “Key policy initiatives and capacity building on gender mainstreaming: focus in economic empowerment of rural women” showed that rural women’s economic empowerment need to be created as a matter of urgency, by placing their concerns in the mainstream economic agenda, particularly in the areas of agriculture, finance and national planning. The expert discussions specifically identified granting micro credit scheme with no collateral and low interest rates as a successful way of increasing rural women’s access to credit. Access to crop and health insurance is also important capacity building areas for rural women, especially for women small-holder farmers (United Nations Commission on the Status of Women, 2012).

Rural women need capacity building in functional areas such as improvement in literacy/educational skills, economic empowerment, environmental management, managerial skills and political empowerment to fight against poverty. This study is therefore aimed at evaluating the nexus between rural women and sustainable development with the aim of building their capacity for poverty alleviation in Ohaji/Egbema in Imo State, Nigeria. However, the specific objectives are to:

- i) Identify rural women’s perception about sustainable development.
- ii) Examine the challenges facing rural women in achieving sustainable development.
- iii) Identify agents involved in capacity building of rural women.
- iv) Identify aspects of capacity building of rural women aimed at poverty alleviation.

METHODOLOGY

This study was carried out in Ohaji/Egbema L.G.A, Imo State which is made up of 16 autonomous communities and 131 villages. The people are predominantly farmers most of whom are women. Crops commonly cultivated include: cassava, yam, coco-yam, plantain, pineapple, maize, vegetables as well as harvesting and processing of palm oil and kernel. They also engage in non-farm activities. Fishing activities as well as livestock farming (of goats) is also prevalent in the area. Ohaji/Egbema is also an oil-producing area. The multi-stage sampling technique was adopted and four autonomous communities (Umuagwo, Obosima, Asaa and Egbema) were randomly selected. Eight out of 33 villages in the four autonomous communities constitute the sample frame. A simple random Sampling of 25 respondents

(rural women) was carried out in each village giving a total of 200 respondents but only 180 copies of the questionnaire were fit to be used for analysis. Data were collected using a well-structured questionnaire. Also interviews were conducted purposively using members of women organizations engaged in community development initiatives. Data gathered were analyzed using descriptive statistics.

RESULTS AND DISCUSSIONS

Table 1 tested respondents’ perception of rural women on sustainable development. Majority represented by 95.6% believed sustainable development helps to improve living standard and alleviate poverty. This is followed by, to foster the socio-economic well-being of children (89.4%); giving rural women chance to participate in development (76.7%); to reduce uneven urban and rural development (41.7%) while the least is to preserve the environment (38.9%). This finding clearly shows that perception of rural women on sustainable development hinges prominently on improvement of the socio-economic well-being of women as well as the future of their children. This finding concurs with that done by Parven and Leohauser (2012) in Amiri and Panah (2014) that poverty is prevalent among rural women and hence, their priority on sustainable development is toward poverty alleviation. The low response rate on preserving the environment showed that rural women have limited knowledge on the nexus between the environment and sustainable development. From the interview conducted, environmental conservation is the least of worries of most rural women as seen in their felling of trees for cooking due to high cost of conventional cooking source of fuel like gas, kerosene etc. Also bush burning remains their best options for clearing land for agricultural purpose. It is therefore important to highlight the environmental mix of sustainable development to the rural women and not only the social and economic angle.

Table 1: Perceptions of rural women on sustainable development.

Perceptions	Frequency	Percentage
To foster the socio-economic	161	89.4
To preserve the environment	70	38.9
To improve living standard/poverty alleviation.	172	95.6
Give rural women chance to participate in development	138	76.7
To reduce uneven urban – rural development	75	41.7

❖ Multiple responses recorded

Table 2 below shows the challenges facing rural women in contributing to achieving sustainable development. More than 70% of the respondents identified poverty,

lack of economic resources (credit, land and commercial market outlets) and lack of education while more than 40% identified lack of political/democratic participation and lack of access to healthcare. Further findings from the interview revealed that rural women lack the right to control their income and investments, lack access to information, network and face government policies and legislations that do not recognize the role of rural women in sustainable development. This result agrees with the report by the United Nations (2012) and Dreze and Sen (1999) in Modi (2012) who found out same. This implies that any honest call about sustainable development should first tackle these structurally placed conditions in the society that deprive rural women opportunities to participate.

Table 2: Challenges facing rural women in achieving sustainable development.

Challenges	Frequency	Percentage
Lack of education	138	77.8
Lack of access to healthcare	85	47.2
Lack of economic resources (credit, land, commercial market outlets etc).	141	78.3
Poverty	142	78.8
Lack of political/Democratic participation	89	49.4

❖ Multiple responses recorded

Table 3 below showed the agents involved in capacity building of rural women. The women organizations had the highest response rate of 79.4%; followed by government with 69.4%. Churches had 66.7%, private individuals had 47.2% while the NGOs had the least with 38.9%. This result indicated the centrality of women organization at steering their lives and drawing from their mental and material resources towards improving their socio-economic well-being. They have indeed empowered rural women especially in vocational training and promotion of entrepreneurship through thrift and cooperative initiatives. The least involvement of NGOs in capacity building is however worrying owing to their knowledge and high expertise especially on issues relating to empowerment of rural communities.

Table 3: Agents involved in capacity building of rural women.

Agents	Frequency	Percentage
Women organizations	143	79.4
Government	125	69.4
NOGs	70	38.9
Private individuals	85	47.2
Churches	120	66.7

❖ Multiple responses recorded

Table 4 below tested areas of capacity building of rural women aimed at poverty alleviation. Economic

empowerment via: entrepreneurial training, access to finance through micro finance, cooperatives and thrifts had the highest response rate of 78.3% and 76.7 % respectively. This was followed by reproductive health with 73.9%, management skills and information networking by agricultural extension agents had 44.4% and 41.6% respectively, while democratic participation, literacy skills/education and environmental management/conservation had the least scores of 36.1%, 34.4% and 33.3% respectively.

Further revelation from the interview conducted showed that most rural women in the study area have been empowered economically in skill acquisition like soap making, bead making, tailoring, hair dressing and confectionaries. These women also explained that they receive finance (credit) usually from micro-finance scheme, women cooperatives and thrift scheme to fully transform these skills into viable income generating activities for their households. Apart from these non-farm economic activities, entrepreneurial training was also given to women farmers by agric extension agents on relevant agricultural technologies and information to boost their economic viability. Also the high premium placed on healthcare as a capacity building strategy showed that the fight for poverty alleviation is strongly correlated to women's reproductive health. Those interviewed asserted they have acquired reproductive health knowledge that discourage early child bearing, and unintended pregnancy. To this end, having a small family size they can cater for is one of the steps to alleviating poverty and giving a better future to their children. Although, the women noted that their husbands are big hurdle in achieving this feat. In the final analysis, the economic empowerment of rural women is central and links other sectors of their capacity building endeavours.

Table 4: Areas of capacity building of rural women aimed at poverty alleviation.

Areas	Frequency	Percentage
Literacy skills/education	62	34.4
Environmental Management / conservation	60	33.3
Managerial skills	80	44.4
Reproductive Health	133	73.9
Democratic participation	65	36.1
Economic empowerment:		
a) Access to finance through micro-finance scheme, co-operatives and thrifts,	138	76.7
b) Entrepreneurial skills	141	78.3
c) Information networking by agric extension agents	75	41.6

❖ Multiple responses recorded

CONCLUSION AND RECOMMENDATIONS

Rural women are catalysts for sustainable development and fight against poverty. This study has revealed that

rural women's perception on sustainable development hinges mainly on their socio-economic wellbeing and that of their children's future. To this end, rural women lack a balanced knowledge of what sustainable development stood for. Issue like environmental management/conservation is seen as secondary. The study further revealed that the conditions under which rural women have been participating in the development process are beset with serious challenges, such as lack of economic resources, health care, education, political participation among others which has kept them in the vicious circle of poverty. To this end, capacity, building of rural women in functional areas like economic empowerment, management skills, reproductive health, literacy skill / education etc should be the key to achieving sustainable development and poverty alleviation. This work is therefore relevant as it identifies (i) women as viable agents of sustainable development; (ii) women as those who consider sustainable development as socio-economic. This study therefore recommends the following:

- (1) The capacity of women in Ohaji/Egbema area be built in functional areas such as empowerment in literacy, economic empowerment (financial freedom, marketing and production capabilities), environmental management, empowerment in democratic participation, access to justice and legal rights and managerial skills at all level.
- (2) The government and advocacy groups should embark on serious enlightenment of the rural women on what sustainable development really stands for (the mix of socio-economic well being and environmental management).
- (3) There should be the integration of rural women's traditional knowledge and practices of sustainable resources use and conservation in the development of environmental management and extension programmes.
- (4) Government should create genial socio-economic and political environment that allow rural women's full and equal participation in sustainable development and fight against poverty.
- (5) There should be the promotion of entrepreneurship among rural women in order to build their capacity to joining the economic mainstream. These measures should include:
 - (a) Giving soft loans/grants to women farmers to enable them acquire land and other agricultural inputs.
 - (b) For those engaged in non-farm economic activities loans should be given to enable them increase their production and turnover.
 - (c) Empowering women in modern business administration through adult education programmes.

- (6) Counseling units should be provided in the communities where issues affecting their social, economic and environmental concerns are handled professionally by psychologists, committed NGOs, managerial experts, environmentalist and agricultural extension workers.

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CHRISTIAN RELIGION AS TOOL FOR WOMEN EMPOWERMENT IN NIGERIA

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ABSTRACT

This paper looked at Christian religion as tool for women empowerment in Nigeria. The study found that Christian religion serves as a tool for empowering women in the society. Empowerment was seen as the process of enabling or authorizing the individual to think, take action and control work in an autonomous way. It was seen as the process by which one can gain control over one's destiny and the circumstances of ones lives. Empowerment includes control over resources (physical, human, intellectual and financial) and over ideology (beliefs, values and attitudes). The church was discovered to have helped in so many ways by giving money to women for businesses through micro credit scheme and others. It was recommended that the churches should strengthen their tie of relationship with the society especially in area of family upbringing and economic empowerment of women

KEYWORDS: capacity building, health promotion program, university community, health seminars, community services, sustainable development.

INTRODCUTION

Christianity centers on the person and teachings of Jesus of Nazareth, a Jew who lived in first century C.E. Palestine. Christians believe Jesus is the Christ, or the one promised by God in the prophecies of the Hebrew Bible. Through his life, death and resurrection, he is believed to have freed human beings from their sinful state and made them recipients of God's saving grace. During Jesus lifetime and in the generation after his death, Christianity was marked by egalitarianism in both its teachings and its institutional structures. Transcending the established norms of his own culture, Jesus openly and frequently affirmed women's worthiness and included them in his community of disciples. After his death women were prominent in leading the emerging church as apostles, deacons and prophets. Since baptism, rather than circumcision, became the primary rite of initiation, women became full members of the community and were given the same rights and duties as men (Gross, 1993).

Such egalitarianism, however, was gradually replaced with patriarchal institutional structures after Christianity spread through the Mediterranean world in the 2nd century C.E. and then, two centuries later; it became the official religion of the Roman Empire. Such changes in structure were accompanied by a theology which identified the patriarchal social order with the divinely created order and thus insisted that the proper relationship between men and women was one in which men ruled and women were obedient. While such structures were to dominate most of Christianity for the rest of its history, egalitarian structures and theologies would re-emerge time after time in minority renewal

movements. Even in the patristic and medieval Church, proponents of the egalitarian core did not vanish. The egalitarian vision and institutional structures survived in modified forms in monastic movements, especially in women's monasticism. While the most powerful traditions in the Protestant Reformation continued the theology of subordination, sectors of the radical reformation sought to restore the New Testament church and its vision of equality between men and women.

CONCEPT OF WOMEN EMPOWERMENT

Empowerment can be viewed as means of creating a social environment in which one can make decisions and make choices either individually or collectively for social transformation. It strengthens the innate ability by way of acquiring knowledge, power and experience (Hashemi Schuler & Riley, 1996). Empowerment is the process of enabling or authorizing the individual to think, take action and control work in an autonomous way. It is the process by which one can gain control over one's destiny and the circumstances of ones lives. Empowerment includes control over resources (physical, human, intellectual and financial) and over ideology (beliefs, values and attitudes). (Kishore, 2008). It is not merely a feel of greater extrinsic control, but also grows intrinsic capacity, greater self-confidence and an internal transformation of one's consciousness that enables one to overcome external barriers to accessing resources or changing traditional ideology (Pinto, 2001).

A distinct vagueness and subjectivity is in-built into this concept as it goes beyond the material well being of

women, the latter being only as one of the outcomes of the lengthy process of empowerment. To understand the doings and beings of women, researchers have resorted to various interrelated concepts like, autonomy, agency and well-being. Most of the works on women's empowerment start with: 'it is important to clarify what is implied by empowerment in this article', clearly reflecting the deferring views on empowerment (Kabeer, 2005). Different scholars hold different definition of empowerment according to the need of their work. In fact many of them value it because of its fuzziness, which gives them breathing space to work it out in action (Alkire, 2007).

Women's empowerment is very essential for the development of society. Empowerment means individuals acquiring the power to think and act freely, exercises choice and fulfill their potential as full and equal members of society. As per the United National Development Fund for women (UNIFEM), the term women's empowerment means:

- Acquiring knowledge and understanding of gender relations and the ways in which these relations may be changed.
- Developing a sense of self-worth, a belief in one's ability to secure desired changes and the right to control one's life.
- Gaining the ability to generate choices exercise bargaining power.
- Developing the ability to organize and influence the direction of social change, to create a more just social and economic order, nationally and internationally.

Thus, empowerment means a psychological sense of personal control or influence and a concern with actual social influence, political power and legal rights. It is a multi level construct referring to individuals, organizations and community. It is an international, ongoing process centered in the local community, involving mutual respect, critical reflection, caring and group participation, through which people lacking an equal share of valued resources gain greater access to the control over these resources. The church as an institution has been very instrumental in the empowerment of women financially, economically, psychologically and morally. Many churches today render loan scheme to women even without interest. Many widows have been empowered through this medium. Most times, they are given money ranging from ₦50, 000, ₦100, 000 or ₦200, 000 and are made to pay back the capital after twelve calendar months without any interest. Some Roman Catholic, Anglican and new generation priests and pastors buy sewing machines, grinding machines among others and give to

some of their dedicated church members as a way of empowering them economically.

Women's empowerment is a flow rather than a stock variable manifesting into various outcomes and well being is a necessary but not sufficient condition for the former, i.e. well-being going through various pathways like gaining resources, autonomy and agency. These pathways denote expansion in capabilities in a way which brings changes in the lives of individuals; people who are previously denied power are now being empowered. Kabeer (2005) defines it as a process by which those who have been denied the ability to make choices acquire such ability. The elements required in enabling one to gain power, authority and influence over others, institutions or society may be listed as follows:

- decision-making power of one's own;
- access to information and resources for taking proper decision;
- availability of a range of options from which choices can be made (not just yes/no, either/or);
- ability to exercise assertiveness in collective decision making;
- positive thinking on the ability to make change;
- ability to learn skills for improving one's personal or group power;
- ability to change others' perceptions by democratic means;
- involvement in the growth process and changes that is never ending and self-initiated;
- increasing one's positive self-image and overcoming stigma; and
- increasing ones' ability in discreet thinking to sort out right and wrong.

Women as Fully and Equally Human

Those Christians who contend that Christianity has an egalitarian core insist that their position is most authoritative because it represents the earliest tradition within Christianity. Thus while the theology of subordination remained dominant through out most of history, those pointing to Christianity's egalitarian core insist that such a theology is in direct contradiction to Jesus own proclamation and the writings which can be authentically traced to the apostle Paul. The understanding of women's subordination to men, they claim emerged only in texts which, while attributed to Paul, were actually written after his death.

Three main texts form the core of the egalitarian tradition within Christianity: Galatians 3:28; Genesis 1:1-2:4, and Acts 2:1-18. Galatians 3:28 is actually an early baptismal formula quoted by Paul in his letter to the churches of Galatia. Often called the Magna Carta of

Christian liberty, Galatians deals primarily with the question of whether Gentiles must become Jews (through circumcision and obedience to the Law) before they can become Christians.

In answering no, Paul provides insight into early Christian views of women's status in Christianity. By using the baptismal formula, there is no longer Jew or Greek, there is no longer slave or free, there is no longer male and female. Paul affirms that not only Gentiles, but also slaves and women become full and equal members of the community through baptism, the primary rite of initiation.

Genesis 1:1-2:4, the first of two accounts of human creation found in the Bible, demonstrates that women and men were originally created equal. In this creation story, since men and women are made in the image of God and share the same human nature, they are equal. Some opponents of egalitarianism appeal to the doctrine of the fall to insist that while Adam and Eve may have been created equal, they became unequal after their fall from God's grace. Proponents of the egalitarian core, respond in two ways to such objections. Some concede that after the fall, women did indeed become subject to men. Nevertheless, because in Christ's resurrection, the vision of the original creation is restored, men and women are once again equal partners in the world.

Others, however, insist that the announcement of Eve's subjugation to Adam after their departure from the garden was not a punishment for their sin, but God's prediction of what life outside of God's order would be like. Put another way, women's subordination to men is the inevitable consequence, not God's punishment, of human sinfulness and rebellion against God's original plan for humanity. Thus the emergence of male domination is not a prescription by which humanity is to live, but rather a description of the inevitable consequences of a life lived in disharmony with God's will.

The story of Pentecost (Acts 2:1-21), in which Jesus' followers received the Holy Spirit, demonstrates that both men and women received the gift of prophecy in the early church. Prophecy was possible only when a believer was filled by God's Holy Spirit, and became the primary means by which the risen Christ communicated with the early Christians. At Pentecost, God pours the Holy Spirit on all of humankind, the young and the old, the sons and the daughters, and both male and female slaves. Later in Acts, Luke also specifically mentions the four daughters of Philip as renowned Christian prophets (Acts 21:9). While Paul does admonish women to exercise their gifts of prophecy and their liturgical gifts properly, he nevertheless assumes that women

engage in such activities. The inclusion of women in prophecy is no small matter since Paul himself lists prophets after apostles in the hierarchy of spiritual gifts.

Lastly, proponents of the egalitarian core look to Jesus own actions and words to bolster their claim that the egalitarian tradition is the earliest and most authoritative. The lack of any Gospel texts which justify women's subordination to men indicates that Jesus did not endorse women's subordination. Indeed, in contrast to cultural expectations, Jesus' actions appear to affirm that he saw women as his equals. In addition to affirming women's right to study alongside his male disciples (Luke 10:38-42), in the Gospel of John, Jesus reveals his identity as the Messiah to both women and men alike.

Religion and Rights of Women

Historically, much of the oppression women have faced came as a result of policies within churches and organized religion. Forced marriage, oppressive ideas about sexuality, quashing of rights to speak, and lack of stake in family and church leadership are all issues women have faced through the centuries. On the other hand, research in recent decades has shown that women who are involved in religion report higher levels of happiness. Researchers could examine this dichotomy to discover core values held by women who choose to affiliate with a religion and those who do not. Researches could look at what specifically and indirectly makes women happier when their lives are tied to religious beliefs and settings (Sharma, 1987). They could also look at how much religious oppression colours women's views about religion in the present day and whether it affects their choice to be or not to be religious.

While religion can be oppressive to individual and gender rights, religions have also helped to pave the way for social changes and civil rights. The Christian Apostle Paul wrote that "... women should remain silent in the churches. They are not allowed to speak, but must be in submission, as the law says" (1 Corinthians 14:34), but also made the point that there is no "male nor female, for you are all one in Christ Jesus" (Galatians 3:28) and instructed husbands and wives to have mutual care for each other. The Christian church's prohibition against divorce, which may have bound women into marriages against their will, was also designed to protect women from finding themselves cast out of a home. The Protestant Reformation helped change paradigms about views of women by first emphasizing the value of the individual, and his or her own value in the eyes of God, a key underlying idea to the exploration of human rights. Hence, the church is a means not only to building peaceful homes but,

empowering the home especially women economically and educationally.

Religion and Societal Development

If they are to play a genuine role in the building up of society, creative and original ways must be found in order to achieve a healthy and humane balance between professional life and family life for women. In most cases nowadays women and men have to combine family life and work. I think it is important here to overcome the contradictions found in societies that are organized on the basis of criteria of practicality and efficiency and therefore have family policies that do not support and protect working mothers (Siena, 2006). In this sense, the Social Doctrine of the Church can offer principles to help the laity support actions and initiatives that advance women and men in the field of work in respect for personal dignity and mission within the family.

Specifically in Nigeria, the commitment of the Church to the dignity and vocation of women in the sphere of the evangelization of culture is particularly appreciated. Nigeria is a multi-cultural society made up of many tribes and languages. In our globalized world, Nigeria has become in a special way an arena of agreements and clashes between traditional African cultures and Western postmodern culture where basic values like family and marriage are questioned.

Despite the misunderstanding between traditional African cultures and the Christian mission, the dignity and importance of the Nigerian woman cannot be overemphasized. Today, a common slogan in our communities, particularly among women circles which I consider relevant to this discourse is:

woman talks to woman, woman understands!
educate a woman, you educate a nation!
empower a woman, you empower a nation!

It therefore follows, in my opinion, that for any meaningful development to take place in any nation, an all round development of women is not negotiable. The above slogan vividly captures the role of the Christian religion in giving back to the society via women's empowerment.

CONCLUSION

The Christian religion is an important institution of social development not only in the empowerment of women but in the overall growth and development of the Nigerian economy. Churches today create job opportunities and also empower their members especially women economically. The church teaches morality and prudence in management of finance both at private level and government circle. It also serves as source of encouragement to women in society. It is

expedient therefore that the church be given special recognition by the Federal Government of Nigeria and other well meaning individuals for its contributions to the development of the nation.

RECOMMENDATION

While commending the church in Nigeria for the giant strides in enhancing the dignity of womanhood, it is recommended in this paper that:

1. Each religious organization in the country should endeavour to strengthen its ties of relationship in the building and cementing of good family upbringing especially in preaching peace and togetherness as it relates to women empowerment.
2. The churches should be encouraged to increase their corporate responsibility of developing the society through empowerment especially of women for rapid economic advancement.
3. All restrictions hindering the full humanization of the Nigerian woman should be eradicated.
4. Government should create the enabling environment for women to actively participate in politics. The 35% affirmation in favour of women in the Goodluck Jonathan led Federal Government though commendable, should be reviewed upwards to reflect parity.

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SEMANTIC RELATIONSHIP BETWEEN THE HAUSA LEXICAL ITEMS

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ABSTRACT

The information of a predicate for instance may be apprehended and distributed over three levels of structure viz: LC- structure, Th-structure and L-structure, this could only be determined by the syntactic structure of a verb. This paper is determined to discuss the different linking and non-morpholexical alternation, i.e. linking is the association of two or more pieces of information by principles of a grammar. While thematic linking is understood as the licensing, in virtue of case, argument, or position, on the association of Th-roles to arguments at a level of lexical structure. The paper posits also to discuss the different types of morpholexical and non-morpholexical alternations in Hausa, but those that are relevant for the purpose of this discussion are two main operations, namely addition of an argument or suppression. Addition can either be at LC-structure or Th-structure like applicative and causative constructions, morpholexical versus phonology, the role of morphology in Direct Linking Theory DLT, idioms and lexicalized phrases, opaque lexicalized phrases or compounding, composition of Hausa idioms, idioms and proverbs which are subjected to the “conceptual structures” theoretical framework.

KEYWORDS: LC- structure, Th-structure, L-structure, Th-roles, DLT and –r and –n linkers.

INTRODUCTION

Recent work in morphology has been concerned exclusively with the composition of complex names for concepts-that is, the structural side of morphology. This dissociation of “form” from “meaning” was foreshadowed by Aronoff’s (1976) demonstrating that morphemes are not necessarily associated with a constant meaning-or any meaning at all-and that their nature is basically structural. Although, in early generative treatments of word formation, semantic operations accompanied formal morphological operations (as in Aronoff’s Word formation Rules), many subsequent generative theories of morphology, following Lieber (1980), explicitly dissociate the lexical semantic operations of composition, from the formal structural operations of composition, focusing entirely on the latter. Carstairs-McCarthy (1992), following Corbin (1990), calls such theories “dissociation” theories of morphology, while Beard (1990) calls them “Separationist”.

THEORETICAL FRAMEWORK

In the semantic analysis of derived verbs in this article, we will use the theory of lexical conceptual semantics developed by Jackendoff (1983, 1990, and 1991). The reason for adopting this framework is that it is particularly useful for the description of the semantics of verbs in general and the analysis of verbal derivation in particular (e.g. Lieber and Baayen 1993, Lieber 1996). The claim of the theory is:

The theory of lexical conceptual structure as developed by Jackendoff assumes that there is a form of mental representation, so-called ‘Conceptual structures’ that is common to all languages and that serves as the ‘syntax of thought’. These conceptual structures can be described in terms of semantic primitives on the one hand and principles according to which these primitives can be contained on the other. The primitives of the theory are at least major conceptual categories such as Thing, Event, State, Property, Path, or Place which are combined by functions that operate on these primitives. Verbal meanings for example can be represented by hierarchically organized structures containing semantic functions like GO, CAUSE, TO, and argument on which these functions operate (see Jackendoff 1991:10-13).

Linking and Non-Morpholexical Alternations

Linking is the association of two or more pieces of information by principles of a grammar. Thematic linking is understood as the licensing, in virtue of case, argument, or position, on the association of Th-roles to arguments at a level of lexical structure. The information of a predicate for example may be distributed over three levels of structure: LC-structure, Th-structure and L-structure (Kiparsky 1987:46).

There are many types of morpholexical and non-morpholexical alternations in Hausa but those that are relevant for the purpose of this discussion are two main operations, namely addition of an argument or suppression. Addition can be either at LC-structure or Th-structure like applicative and causative constructions. We have seen that in applicative constructions as by definition it promotes the lexically demoted θ -role. For instance consider the following sentence as:

1. Abdù yaa aikà wasifkàa gà Bintà.

|
|
|
Ag
Th.
Go[^]

In 1 the Go is demoted in the first place by semantic linker 'ga' and also demoted because of the hierarchical structure of θ -role. By applicative function, the sentence looks like this:

2. Abdù yaa aikà wà Bintà wasifkàa.

|
|
|
Ag
Go
Th.
|
|
|
Subj
Obj1
Obj2.

1.2.0 Causative: It introduces the highest θ -role. For instance;

3. Yaaroo yaa zaunaa.

|
Ag

And if we change the structure of the sentence into causative it will look like this:

4. Uwaa taa zaun[ar dà] yaaroo.

|
|
Ag
Th.

5. Uwaa taa shaayar dà jàariirii noonò.

|
|
|
Ag
Go
Th
|
|
|
Subj.
Obj¹
Obj²

According to DLT, an affix may have its own Th-structure whose Th-role is combined with the Th-role of the stem to form a new composite predicate. This is lexically what the causative morpheme -ar (dà) does. The morpheme simply sanctions the addition of an extra role without specifying its syntactic content. This is determined by the syntactic structure of the verb. In causatives however, the added argument is accompanied by the specification of the meaning of causation in the syntactic-semantic structure. Now the question to be addressed is that, to what extent do morphological and non-morphological alternations differ, and how could we account for such two types of alternations? Another important question which as far as we know has been totally neglected in the study of grammatical relation is why are meanings such as, causation, volitionality, animacy, change of state, delimitedness e.t.c. entered into the determination of meanings but not grammatical

functions such as number, size, sex, colour, weather of the day, personality e.t.c.? The possible hypothesis is that only those syntactic arguments which are associated with syntactic arguments may determine the selection of grammatical functions.

Morpholexical Versus Phonology

If the combination of meanings that could be expressed morpholexically is already expressed lexically, the morpholexical process will not usually apply (this is called the phenomenon of blocking as a result of language or culture i.e. morphological blockages (see Aronoff, 1976, Kiparsky, 1988 and Fagge, 2005). For instance in Hausa, the fact that the word *barawo* "thief" already exists blocks the formation of "*masaciya*" from the verb stem *sata* to steal through the attachment of productive agential prefix *ma-* on the stem. Likewise the word *mahauci* meaning 'meat seller' also blocks the formation of **mafawiya* 'meat seller' from the noun '*fawa*' selling meat' for similar reasons. Similarly, since English has a lexical preservative for 'freeze', which is *thaw*, the formation **unfreeze* is unnecessary, and indeed not possible.

That is to say in other words, there cannot be a language which has both morpholexical and lexical forms for the same thing. Consider the following monosyllabic verbs:

- (6). So → love / like
- (7). *Soyu → to mean love / like?
- (8). Ki → hatred / dislike
- (9). *Kiyu →

The Role of Morphology in Direct Linking Theory (DLT)

According to Kiparsky (1990:26), relation changes affixes (and function words such as clitic) may combine with a predicate at L-structure if the phonology and morphology so dictate. In such case, an affix or clitic may affect argument structure in one of the following ways: According to DLT, an affix may have its own Th-structure whose Th-roles combine with the stem to form a new composite predicate. This is exactly what the causative morpheme -ar (+da) does in sentences like:

- (10). Binta ta kwantar da jariri.
(Binta she lain the baby)*
Binta had laid the baby on the floor
- (11). Bala ya sayar da gidansa jiya.
(Bala he sold with house him yesterday)*
Bala has sold his house yesterday.

From the above sentences (10 and 11) one would realize that the causative verb -ar + da grammatically collocates with the subject and object *Binta* and *Bala* on one hand and *jariri* and *gida* on the other respectively as the case may be.

Idioms and Compound Nouns

An idiom is a common form of expression whose meaning can not be deduced by understanding the individual words on the sequence alone. Crystal (2008:236) stresses that, "Idiom is a group of words which have special connotation not usually equal to the sum of meanings of the individual word and which usually cannot be translated literally into another language without the special meaning being lost". Take for instance:

- (12). Ya fasa kwai.
*He (MS) breaks (Trns. VB) egg Nn).
He spills the beans.

Ahmad (1985) asserts that, two or more words that are indivisible in a sentence structure are called compound noun. Thus, compound noun and idiomatic expressions their component parts do not function independently, but rather as a unit. For instance the following examples in English by Ahmad:

- (13). *Put out*: (a) John put out the fire.
(b) John put the fire out.

At the L-structure, there is no any dichotomy in terms meaning, hence the LC-structure are same. Consider other examples in Hausa as in:

- (14a). Adamu ya yi azumin-Jemage.
b. Adamu yana da cin-zanzana.

From the above sentences, one would realize that (14a) is describing Adamu as one who does not eat in the day time but rather one who eats in the night only. While in (14b) Adamu has natural marks like dots on his face. Other compound nouns include:

Words	Gloss
(15a). Girman-kai.	'arrogancy'
b. Barkonon-tsohuwa.	'tear-gas'
c. Cin-hanci.	'bribery'
d. Cin-fiska.	'embarrassment/slap to someone else'
e. Baccin-zomo.	'vigilant/one eye open while asleep'

Opaque or Compounding

Opaque simply mean compound words that is visible but indivisible. In the same vein Crystal (2008:339) refers it to a set of CONDITIONS specifying the grammatical CONTEXTS in which an expression cannot be free. Opaque or intentional context is one in which the substitution of CO-REFERENTIAL terms potentially results in a change of TRUTH VALUE. For instance, indivisible words in Hausa include:

Word	Gloss
(16a) Farin-ciki.	'excitement/joy/happiness'
b. Bakar-magana.	'unguided remarks/utterance'
c. Bakar-aniya e.t.c.	'bad manner/intention' e.t.c.

Composition of Hausa Idioms

The question is what is the composition of compounding? Wood (1983) maintains that idiom is a

complex expression which is wholly non-compositional in meaning and non-productive in form. Another question is do we accept that idiom is non-compositional and non-productive in terms of meaning? In Hausa it is confirmed that idioms are non-compositional and non-productive in terms of meaning and in terms of form. Do we accept that lexicalized phrases are non-compositional and non-productive in terms of meaning? Here we have accepted that lexicalized phrases are compositional by looking at their primary senses. Take for instance:

Word	Gloss
(17a) Rigar-ruwa	'rain coat'
b. Rigar-kaba	'a shirt made up of a sharp grasses' (description)
c. Ciwon-kai	'headache/trouble/problem' e.t.c

Another important question is that, do we accept that lexicalized phrases are non-productive in form? Here, we would like to emphasize that some lexicalized phrases are productive while some are not. Or in other word, some phrases are fossilized while others are not (Crystal 2008:197). Consider the following examples below:

Word	Gloss
(18a) Fitsarin-gwaur	'bruises that usually inflames on one's knee'
b. Dan-sanda.	'Police man'
c. Gyadar-Dogo	'luck' e.t.c.

One would realize that, all the above mentioned lexemes are said to be non-productive because one can never take the urine of a married person and later on divorce his wife as in (18a) to mean '*fitsarin-sakakkiyar mace*' to refer to what is in the gloss. Likewise, semantically *dan-sanda* can never mean '*small stick*' even if it is derogatory nor '*babbar-sanda*' to mean a 'Policeman'. This is because both '*babban and dan*' here, is implying to size of the stick, instead of making a direct reference to the noun (person type noun/profession). While in the same vein, some of the lexicalized phrases are said to be productive if one considers the *da-*, *'ya-*, *ba-*, *ruwa-* and *aboki-* plus either of the genitival linkers *+n* or *+r*, which usually off course *+n* is attached to a masculine while *+r* to a feminine gender in the following cases below:

Word	Gloss
(19a) Dan-ruwa	'drunkard/anything that lives in water like fish, tortoise'
b. Dan-takarda	'a literate person'
c. Dan-kwaya	'an illicit drug consumer' e.t.c

Let us consider '*ya-* + *-r* case:

Word	Gloss
(20a) 'Yar-gagara	'troublesome lady'

- b. ‘Yar-lele ‘the most loved lady’
c. ‘Yar-gaban-goshi ‘the most loved wife/lady’
e.t.c

Let us consider ba-+-n case:

Word	Gloss
(21a) Ban-sha’awa	‘interesting’
b. Ban-dariya	‘very funny’
c. Ban-takaici	‘pathetic’ e.t.c

Let us consider ruwa-+-n case:

Word	Gloss
(22a) Ruwan-Goro	‘light brown’ (colour)
b. Ruwan-madara	‘milk-colour’
c. Ruwan-Dorawa	‘yellow-colour’

e.t.c

Let us consider aboki-+-n case:

Word	Gloss
(23a) Abokin-zama	‘a bosom friend’
b. Abokin-hira	‘a conversational friend’
c. Abokin-fada	‘a quarrelling friend’

e.t.c

IDIOMS AND PROVERBS

Crystal (2008:236) stresses that, “Idiom is a term used in GRAMMAR and LEXICOLOGY to refer to a SEQUENCE of WORDS which is SEMANTICALLY and often SYNTACTICALLY restricted, so that they function as a single UNIT”. Crystal (ibid) further emphasizes that, from semantic viewpoint, the MEANINGS of the individual words cannot be summed to produce the meaning of the idiomatic expression as a whole. But I have seen idiom as a group of words which have special connotation not usually equal to the sum of meanings of the individual word and which usually cannot be translated literally into another language without the special meaning being lost. Pryse (1984:75) argues that, an idiom is a common form of expression whose meaning cannot be deduced by understanding the individual words alone. Pryse (ibid) further stresses that, a proverb is a wise saying that does not mean the actual word, but it can be applied to suit many different circumstances. Consider the following examples:

CONCLUSION

The hypothesis of DLT stipulates that Th-role/syntax mapping depends on morphology i.e. on applicative and causative construction in Hausa. An interesting aspect of Kiparsky’s direct linking theory is that linking principles allow morphology to constrain syntax (Kiparsky, 1989). This correctly predicts that the Th-role/syntax mapping for a language will depend on its morphology (Bature, 1991) thus; the prediction is clearly glaring on the semantic relationship between the Hausa lexical items mentioned therein. The building capacity of some lexical items expressions depend largely on how speakers are able to strategies the

semantic relations attached to those lexemes, otherwise, there would be absolute digression of meaning thus; is going to hamper the faculty building capacity of language learner.

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**Conference On National Capacity Building Strategy For
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*Track Nine: National Capacity Building Strategy in Health
Sector (NCBSHS)*

MAKING SUPERVISION SUPPORTIVE AND SUSTAINABLE IN PRIMARY HEALTH CARE SERVICES IN NIGERIA

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ABSTRACT

Apart from technical roles of supervision like overseeing implementation of clinical and non-clinical tasks and others, there is important human dimension, which is, relationship existing between supervisors and supervisees. In developing countries like Nigeria, many health care workers in remote areas either work alone or in small groups. Supervisors who represent link between staff and larger health system exhibit negative relationship by using more of punitive approaches than facilitation when deficiencies in job performances are noted, thereby demoralize staffs, and make benefits of supervision not achieved. Project focused on improving systemic problems plaguing effective supervision in primary health care centers. The study identified several systemic problems plaguing effective supervision in primary health care centres. These problems were analysed as institutional and staff problems. They include lack of planning, training, defined priorities, shortage of resources (man, materials and finance), episodic visits by supervisors, lack of adherence to work ethics, poor interpersonal relationships between supervisors and supervisees and others. Among these problems identified, the most plaguing was lack of financial stability which resulted to poor motivation of staff as majority of them, 33(94.3%) complained of being owed two to three months salary arrears. Categorizing the problems that negatively influenced supervision helped the researchers to highlight best practices and the underlying mechanisms for sustainable supportive supervision that are capable of upgrading the technical and clinical skills of supervisors

KEYWORDS: clinical skills, primary health care, financial stability, resources, teamwork

INTRODUCTION

Project encouraged sustainable supervision in primary health centres by using supportive supervision to promote teamwork, monitoring, mentoring, and effective communication between supervisors and supervisees. In this project self-assessment, peer assessment, and community input were vital components of result-oriented supportive supervision. Project focused on effective communication between supervisors and supervisees to minimize constant conflicts supervisors experienced with supervisees.

The benefit of supervision in managing human resources in Primary Health Care is often not achieved in developing countries including Nigeria. Traditionally, supervision emphasizes inspection of facilities without regard to facilitation. It blames individuals rather than look for root causes in deficient processes. For this reason, traditional supervision has tended not to 'empower' staff to engage in problem solving and/or to taking initiative in improving service quality and access. There is need to change focus of supervision from inspecting facilities and gathering service statistics to concentrating on performance of clinical tasks and resolution of problems. Paper aims to provide framework for supportive supervision by identifying key lessons learnt.

METHODOLOGY

The information contained in this paper was based on work experiences and literature review on supervision. It emphasizes effective supervision by viewing self-assessment, peer assessment, community input as vital component of result-oriented, supportive supervision.

FINDING

Systemic problems plaguing effective supervision include:

- lack of planning and /or training
- failure to define priorities
- shortage of resources (man, materials and finance
- episodic visits
- no adherence to work ethics
- diversion of resources
- lack of financial stability
- lack of accountability
- low morale among health workers due to punitive measures

WHY INVEST ON SUPPORTIVE SUPERVISION

Studies have shown that facilitating on the job learning promotes quality at all levels of health care, high standard teamwork and increase problem – solving techniques thereby make supervision more conducive as well as improve health workers'

performance. It also promotes continuous improvement on individual worker's skills and performance. Unlike traditional supervision approaches where supervision takes place only when an external supervisor shows up at the health facility, supportive supervision occurs continuously as ongoing performance monitoring and quality improvement become a routine part of health workers' jobs. It takes place on the job both formally and informally in one-on-one meeting, in peer discussion, in meetings outside the work place and enable health workers review their own performance against standards

MECHANISM OF SUPPORTIVE SUPERVISION

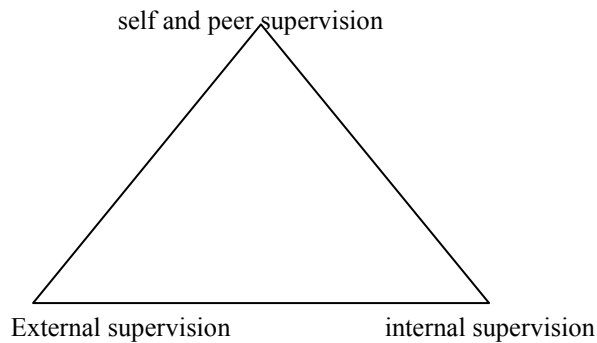


Table 1: Field experiences of implementing supportive supervision

interventions	results	Lessons learned
Construction of checklists and guidelines for quality performance	Regular feedback from health workers , adherence to standard treatment schedules, improvement in history taking, disease classification, treatment and counseling	Joint identification of opportunities for staff improvement, better communication and provision of information to patients,
Training of supervisors(workshops and seminars)	Better facilitation, interpersonal, problem –solving and analytical skills developed, better translation of institutional goals into services , increased job satisfaction, increased self-assessment	Better problem identification, increased coaching and mentoring, Service providers continuously improve their performance,
Data collection and analysis,	Improved documentation, clearer standards of care, more response to patients' needs,	Clearer feedback on strengths and weaknesses, access to more quality care, patients' care oriented approach, increase in quality care indicators

Table 2: interventions given, results got and lessons learned during the study

Interventions given	Results got	Lessons learned
Introduction of checklists and guidelines for self assessment of quality performances in assigned health programmes.	Regular feedback from health workers , improvements in adherence to standard treatment schedules, history taking, disease classification, treatment and counseling	Joint identification of opportunities for staff improvements, better communication and provision of information to patients,
Training workshops and seminars on facilitation, feedback mechanisms, team building and problem-solving skills	Improved staff facilitation, interpersonal relationships, problem –solving and analytical skills were developed. Better translation of institutional goals into services, increased job satisfaction, and self-assessment among staff.	Better problem identification, increased coaching and mentoring among Service providers, increased staff desire for self improvements,
Introduction of strategies for data collection and analysis,	Improved skills on documentation, report writing, effective case presentation on standards of care, and management	Clearer methods to identify staff strengths and weaknesses, increased staff desire to provide more quality care, better patients' care oriented approach, improved identification of quality health care indicators



Figure 1



Figure 2

Hospital Environments littered with odds and ends by supervisees



Fig 3: Littered Hospital environment

CONTRIBUTIONS MADE IN THIS PROJECT

Studies have shown that facilitating on the job learning promotes quality at all levels of health care services. This project succeeded in modifying the mode of supervision activities in primary health centres from the traditional single official to a broader work force. Supportive supervision was used to influence high standard teamwork that collaboratively identified appropriate problem-solving techniques that made supervision a little more conducive. The project used supportive supervision to emphasize patients' safety by encouraging professional development through training and re-training to enhance worker's skills and performances on the job. Unlike traditional supervision approaches where supervision took place only when an external supervisor showed up at will in the health facility, the project prompted supportive supervision to occur continuously as ongoing performance monitoring and quality improvements. This made supportive supervision to become a routine part of health workers' job. Distinct from the traditional supervision, supportive supervision took place in a variety of ways. It took place on the job both formally and informally, in one-on-one meeting, in peer discussion, in meetings outside the work place. These various ways, in which supportive supervision was made to take place, enabled health workers to review their performances against existing guidelines. The project succeeded in influencing enduring interventions that would result to long lasting positive changes in the mode of supervision in primary health centers in rural areas. The project showed that supervision can be improved within the resource constraints of a developing country like Nigeria. More work is needed to document the cost effectiveness of the mechanisms of supportive supervision such as peer review, self-assessment and internal and external supervision. There is evidence from the project that with more funding, the sustainability of improved supervision practices, in supportive supervision could be successfully institutionalized. The key lesson from the project implementation is that for successful quality and

performance improvements in supervision to take place, there must be an enabling environment that will be conducive to expand, initiate and sustain the changes the enabling environment including policies, leadership styles, organizational values and adequate resources would initiate to support the improved practices. This thinking is supported by the literature reviewed, which emphasized the importance of using teamwork, effective job performance and respect to focus on positive behaviour to achieve improved feedback between supervisors and supervisees.

DISCUSSION

Project addressed problems of non-adherence to work ethics, diversion of resources, lack of financial stability, and low morale due to constant punitive measures. Project noted inadequate planning for health programmes giving rise to hurried execution of projects. Health planners scarcely prioritize health care services in communities, and majority of health programmes mounted were not actually needed by community members. Supervisors sometimes impose programmes not needed by community members resulting to their underutilization because the programmes were politically motivated. See pictures of such underutilized health facilities enclosed.

There was also inadequate training and re-training of health care providers. Individuals with little or no requisite skills for health care services were recruited by politicians in primary health centers. The effect was that programmes were haphazardly carried out giving rise to poor sustainability. Programmes affected include health education, environmental health, immunization, and postnatal care services.

The health workers in primary healthy centers lacked skills in communication, team building, and facilitation. Moreover, the political drive that usually influenced provision of most health care programmes in the communities as well as employment of staffs based on party affiliations exacerbated the practice of engaging individuals with little or no professional skill to administer health programmes especially immunization and HIV counseling. The effect was that the health programmes were haphazardly implemented.

As a result, some interventions were offered to the health workers to enhance their skills on the job performance. The initial intervention was the introduction of checklist to examine the feasibility of supportive supervision in primary health care centers in the communities, as well as the knowledge base of the workers. Checklist and guidelines were constructed to enable the health workers to self-assess their quality performances. The results obtained showed obvious

discrepancies in the rating of the workers, revealing need for organizing training on certain aspects of health functions such as feedback mechanism, history taking, disease classification, treatments and counseling. Thereafter, another intervention which concentrated on training was provided. Here, ten days intensive trainings (workshops and seminars) were organized using experienced but skilled staff members from the University. Health workers' assessment after the ten days' training revealed improvement in the extent to which adherence to standard treatment schedules were done. For example, there was remarkable improvement in history taking, disease classification, better time management, problem –solving techniques, clinical updates, treatment and counseling. Lessons learned revealed improved communication and provision of information to patients,

Also post assessment of the workers showed better problem identification, and increased coaching and mentoring among staff. Generally, the workers demonstrated more concerns on being part of problem-solving in the health centers after the training than before the training. This workers' concern on being part of problem-solving in the health center was a major strength to teamwork approach. There was improved documentation, clearer standards of care, and constructive feedback on strengths and weaknesses among the workers.

Studies have shown that facilitating on the job learning promotes quality at all levels of health care services. This project succeeded in modifying the mode of supervision activities in primary health centres from the traditional single official to a broader work force. Supportive supervision was used to influence high standard teamwork that collaboratively identified appropriate problem –solving techniques that made supervision a little more conducive. The project used supportive supervision to emphasized patients' safety by encouraging professional development through training and re-training to enhance worker's skills and performances on the job. Unlike traditional supervision approaches where supervision took place only when an external supervisor showed up at will in the health facility, the project prompted supportive supervision to occur continuously as ongoing performance monitoring and quality improvements. This made supportive supervision to become a routine part of health workers' job. Distinct from the traditional supervision, supportive supervision took place in a variety of ways. It took place on the job both formally and informally, in one-on-one meeting, in peer discussion, in meetings outside the work place. These various ways, in which supportive supervision was made to take place, enabled health workers to review their performances against existing

guidelines. The project succeeded in influencing enduring interventions that would result to long lasting positive changes in the mode of supervision in primary health centers in rural areas. The project showed that supervision can be improved within the resource constraints of a developing country like Nigeria. More work is needed to document the cost effectiveness of the mechanisms of supportive supervision such as peer review, self-assessment and internal and external supervision. There is evidence from the project that with more funding, the sustainability of improved supervision practices, in supportive supervision could be successfully institutionalized. The key lesson from the project implementation is that for successful quality and performance improvements in supervision to take place, there must be an enabling environment that will be conducive to expand, initiate and sustain the changes the enabling environment including policies, leadership styles , organizational values and adequate resources would initiate to support the improved practices. This thinking is supported by the literature reviewed, which emphasized the importance of using teamwork, effective job performance and respect to focus on positive behaviour to achieve improved feedback between supervisors and supervisees.

CONCLUSION

While it is difficult to isolate effects of an intervention in the field settings, more attempts to evaluate impact of supportive supervision will help to encourage its adoption. Also identifying best practices should include defining the cost of the three mechanisms of supportive supervision(external, internal and self/peer supervision). This will help to enrich understanding of factors that encourage sustainability. There is need to continuously upgrade the technical and clinical skills of supervisors.

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**Track Ten: National Capacity Building Strategy in
Conservation and Natural Resources Management
(NCBSCNRM)**

EFFECT OF SECONDARY SUCCESSION ON THE CHANGES IN SOIL PHYSICOCHEMICAL PROPERTIES IN THE CROSS RIVER RAINFOREST, NIGERIA

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ABSTRACT

This study anchored on how secondary succession has affected the soil physico-chemical properties in the Cross River rainforest. The objective of the paper was to examine changes in surface and subsurface soil as influenced by secondary succession and the contributions made by the changes in relation to nutrients upgrade. The study area was the Oban group forest within the Southern part of Cross River State. Five succession phases were identified as follows forbs area (2-years old), young fallow (3-7 years) mature fallow (8-15 years) secondary climax (16-25 years) and primary climax (25 years and above). The soil samples were collected at the surface (0-15cm) and subsurface (15-30cm) levels. From the study findings, it was discovered that sand constituted more than 65% of the inorganic mineral fragment. Furthermore, the soils were classified as loamy-sand. However, there was a substantial increase in the levels of organic carbon and total nitrogen in the top soil across the various succession phases mostly in the mature fallow and primary climax. Hence, this increase in organic carbon and total nitrogen is attributed to the increase in the density of tree/shrubs, dense crown cover and the high amount of litter production through decomposition, thus, adding nutrient to the soil. Therefore, with a viable and functional luxuriant Cross River Rainforest, the livelihood sustainability of the forest community dwellers/inhabitants could be guaranteed upon the continuous availability of forest resources and services, vis-à-vis poverty alleviation.

KEYWORDS: secondary succession, soil, physico-chemical properties, cross river rainforest and succession phases

INTRODUCTION

Secondary succession is the series of community changes which takes place on a previously colonized, but disturbed or damaged habitat. These changes might take place in areas which have been cleared of existing vegetation (such as after tree-felling in a woodland) and/or destructive events such as fires. Secondary succession is usually much quicker than primary succession because there is already an existing seed bank of suitable plants in the soil which aid re-growth of plants; the root systems of plants are undisturbed in the soil which enhances stumps and other plant parts from previously existing plants to rapidly regenerate. Also, the fertility and structure of the soil has also already been substantially modified by previous organisms to make it more suitable for growth and colonization.

Several studies have shown that secondary succession has great impact on soil fertility status (Diekmann *et al.* 2007; Sarmiento and Bottner, 2002; Moran *et al.* 2000; and Bisong, 1994). According to Van der Kamp (2009), the effects of secondary succession on soil are strongest in the A-horizon (0–10 cm), where an increase in carbon stock, N, and C/N ratio, and a decrease in bulk density and pH are observed. However, Maharning *et al.* (2009) examined soil community changes during secondary

succession to naturalized grassland, and discovered that in various successional stages approaching naturalized grasslands, interaction between plant species composition changes and soil ecology affect each other. Those changes in micro-arthropod communities are obscured; nematode trophic functional group (ecological guild) changes response to both plant and soil community changes.

Considering how succession impacts on soils in different *seres* otherwise called fallows, the trend of organic matter build – up has been assessed in parts of South-Western Nigeria and its resultant effects on soil properties (Aweto, 1981). Here he suffice that organic matter accumulation in fallow soil over time was largely confined to the top 10cm of the soil. He went further to state that the trends of nutrients build – up in fallow soils is similar to that of organic matter. Therefore, this assertion rest on the fact that organic matter exerts marked effects on the properties of fallow soils. Similarly, that the influence exerted by organic matter poses stronger influences on soil properties with time (according to fallow age). Invariably, this implied that as fallows grow older in age, the more they accumulate organic matter. Thus, succession impacts the soil as

more dead plants and other organisms die and give way to other plants. The processes of secondary succession and their resultant effects on soil characteristics in the Cross River Rainforest is lacking in the already existing literature. However, even the studies like that of Aweto (1981 a, b & C; Donfack et.al (1995), Swaine and Hall (1983) which appear to be closer to the area of study also lack information on the study area. Hence, with the current trend in the Cross River Rainforest loss, which plays host to a lot of endemic, charismatic and keystone species (flora and fauna), therefore, this paper becomes pertinent as it intends to characterize the effects of secondary succession on the soils of the area. Based on these, the study seeks to achieve the following objectives such as: to examine the soil physico-chemical properties at the surface and sub-surface levels across the succession phases; to evaluate the various changes that occurred across the succession phases and to determine the roles and contributions of secondary succession activities on soil nutrients restoration in the area.

However, considering the role of forest ecosystem on livelihood sustainability of the forests community dwellers, whose source of income and revenue is dependent on forest resources cannot be overlooked at this point in time. Therefore, as the rainforest ecosystem degradation is ongoing, due to indiscriminate utilization/exploitation pattern and processes, there is the need for the understanding of the forest fallow dynamics that could help in the amelioration of the observed problems and further facilitate forest regeneration and restoration, thus, the alleviation of poverty among forest community dwellers.

MATERIALS AND METHODS

Study Area

The study was carried out in Oban Group Forest in Akamkpa Local Government Area, Cross River State. Geographically, the area lies between longitude 8^o 06' and 8^o 50' E and latitude 5^o 00' and 5^o 57' N. The climate is characterized by a double maxima rainfall beginning in the month of March to August, then August to October, reaching its peak in the month of July and September. The annual rainfall is about 2000-3000mm with average temperature of about 27^o C, while relative humidity is about 80%. The area is characterized by luxuriant evergreen forest vegetation with few patches of secondary forest which constitutes the fallows (Offiong & Iwara, 2012). Many trees grow to the height of 30m - 60m tall. A larger number of trees have large buttresses, smooth barks, columnar holes and thick woody climbers. Several species of birds, mammals, reptiles and insects are found in the area. The terrain is undulating with flood plains around the Ikpan River.

Soil Sampling

The quadrat approach was employed to collect surface (0-15cm) and sub-surface (15-30cm) soil samples from plots of 400m² across five succession phases namely, forbs, young fallow, mature fallow, secondary climax and primary climax. In all of 50 soil samples were collected (10 soil samples of both surface and sub-surface for each succession phase). The rationale behind the fallow segmentation was to enable the researcher observe changes in soil properties over time. The forbs area was 2-years old; young fallow was 3-7years old; mature fallow was 8-15-years old; secondary climax was 16-25-years old, while the primary climax was >25-years old. Information on the fallow ages of the respective succession phases was obtained from the local farmers using participatory rural appraisal (PRA). The collected soil samples were analyzed in the laboratory for soil physical and chemical properties.

RESULTS

Physical Properties of Surface Soil in the Succession Phases

The physical properties of surface soil in the succession phases are presented in Table 1. The result showed that the mature fallow had the highest sand content with a value of 75.2% next to it was the forbs and secondary climax with values of 77.2% respectively. However, the young fallow almost fell within the same range as it had a value of 71.2%. The secondary climax had the lowest sand content of 69.2%. In the same vein, the young fallow had the highest silt content in the area with a value of 27.4%. The young fallow with a percentage value of 13.4% was next. On the other hand, mature fallow and primary climax had moderate silt content with values of 11.4% respectively, while the secondary climax had the lowest silt content with a value of 9.4%. Similarly, the clay content was high in the primary climax with a value of 19.4%; this was followed by the mature fallow and secondary climax with values of 13.4% respectively. The young fallow and the forbs had low clay contents of 10.4% and 9.4% respectively. The moisture content of soil varied across the succession phases with the secondary climax recording the highest value of 38.0% followed by the primary climax of 36.6% and then the mature fallow with 35.1%; the availability of moisture was slightly the same between the forbs and young fallow with values of 28.7% and 27.8% respectively. The porosity of the soils varied across the succession phases with high values recorded in young fallow and primary climax with values of 56.64 g/kg and 53.12 g/kg respectively, while low values were recorded in the forbs and secondary climax with values of 51.03 g/kg and 51.17 g/kg respectively. The soil particle size composition of soil as shown in Table 1 shows that the soils of the succession phases are principally sandy with sand constituting more than 65%

of the inorganic mineral fragment. The soil of the succession phases is classified as loamy-sand having been derived from granitic parent materials.

Table 1: Physical properties of surface soil in the succession phases

Soil properties	Succession phases				
	Forbs	Young fallow	Mature fallow	Secondary climax	Primary climax
Sand content (%)	77.2	71.2	75.2	77.2	69.2
Silt content (%)	13.4	27.4	11.4	9.4	11.4
Clay content (%)	9.4	13.4	13.4	13.4	19.4
Porosity (g/kg)	51.03	56.64	52.73	51.17	53.12
Moisture content (%)	28.7	27.8	35.1	38.0	36.6

Chemical Properties of Surface Soil in the Succession Phases

Table 2 gives information on the chemical properties of surface soil across the succession phases. It showed that the level of organic carbon (OC) was high in the primary climax with a value of 1.71%, followed by the mature fallow with a value of 1.76% and then the forbs (1.48%), while the lowest proportion of OC was observed in the young fallow with value of 1.26%. The high OC content in the primary climax was attributed to the high density of tree and biomass accumulation. The level of total nitrogen was high in the mature fallow and primary climax soils with values of 0.42% respectively, followed by the forbs (0.36%) and the secondary climax (0.35%), the lowest value of 0.31% was recorded in the young fallow. The level of exchangeable bases (Ca, Mg, Na and K) varied across soils of the succession phases. The level of exchangeable calcium (Ca) was in the forbs with a value of 5.00cmol/kg followed by the young fallow and mature fallow with values of 2.24cmol/kg respectively, while the lowest value of 1.42cmol/kg was recorded in the primary climax.

Furthermore, the level of exchangeable magnesium (Mg) and sodium (Na) were high in the secondary climax and young fallow with values of 0.70cmol/kg and 0.35cmol/kg respectively, followed closely by the mature fallow/primary climax and secondary climax with values of 0.63cmol/kg and 0.11cmol/kg respectively, while the lowest values were recorded in the young fallow and forbs with values of 0.33cmol/kg and 0.08cmol/kg respectively. For exchangeable potassium (K) and cation exchange capacity (CEC), the mature fallow and forbs recorded the highest value 0.13cmol/kg and 6.33cmol/kg respectively followed by secondary climax with values of 0.09cmol/kg and 4.55cmol/kg respectively. The lowest values of K and CEC were recorded in the primary climax with values

of 0.06cmol/kg and 3.40cmol/kg respectively. The level of available phosphorus (Av. P) and pH varied across the succession phases with the highest value of 10.28mg/kg and 5.1 in the young fallow and forbs respectively, followed by the forbs and young fallow with values of 7.1cmol/kg and 4.5 respectively. The lowest level of these two soil properties were found in the primary climax and secondary climax with value of 1.31cmol/kg and 4.1 respectively. On the other hand, the concentration of electrical conductivity happened to be high in the secondary climax with value of 0.45 dsm⁻¹, followed by the forbs with a value of 0.43 dsm⁻¹ and then the mature fallow (0.42 dsm⁻¹) while the lowest conductivity level across the succession phases were obtained in the young fallow with value of 0.04 dsm⁻¹.

Table 2: Chemical properties of surface soil

Soil properties	Succession phases				
	Forbs	Young fallow	Mature fallow	Secondary climax	Primary climax
Organic carbon (%)	1.48	1.26	1.76	1.45	1.71
Total nitrogen (%)	0.36	0.31	0.42	0.35	0.42
Ca (cmol/kg)	5.00	2.24	2.24	2.05	1.42
Mg (cmol/kg)	0.37	0.33	0.63	0.70	0.63
Na (cmol/kg)	0.08	0.35	0.09	0.11	0.09
K (cmol/kg)	0.08	0.08	0.13	0.09	0.06
C.E.C. (cmol/kg)	6.33	4.00	3.89	4.55	3.40
Av. P (mg/kg)	7.31	101.28	2.13	1.48	1.31
pH	5.1	4.5	4.3	4.1	4.3
Electrical conductivity (dsm ⁻¹)	0.427	0.067	0.421	0.451	0.394

Physical Properties of Subsurface Soil in the Succession Phases

Information on the physical properties of sub-surface soil across the succession phases is depicted in Table 3. From the table, the level of sand was relatively similar across the forbs, young fallow, mature fallow and secondary climax with values of 77.2%, 75.2% and 73.2% respectively. The least concentration of sand was in the primary climax with a value of 67.2%. However, on individual consideration, the forbs had more concentration of sand (77.2%), followed by the mature fallow (75.2%), while the young fallow and secondary climax had the lowest contents of 73.2% respectively. The concentration of silt was high in the primary climax with a value of 23.4% followed by the forbs, young fallow and mature fallow with values of 9.4% respectively, while the secondary climax had the lowest

concentration of silt with a value of 7.4%. On the same note, clay content was the same with values of 19.4% respectively for the secondary climax and primary climax, but low in the mature fallow with a value of 15.4%. Also, the level of porosity was high in the forbs and young fallow with values of 58.59g/kg respectively followed by the primary climax with a value 56.25g/kg. The lowest porosity level was recorded in the secondary climax with a value of 53.12g/kg. The availability of moisture which is influenced by tree density, forest crown and tree/shrub heterogeneity was high in the mature fallow with a value of 37.0%, followed by the secondary climax with a value of 34.0%, and then the young fallow (31.8%). The least concentration of moisture was obtained in the forbs (23.9%).

Table 3: Physical properties of sub-surface soil in the succession phases

Soil properties	Succession phases				
	Forbs	Young fallow	Mature fallow	Secondary climax	Primary climax
Sand content (%)	77.2	73.2	75.2	73.2	67.2
Silt content (%)	9.4	9.4	9.4	7.4	23.4
Clay content (%)	13.4	17.4	15.4	19.4	19.4
Porosity (g/kg)	58.59	58.59	53.91	53.12	56.25
Moisture content (%)	23.9	31.8	37.0	34.8	30.5

Chemical Properties of Sub-Surface Soil in the Succession Phases

Similarly, the proportion of organic carbon (OC) was high in the primary climax with a value of 1.43%, while the lowest value of 0.71% was obtained in the young fallow. For total nitrogen (TN) and exchangeable calcium (Ca), the highest values of 0.35% and 3.56cmol/kg were obtained in the primary climax/mature fallow and forbs respectively, while the lowest values of 0.17% and 1.27cmol/kg were obtained in the young fallow and primary climax respectively. The forbs and young fallow had the highest concentrations of exchangeable magnesium (Mg) and sodium (Na) with values of 0.88cmol/kg and 0.36cmol/kg respectively, while the lowest values of 0.43cmol/kg and 0.08cmol/kg were obtained in the young fallow and mature fallow respectively. For exchangeable potassium (K) and cation exchange capacity (CEC), the highest and lowest values of 0.14cmol/kg and 5.68cmol/kg were obtained in the forbs as well as the young fallow, secondary climax and primary climax with values of 0.05cmol/kg and 2.80cmol/kg respectively. The level of available phosphorous and pH varied across the succession phases with the young fallow and forbs having the highest values of 13.96 mg/kg and 4.8 respectively,

followed by the forbs and young fallow with values of 6.53mg/kg and 4.6 respectively. The lowest level of Av. P and pH were obtained in the primary climax with value of 0.40mg/kg and 4.2 respectively. The level of electrical conductivity in the soil was relatively the same with slight increase in the forbs and decrease in the young fallow with values of 0.46dsm⁻¹ and 0.03dsm⁻¹ respectively.

Table 4: Chemical properties of sub-surface soil

Soil properties	Succession phases				
	Forbs	Young fallow	Mature fallow	Secondary climax	Primary climax
Organic carbon (%)	1.38	0.71	1.43	0.95	1.43
Total nitrogen (%)	0.32	0.17	0.35	0.22	0.35
Ca (cmol/kg)	3.56	1.91	2.25	1.33	1.27
Mg (cmol/kg)	0.88	0.43	0.67	0.53	0.58
Na (cmol/kg)	0.10	0.36	0.08	0.09	0.11
K (cmol/kg)	0.14	0.05	0.11	0.05	0.05
C.E.C. (cmol/kg)	5.68	3.75	3.91	2.80	3.61
Av. P (mg/kg)	6.53	13.96	1.39	0.52	0.40
pH	4.8	4.6	4.5	4.5	4.2
Electrical conductivity (dsm ⁻¹)	0.460	0.030	0.454	0.330	0.369

DISCUSSION

The result shows a substantial increase in the levels of organic carbon and total nitrogen in the top soil across the various succession phases mostly mature fallow and primary climax. The substantial increase in OC and TN contents is attributed to the increase in the density of trees/shrubs, dense crown cover and the higher amount of litter production which *in situ* decomposes to add nutrient to the soil. The density of trees/shrubs provides adequate protection to the soil thereby, preventing unproductive loss of soil nutrient to soil erosion. The dense crown cover helps to attenuate the direct impact of raindrop on the soil, thereby keeping litter stable for decomposition. This observation confirmed the findings of Aweto (1981) that a substantial increase in total nitrogen and organic matter occurred in the upper part (10cm) of soil profiles during the first ten years of fallow. In the same vein, available phosphorous in the fallow cycles was high in the surface soils across the succession phases. This trend is affirmed by earlier studies carried out by Chidimayo and Kiribisa, (2003), and Aweto, (1981). However, the contents of available phosphorus and cation exchange capacity are high in the forbs and young fallow, the levels of these soil nutrients

decrease substantially in the secondary and primary climaxes. The decrease in the level of Av. P and CEC in the latter stage of the succession stage is attributed to nutrient immobilization as well as the high intake of nutrient by the trees. The high proportion of Av. P in forbs and young fallow is attributed to the abundance of herbaceous vegetation which helps to decrease the leaching of basic cation (Ekukinam et al., 2014). Also, the high Av. P content may be attributed to the pH of the forbs and young fallow soil which favour phosphorus increase.

CONCLUSION

The physico-chemical properties of soil across the succession phases in the study area indicated a significant variation in their composition respectively. Invariably, the soils in the primary and secondary climaxes appeared to be richer in nutrients than others. This was attributed to the relatively low level of disturbances and lengthens fallow periods. However, this is consequent upon the presence of tree/shrub species with a high level of healthy tree growth variables and litter cover/content. Invariably, the rich soils of the area ensure the longevity of the forest ecosystem and its resources which gives both tangible and intangible values to the inhabitants of the area. Consequently, it is recommended that the rainforest fallow areas should be put under the gazette of protected areas. This is because, forest fallows mark the beginning of succession which over time restores the degraded forest that once existed in the area before disturbance though with slight modification.

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IMPACT OF WATER HYACINTH (*EICHHORNIA CRASSIPES*) INFESTATION ON THE GROWTH OF EDIBLE BENTHIC GASTROPODS: THE BANE OF POVERTY ALLEVIATION AMONG ARTISANAL FISHING FOLKS IN NIGERIA

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ABSTRACT

The impacts of water hyacinth infestation on water quality and growth in benthic gastropods, *Pachymelania species* under experimental conditions were examined for six months by a fortnightly data collection and analyses over a period of six months. Five different experimental setups with varying degrees of water hyacinth stands were used to establish probable impact on water quality and growth of the animals. The low dissolved oxygen and significantly higher alkalinity values observed in experiment five which had the highest water hyacinth stands is indicative of a stressed condition. The results recorded for adults and juveniles indicate that the animals were affected by the density of water hyacinth stands. In adults, average length and body weight were highest in experiment 2, while the lowest values were recorded in the control experiment. Juveniles recorded highest overall average length and body weight in experiment 3, while the lowest values were recorded in the control experiment and experiment 3 respectively. Condition factor, K was highest in experiment 2 and lowest in experiments 4 and 5. This study shows that floating macrophytes are inimical to the growth and development of gastropods when present in large expanses and poses a lot of challenges to artisanal fishery

KEYWORDS: water hyacinth, water quality, edible gastropods, artisanal fishing, socio-economic life.

INTRODUCTION

Bio-invasion has been considered as a significant component of global change and one of the major causes of species extinction and great economic lost (Drake & Mooney 1989; Cook, 1990). Invasive species are of interest to ecologists, biological conservationists and natural resources managers due to their rapid spread, threat to biodiversity and damage to ecosystems (Mironga, 2003; Marshall and Brendonck, 2003). Some may alter the hydrology and physico-chemical properties of water, nutrient cycling and the general ecological balance in the aquatic ecosystem (Schmitz *et al.* 1993). Water hyacinth (*Eichhornia crassipes*) is the most deleterious of all invasive plant species in tropical countries and has been regarded as the most 'notorious' weed in the world (Greathead & DeGroot, 1993). By the beginning of the 20th century water hyacinth has invaded aquatic systems in almost every country of the world. The first surge of the weed in Nigeria was observed in September, 1984 along the Badagry Creek in Lagos State where the weed formed a thick 'mat' over the surface of the water (Sharma & Edem, 1988). By 1990, the weed has spread through the entire Nigerian Coastlines in the creeks and lagoons. Inland water

bodies such as Rivers Niger, Benue, Benin, and Kaduna were also affected.

Water hyacinth is a perennial, herbaceous monocotyledon member of the pickerelweed family (Pontederiaceae). It is usually found as a free-floating aquatic macrophyte which derives its nutrients from the water column (Brendock, 2003). Mature specimens have long feathery roots that can be over 2 m in length. However in shallow waters individuals can root themselves into sediment and individual plants can even be found fully rooted on bank sides. The matured plants possessed above ground density of about 14 plants/m² and biomass of more than 1494 g (Sherma & Edem, 1988). Water hyacinth grows fast from seeds and from shoots that break off and grow into new plants. It commonly forms dense, interlocking mats due to its rapid reproductive rate and complex root structure (Mitchell, 1985). Water hyacinth reproduces both sexually and asexually. Ten to 100 % of existing seeds are found to germinate within six months, with dry conditions promoting germination (Wilson *et al.*, 2005). Nutrients and temperature are considered the strongest determinants for water hyacinth growth and reproduction (Lu *et al.*, 2007; Wilson *et al.* 2007). The

survival of the plant is encouraged in water bodies where nutrient levels are high due to agricultural runoff, deforestation, and insufficient wastewater treatment. Its success as an invader is attributed to its ability to outcompete native vegetation and phytoplankton for light. Its proliferation is exacerbated by water contamination from industrial effluent, fertilizer run-off and raw sewage. These wastes encourage the growth of water hyacinth which impacts negatively on the water quality and impedes the growth of aquatic organisms.

The spread of water hyacinth in Nigeria is perceived as a major environmental problem (Uwadiae *et al.*, 2011), this is especially so in the south where many rivers and channels are blocked by dense growth of the weed which impede navigation, block access by artisanal fishermen to fishing grounds and lower primary productivity of aquatic systems (Sharma & Edem, 1988). Water hyacinth has become a nuisance to fisheries, navigation, water intake to hydropower plants, irrigation and recreation in Nigerian aquatic systems and it restricts photosynthesis in other aquatic plants through increased sedimentation and by shading the water column, leading to deoxygenation with a detrimental impact on aquatic organisms, especially invertebrates (Uwadiae, *et al.*, 2011).

The benthic gastropod filter feeder *Pachymelania* spp is a common species in the Nigerian Coastal waters and occurs along the West African coast from Senegal to Angola, and constitute an important source of protein for inhabitants of villages along the coastline, notably in the Nigerian Niger Delta. The species are of great economic value as they constitute major component of artisanal fishing. They are gathered and consumed and also sold in markets. The juveniles of these species are important component of the staple of snail-eating fish. *Pachymelania* spp live in sandy-mud sediment in the open lagoons and avoids areas with a strong current. They live in water depths of up to 5 m. They are euryhaline species inhabiting areas of salinity variation between 0 and 27 ‰ and prefers the upper region of the infra-litoral. The weak teeth and the fringed mantle border further attest to the fact that they are filter feeders, which means that a larger percentage of their food come from microalgae.

The species have received a lot of research attention due to their economic importance. Uwadiae *et al.* (2009) established the ecological requirements and natural food components of one the species, *Pachymelania aurita*. However, a major gap in the research efforts on these species is on its survival outside its natural environment and the need to establish the possible impact of the ubiquitous water hyacinth on the animals. Therefore, the aims of this present study are to assess the impact of

water hyacinth on the physico-chemistry of water and growth of edible benthic gastropod (*Pachymelania* species) under experimental conditions with a view to establishing its impact on the animals for better understanding of the socio-economic implications for artisanal fishing.

MATERIALS AND METHODS

Collection of Materials for Experimental Setup

Water
Large quantity of water from the Lagos Lagoon was collected using plastic buckets and the required quantity transferred to experimental tanks

Specimens of Water Hyacinth

Water hyacinth used for the study was collected from the Lagos Lagoon at the University of Lagos Lagoon Front. Specimens were collected in wide open mouth big bowls with water from the habitat and taken to the laboratory where the collected specimens were placed in a holding glass tank containing water from their habitat for one week, to establish their level of survival in an artificial space different from their natural habitat. Care was taken to ensure that no *Pachmelania* spp were attached to the collected specimens.

Sediment

Sediment from the Lagos Lagoon was collected using van Veen grab. Specimen of gastropods in sediment collected for the experiment were carefully handpicked and removed.

Specimen of *Pachymelania* Species

Specimens of *Pachymelania* species used for this investigation were collected from the Lagos Lagoon, south-west Nigeria, using a van Veen grab. Several hauls were emptied into a wide open plastic bowl after retrieval from the water and specimens were stored in plastic containers with water from the habitat and taken to the laboratory.

LABORATORY PROCEDURE

Preparation of Sediment

In the laboratory, sediment collected from the habitat was sundried and the quantity (1746 g x 10 x2) required for the experiment weighed and kept.

Measurement of Length and Weight of Specimens

Length of specimens was measured using a calibrated meter rule. The meter rule was placed side by side with the specimen to be measured and length taken against the ruler and recorded in mm. Specimens of animals whose length have been taken were weighed with an electronic scale of 0.001g sensitivity. Prior to weighing, the animals were drained on a fine sieve, air dried for 10 minutes on absorbent paper and exposed to air until

liquid is no longer visible. Length and weight of specimens were taken before the animals were introduced into the experimental tanks, and measurements were also taken fortnightly for six months.

Condition Factor (K) of Experimental Specimens:

The condition factor is the state of general well-being of a fish been studied in relation to size, and is denoted by the equation;

$$K = 100W/L^3$$

where, K = condition factor; L = standard length; W = weight. This formula was used to assess condition factor of specimens in this experiment. According to Lagler (1956), the value of K is not constant for individuals, species or populations but is subject to wide variations for organisms. In natural conditions, the K-factor should be equal to 1, while < 1 and >1 indicate below and above average conditions respectively.

Selection of Specimens and Categorization into Age Groups

Specimens of *Pachymelania* species were identified using the identification keys of Edmunds (1978). According to Egonmwan (2007), specimens of *Pachymelania* species between 0 and 33 mm may be categorized as juveniles (Plate 1) while those above 44 mm may categorized as adults (Plate 2). In the laboratory, 400 specimens comprising 200 adults and juveniles respectively were selected on the basis of good health.



Plate 1: Juveniles of *Pachymelania aurita*



Plate 2: Adults of *Pachymelania aurita*

EXPERIMENTAL DESIGN AND SETUP

Summary of the characteristics of the different experimental setups is shown in Table 1. Five different treatments were formulated in this experiment (Table 1). All factors considered in the formulation of the treatments were the same for each treatment except the presence and quantity of water hyacinth. Ten (two replicated for each treatment) different plastic tanks of 1 x 0.7 x 0.4 m in size were used for the experiment. Eight of the tanks (Experiments 2 – 5) contained different quantities of water hyacinth, while treatment 1 which is the control had no stand of water hyacinth.

After placing the tanks on a platform in an open space to allow enough sunlight and atmospheric influence, 1746 g of sediment from the habitat was added to each tank, followed by 30 L of water. The water and sediment were left for 24 h to allow for settling. Water hyacinth stands were introduced in the tanks and left for another 24 h to allow for further settling, after which specimens of *Pachymelania* species were then introduced into the tanks. Measurement of weight, length and analysis of environmental characteristics were carried out fortnightly for six months. Loss of water from the tanks due to evaporation was minimized as much as possible by adding water from the habitat up to the initial water level.

Table 1. Summary of characteristics of the different experimental setups

	Experiment 1 (Control)	Experiment 2	Experiment 3	Experiment 4	Experiment 5
Quantity of water (Litres)	30	30	30	30	30
Weight of sediment (g)	1746	1746	1746	1746	1746
Number of water hyacinth stands	None	10	20	30	40
Number of specimens of <i>P. aurita</i>	40: 20 adults and 20 juveniles	40: 20 adults and 20 juveniles	40: 20 adults and 20 juveniles	40: 20 adults and 20 juveniles	40: 20 adults and 20 juveniles
Initial mean length for adults (mm)	37.9	38.15	39.1	38.70	39.31
Initial mean weight for adults (g)	3.51	3.66	3.41	3.25	3.56
Initial mean length for juveniles (mm)	24.85	25.2	25.05	26.05	25.55
Initial mean weight for juveniles (g)	0.91	0.86	0.88	0.96	0.93
Mean PO ₄ (mg/L)	0.3	0.3	0.3	0.3	0.3
Mean NO ₃ (mg/L)	6.09	6.09	6.09	6.09	6.09

Mean DO(mg/L)	8.3	8.3	8.3	8.3	8.3
Mean Alkalinity (mg/L)	7.6	7.6	7.6	7.6	7.6
Mean BOD ₅ (mg/L)	0.1	0.1	0.1	0.1	0.1

STATISTICAL ANALYSIS

One-Way analysis of variance (ANOVA) was used to compare the variations in length and weights of specimens in the experimental tanks. When significant variations are detected, a *post hoc test* using Tukey's Honestly Significantly Different (HSD) was performed to determine the locations of significant differences. The relationships between biotic and environmental parameters were determined using Spearman rank correlations. All statistical analyses were performed with SPSS 10 and Excel 2003; 2007 for Windows.

RESULTS

Environmental Conditions in Experimental Tanks

During the period of the experiment there were great variations in the values recorded for DO, BOD, alkalinity, nitrate and phosphate (Fig. 1). Whereas variations recorded for other parameters were not significantly different, those of alkalinity were significantly different (ANOVA, $F = 2.871$, $p < 0.05$). The highest level (12.00 mg/L) of dissolved oxygen in experimental tanks was recorded in tanks 1 and 3 in the sixteenth week of study, while the least value (0.10 mg/L) was observed in tank 5 in the tenth week. Values of BOD ranged between 0.10 mg/L observed in tank 5 in week 5 and 10.00 mg/L recorded in tank 4 week 8. The highest value (140.00 mg/L) of alkalinity occurred in tank 5 in week 3, while the least value (0.50 mg/L) was recorded in tank 1 in week 5. The lowest value of nitrate 0.00 mg/L recorded occurred in different tanks at different periods, including tank 1 from week 5 to 8; tank 2 in week 2, and tank 5 in week 7, while the highest value (27.02mg/l) was recorded in tank 3 in weeks 7 and 8. Generally nitrate concentrations were higher in tank 3. The highest value (12.50mg/L) of phosphate was recorded in tank 2 in weeks 7 and 8, while the lowest (0.00mg/l) was recorded in tank 1 in week 2.

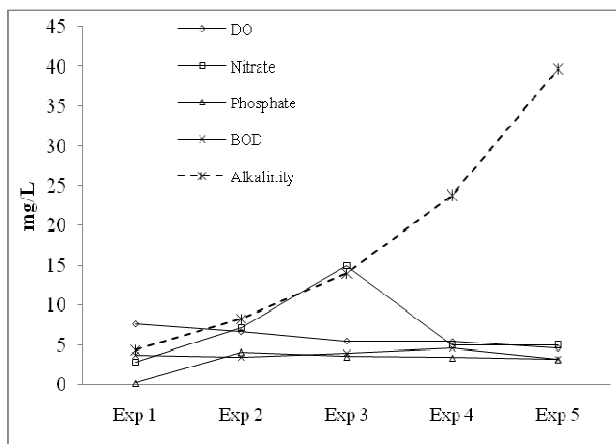


Fig. 1. Variations in water quality parameters in the different experiments

Growth Pattern in Adults

Summaries of values of growth parameters recorded are presented in Table 2. The results recorded for adults indicate that adults were affected by the density of water hyacinth stands. Overall average length (38.77 mm) and body weight (3.74 g) were highest in experiment 2, while the lowest values (37.76 mm; 3.37 g) were recorded in the control experiment. Average values recorded in other experiments were; 38.6 mm and 3.47 g in experiment 3, 38.44 mm and 3.31 g in experiment 4, 38.7 mm and 3.47 g in experiment 5.

Patterns of growth observed in length and body weight in all the experiments varied greatly (Figs. 2 - 7). In experiment 1, adults showed appreciable increase in length between weeks 2 (37.9 mm) and 10 (38.05 mm), after which the length remained constant. Weight of adults however showed appreciable decline from 3.49 g observed in week 2 to 3.07 g in week 20. Experimental condition in experiment 2 appears to favour the overall growth of the animal. Appreciable increase in length and weight of both adults was observed throughout the experimental period. The 38.15 mm length recorded for the adult in week 2, increased to 39.12 mm in week 20, while weight increased from 3.59 g in week 2 to 3.96 g in week 20.

In experiment 3, adults did not show any appreciable change in length and weight. In experiment 4, length of adults remained constant, while there was a consistent decrease in weight. Weight in adults decreased from 3.34 g in week 2 to 3.13 g in week 20. The pattern of variations in length and weight observed in experiment 4 were similar to those observed in experiment 5.

Table 2. Summary of length and weight values recorded for adults and juveniles during the experiment

	Length (mm)														
	Experiment 1(Control)			Experiment 2			Experiment 3			Experiment 4			Experiment 5		
	Min	Max	Mean±SE	Min	Max	Mean±SE	Min	Max	Mean±SE	Min	Max	Mean±SE	Min	Max	Mean±SE
Adult	33.00	49.00	41.00±11.31	33.50	43.00	38.25±6.72	33.00	44.00	38.50±7.78	30.50	43.50	37.00±9.19	30.50	43.50	37.00±9.19
Juveniles	16.50	32.00	24.25±10.96	15.00	32.50	23.75±12.37	21.00	40.00	30.50±13.44	21.50	31.00	26.25±6.72	21.00	31.00	26.00±7.07

	Weight (g)														
	Experiment 1(Control)			Experiment 2			Experiment 3			Experiment 4			Experiment 5		
	Min	Max	Mean±SE	Min	Max	Mean±SE	Min	Max	Mean±SE	Min	Max	Mean±SE	Min	Max	Mean±SE
Adult	0.81	4.86	2.84±2.86	1.33	5.03	3.18±2.62	1.42	4.60	3.01±2.25	1.30	4.82	3.06±2.49	1.10	5.03	3.07±2.78
Juveniles	0.22	3.80	2.01±2.53	0.25	3.93	2.09±2.60	0.47	3.89	2.18±2.42	0.52	1.37	0.95±0.60	0.50	3.01	1.76±1.77

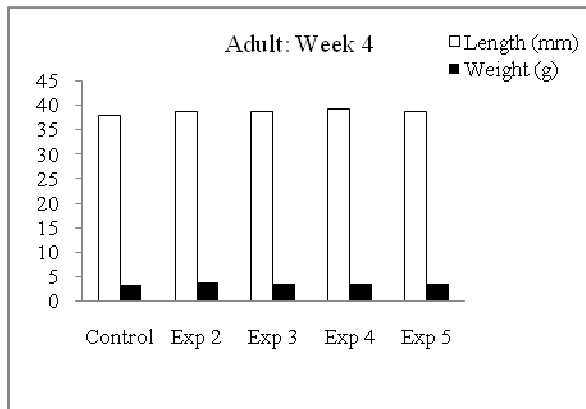


Fig. 2. Variations in weight and length of adult specimens in week 4

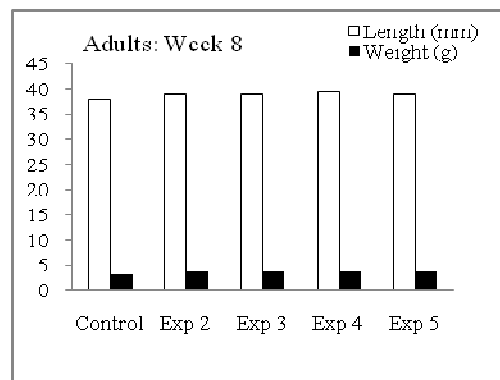


Fig. 3. Variations in weight and length of adult specimens in week 8

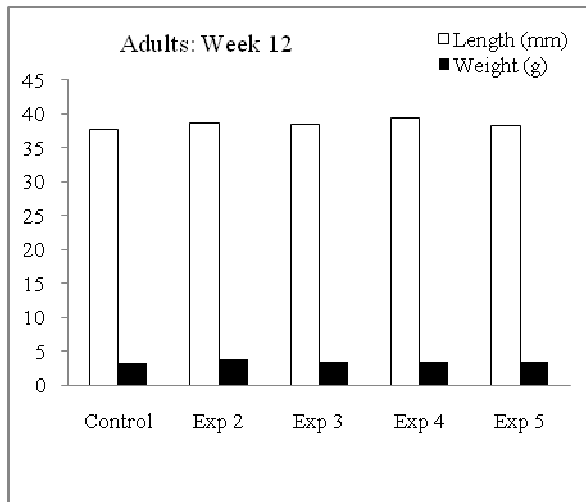


Fig. 4. Variations in weight and length of adult specimens in week 12

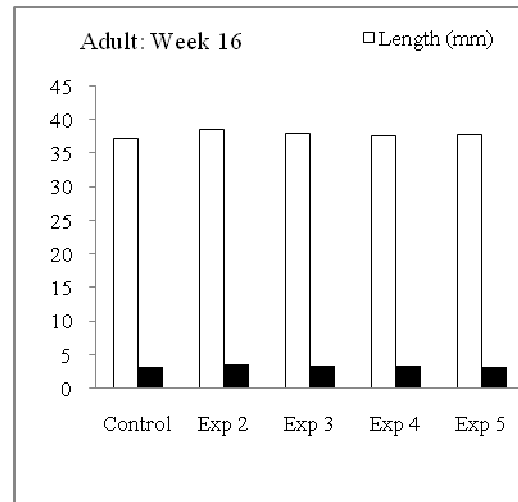


Fig. 5. Variations in weight and length of adult specimens in week 16

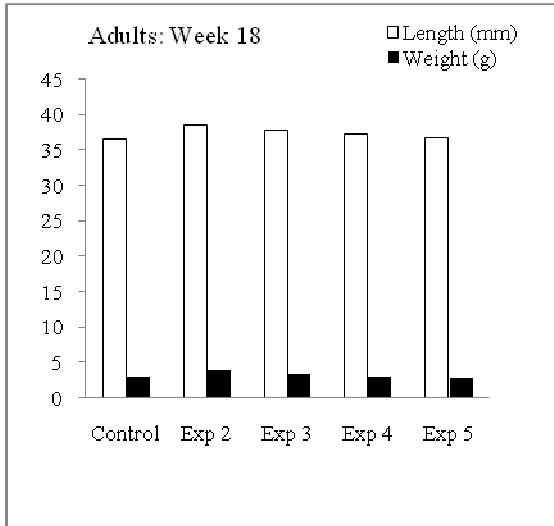


Fig.6. Variations in weight and length of adult specimens in week 18

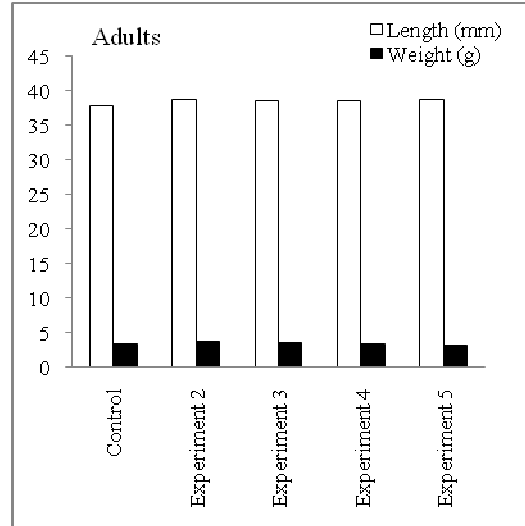


Fig.7. Overall mean values for adult specimens

Growth Pattern in Juveniles

Specimens of juveniles recorded highest overall average length (27.5 mm) and body weight (1.18 g) in experiment 3, while the lowest values (25.63 mm; 0.97 g) were recorded in the control experiment and experiment 3 respectively. Average weight values recorded in other experiments were; 1.03 g, 1.12 g, and 1g in experiments 1, 2 and 5 respectively, while those of length were; 26.56 mm, 26.26 mm and 26.43 mm in experiments 2, 4 and 5.

Variations in length and body weight of juveniles in all the experiments varied greatly (Figs. 8 - 13). In experiment 1, the length of juveniles increased progressively (from 24.85 mm in week 2 to 26.07 mm week 20) throughout the period of the experiment. This trend was also recorded in weight of the specimens which increased from 0.91 g in week 2 to 1.02 g. In experiment 2, appreciable increase in length and weight of juveniles was observed throughout the experimental period. The animals increased progressively in length from 25.2 mm in week 2 to 25.71 mm in week 20, while increase from 0.86 g in week 2 to 1.07 g in week 20 was observed for the weight.

In experiment 3, length of juveniles increased from 25.05 mm in week 2 to 28.38 mm in week 20, while the weight progressed from 0.88 g in week 2 to 1.39 g in week 20. In experiment 4, length of juveniles remained constant, while the weight decreased consistently throughout the period of experiment. The trend observed in experiment 4 was similar to the pattern observed in experiment 5, although in 5, consistent reduction in length was observed in both juveniles and adults.

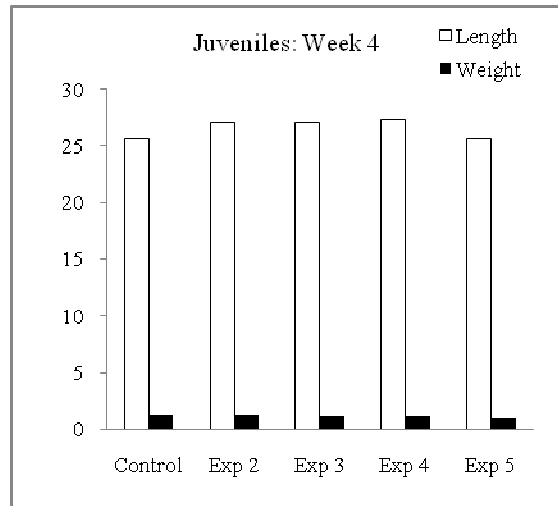


Fig.8. Variations in weight and length of juvenile specimens in week

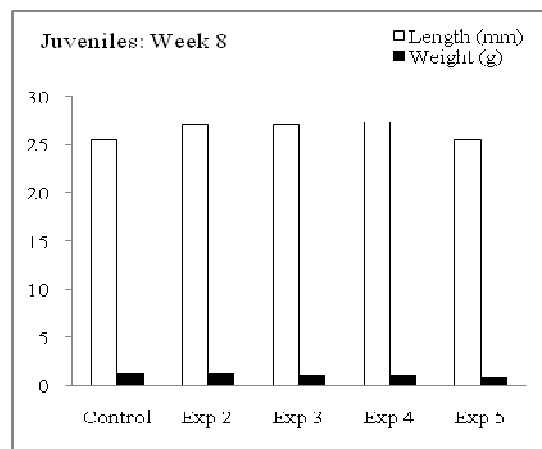


Fig.9. Variations in weight and length of juvenile specimens in

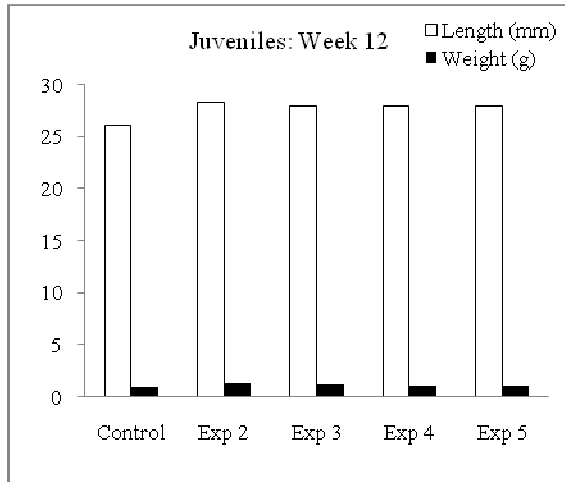


Fig10. Variations in weight and length of juvenile specimens in week 12

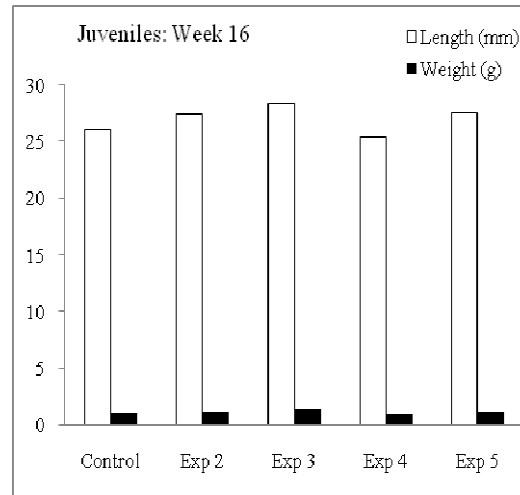


Fig11. Variations in weight and length of juvenile specimens in week 16

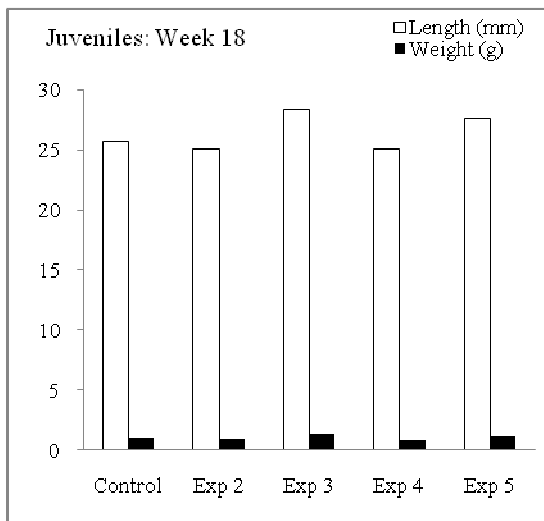


Fig.12. Variations in weight and length of juvenile specimens in week 18

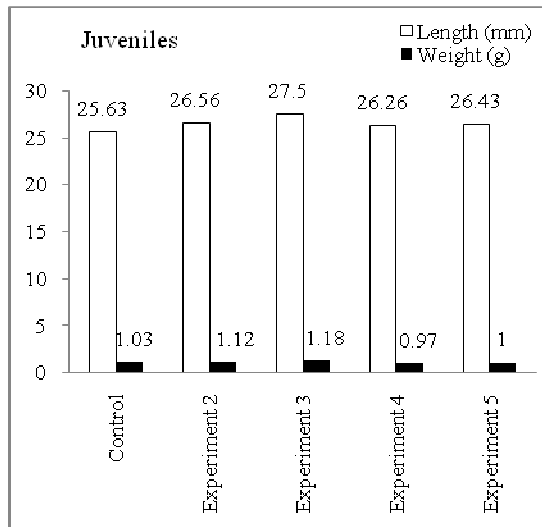


Fig.13. Overall mean values for juvenile specimens

Condition Factor (K)

Condition factor (K) of specimens used in this study varied greatly during the experimental period. For adult specimens, K decreased from 0.006 recorded in week 4 to 0.0006 observed in week 20 in the control, progressed from 0.006 observed in week 4 to 0.007 in week 20 in experiment 2 and remained constant at 0.006 (throughout the period of the experiment) in experiment 3. In experiment 4, K fluctuated between 0.005 and 0.006, while in experiment 5 there was a decline from 0.006 observed in week 4 to 0.005 recorded in week 20. In the juvenile specimens, K increased from 0.006 recorded in week 4 to 0.008 observed in week 8, but decreased subsequently to 0.005 in week 20 in the control experiment. In experiments 2 and 3, values of K increased from 0.005 recorded in week 4 to 0.006 in week 20. Condition factor for juvenile specimens in

experiments 2 and 3 remained constant in the first four months of study and latter increased to 0.006 in week 20. Experiments 4 and 5 recorded consistent decrease from 0.0006 observed in week 4 to 0.006 in week 20.

Relationship Between Number of Water Hyacinth Stands and Growth Parameters

Spearman's correlations between number of water hyacinth stands and growth parameters of experimental specimens (Table 3) indicated that in the adults, there was positive correlation between K ($r_s = 0.16$; $p < 0.5$), length ($r_s = 0.61$; $p > 0.5$) and number of water hyacinth stands, while weight ($r_s = -0.03$; $p < 0.5$) of adult specimens correlated negatively with water hyacinth density. In the juveniles, K ($r_s = -0.90$; $p > 0.5$), weight ($r_s = -0.40$; $p < 0.5$) correlated negatively with water hyacinth density, while length ($r_s = 0.41$; $p < 0.5$) of specimens correlated positively with number of water

hyacinth stands. In the overall, water hyacinth affected the specimens based on the number of stands in experimental tanks. This was more vivid in the juveniles as demonstrated by the negative and significant relationship between number of water hyacinth stands and K in the juveniles.

Table 3. Spearman's correlations between number of water hyacinth stands and growth parameters; +: positive correlation; -: negative correlation; ns: no significant correlation; $p > 0.5$; *: significant correlation; $p < 0.5$.

Growth parameter	Number of water hyacinth stands
Adults	
K	+ns
Length	+*
Weight	-ns
Juveniles	
K	-*0.90
Length	+ns 0.3
Weight	-ns 0.4

DISCUSSION

Effects of Water Hyacinth on Water Quality and Growth of *Pachymelania* Species

In previous researches (Maine *et al.*, 1999; Masifwa *et al.*, 2001; Mangas-Ramirez & Elias-Gutierrez, 2004; Uwadiae *et al.*, 2011) on the impact of water hyacinth on water quality, the most commonly documented effects are lower phytoplankton productivity and dissolved oxygen concentrations beneath mats. Other water quality effects include higher sedimentation rates within the plant's complex root structure and higher evapo-transpiration rates from water hyacinth leaves when compared to evaporation rates from open water (Drake & Mooney, 1989; Giraldo & Garzon, 2002). Photosynthesis is limited beneath water hyacinth mats, and the plant itself does not release oxygen into the water as do phytoplankton and submerged vegetation (Greathead & DeGroot, 1993;), resulting in decreased dissolved oxygen concentration. The extent of dissolved oxygen reduction is dependent on the capacity of the water hyacinth mat to prevent light infiltration into the water column. These assertions may be the justification for the relatively higher values of DO recorded in experiment 5 which had the highest number of water hyacinth stands. Studies have also shown that water hyacinth has been associated with significantly lower concentrations of dissolved oxygen (Uwadiae *et al.*, 2011) when compared to *Hydrilla verticillata* and *Sagittaria lancifolia* L. (Troutman *et al.*, 2007).

The number of water hyacinth stands in experimental tanks (Table 1) also affected growth and well-being of specimens. The average water hyacinth plant absorbed 2.36 mg of ammonium, 1.13 mg of nitrate, and 0.39 mg

of phosphate per kilogram of water hyacinth (wet weight) each hour, therefore, it has the potential to significantly reduce nutrient concentrations in a water body depending on the extent of cover and density (Yahya, 1990; Brendock *et al.*, 2003). The values of phosphate recorded in the various experiments (Fig. 1) attests to this assertion. Phosphate values varied inversely with number and cover of water hyacinth stands in experimental tanks. Rommens *et al.* (2003) and Perna & Burrows (2005) found that littoral sites with water hyacinth in Lake Chivero, Zimbabwe, had significantly less ammonium, nitrate, and dissolved oxygen than limnetic sites or than littoral sites without water hyacinth.

The overall impact of the notorious weed on the specimens is more vivid in the juveniles as demonstrated by the negative and significant relationship between number of water hyacinth stands and K in the juveniles (Table 3). The reason for this may be due to the fact that juveniles may not be strong enough to withstand the stressed condition created by the presence of water hyacinth. Biological respiration increases with increasing plant density and could lead to anaerobic conditions beneath water hyacinth mats, this may be responsible for the poor growth and development recorded for the animals especially in experiment 5. *Pachymelania* species are majorly filter feeders, they depend on a mixture of benthic microalgae and phytoplankton as their food source. Since free floating plants are able to monopolize light and absorb nutrients from the water column, preventing phytoplankton from obtaining sufficient resources for photosynthesis (Brendock, 2003; Greenfield *et al.*, 2007), it limit the quantity of food available to the benthos. Furthermore, water hyacinth can entrap phytoplankton and detritus thereby making their distribution and spread difficult. In the overall, water hyacinth when present in very large numbers seems to limit the productivity of phytoplankton and other microalgae thereby reducing the amount of food available to these gastropods.

Socio-Economic Effects of Water Hyacinth

There are a number of socio-economic impacts associated with water hyacinth infestation. Although, there are some beneficial impacts, the negative impacts are far-reaching when examined on long-term ecological and social-economic scales. The costs of preventing, managing and eradicating the plant pose great challenges to the local fishing folks (Martinez *et al.*, 2007). Water hyacinth invasion into aquatic systems presents a lot of problems for many human uses. The most direct impacts are to boating access, navigability, recreation, and to pipe systems for aquaculture, industry, and municipal water supply. Access to fishing

grounds and fish catchability are also affected (Rommens *et al.*, 2003). Furthermore, evapotranspiration from water hyacinth can exceed open-water evaporation rates by a factor of ten in some areas (Gopal, 1987; Masifwa *et al.*, 2001). This can be a serious concern in water limited areas and small water bodies. Water hyacinth can greatly affect a fishery if it induces changes in fish community composition, or if catchability of harvested species is changed (Meerhoff *et al.*, 2003).

This study has demonstrated the impact of water hyacinth infestation on the growth and condition factor of gastropods which constitute a major component of fish harvested from coastal water bodies in Nigeria. The implication of this is that a lot of efforts are needed to harvest quantity of the gastropod that will meet the markets needs of these peasants. In Lake Victoria, fish catch rates decreased because water hyacinth mats blocked access to fishing grounds, delayed access to markets, and increased fishing costs (effort and materials) (Rommens, 2003). Mats may also block breeding, nursery, and feeding grounds for economically important species. The socio-economic impacts of water hyacinth will also vary in relation to the uses of the water body. An infestation will likely have a greater socio-economic impact when the water body supports several human uses. For a system that is primarily used as a water source, impacts could be measured in terms of changes to water quality. While it is inherently difficult to assign a value to the loss of water quality, a surrogate estimate can be used. In this example, any change in the cost of water treatment could be considered a substitute economic value.

It is also important to recognize that biological impacts and socio-economic impacts may not be immediately realized. Instead damages may increase over time or as a result of synergistic biological or economic interactions. For example, reduced dissolved oxygen may occur as a result of dense water hyacinth mats, but it is the risk of fish kills that would likely draw socio-economic attention. Accounting for all of the impacts is inherently challenging; however, in a world where the invasive species are rapidly increasing, we should begin to prioritize management efforts. The economic cost of controlling water hyacinth infestations is a function of the rate of removal, cost of labor, cost of equipment, and the frequency of treatment. Each of these factors will vary based on the extent of the infestation and the type of control used.

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THE EFFECTIVENESS OF EDUCATIONAL AND AGRICULTURAL EXTENSION ACTIVITIES TO INCREASE THE SKILL LEVEL OF AGRICULTURAL COOPERATIVE MEMBERS OF SEMNAN PROVINCE

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ABSTRACT

The main purpose of this study was to analyze the effectiveness of educational and agricultural extension activities to increase the skill level of agricultural cooperative members of Semnan province. Statistical population of the study consisted of 3357 members of agricultural production cooperative who had participated in the extension education course. Using Cochran formula, 209 persons were selected and at last 209 questionnaires were collected and analyzed. The content and face validity of the instrument was specified after several times of review and correction by the faculty members of agricultural extension and education of Islamic Azad University. The reliability was conducted using Cronbach's alpha which estimated 91% using SPSS16 software. The results showed that there is a significant relationship of 99% confidence between variables including: main jobs, consulting with agricultural experts, visiting a sample cooperative company, having communications with extension agents, watching educational videos and films, having scientific trips, participating in educational and training workshops, taking part in agricultural extension and research programs, the abilities and capabilities of constructors, educational technologies, members' participating in planning and implementing programs along with the effectiveness of educational and agricultural extension activities. There is a significant relationship of 91% confidence between variables including: usage the model members, individual training, and practical environment along with the effective factors to increase the skill of agricultural cooperative members. The result yielded from the collective influence of the independent variables on the effectiveness of the educational and agricultural courses as a dependent variable through a multivariable regression in a step by step way indicated that developmental roles of agricultural extension, educational method, crop-production stages, educational resources, scientific activities explained 59.3% of changes on the dependent variable of skill.

KEYWORDS: effectiveness, education, agricultural extension and education, skill, agricultural production cooperative members, agricultural production cooperative, semnan province

INTRODUCTION

Cooperation is one of the important and economical sections of countries to achieve productive investment. This section can be the basis of economical development to attract investment and to create active occupation when the constraints in production sectors are obviated, internal security coefficient extolled simultaneously we must have some supportive policies and revision of executive laws in order to support investors, have monetary and suitable politics, and regularize effective financial rules (Kluge et al., 2000).

Cooperative companies are the institutes which present social services to their members; we can see them in all economical sectors everywhere and every time (Fairbairn, 2001. P: 24). In Iran constitutes of companies are very important because of some politics like; minimizing state tenure, have programs to achieve privatization, the necessity of people participation. One of these nongovernmental companies in agricultural sector is Agriculture and Production Cooperative Companies that have significant role in minimizing public tenure (Nasimi, 2007).

Agricultural extension and education educate people with different methods and educational tools whereas their goals to create essential changes in knowledge, attitude, skills and aspiration. Because of usage scientific and technical results of modern technologies we can see the better productivity, production increasing and increase in income and at last better condition in members' life. So the importance of agricultural extension and education in changing agricultural and production companies' members and stakeholders is essential as the national capital and human resource of the country and the important section in agricultural sector (Sadeghi, 2009).

Gentry-Van Laanen and Nies (1995) in their study describe how program outcomes can be assessed and used to determine extension program effectiveness, using an evaluative study as an example. The purpose of the study was to determine the extent to which program participants changed their food handling or food preservation behaviors after attending Extension programs. Results indicated that programs were effective in increasing the adoption of safe food handling and safe food preserving behaviors.

Hambleton Heins et al.,(2010) determined the effectiveness of Education for Farm Women' in improving women's skill sets. Illinois farm women who participated in Project were given a pre-test or baseline survey which measured farming practices in the five areas of risk (production, marketing, financial, legal and human resource). The women were later resurveyed. The main methodology to measure improvement in skill is calculated by the difference in the percentage of 'yes' responses from the baseline to the post-test. Results suggest an overall increase of 10.92 percent with the largest improvement occurring in the financial area of risk. The differences in 'yes' responses were found to be significantly different from zero. Multiple regression analysis was also undertaken to determine if socio-economic factors played a critical role in determining who benefited most from Project. The evidence was inconclusive as class participants were not tracked as the identity of individuals was withheld in the post-test surveys. However, age, acres operated, and number of children may play a role in the benefit received by individual class participants. The results suggest that younger women, from smaller farms, most likely with children, seemed to benefit to a greater degree from class participation. Hence older women, likely from larger farms, did not experience the same degree of benefits as the increase in 'yes' responses diminished with age and farm size. Suggested here is that there may be unique needs in this population that need identification. Increases in skill sets likely occur regardless of socio-economic factors, and therefore

programs like this Project will be beneficial to all participants regardless of socio-economic background.

Barrett et al., (2005) in their study about evaluation of the effectiveness of the Caregiver Training Program suggested that extension professionals have a wealth of research-based information and expertise in nutrition, activities of daily living, and resource management. This knowledge is the basis for a new Extension program to train in-home caregivers. Caregiver Training Program designed and delivered by Cooperative Extension academic advisors to enhance the skills and knowledge of the in-home supportive service caregivers. Participants report positive changes in knowledge, skills, attitudes, interest, and self-confidence. Extension is uniquely qualified and positioned to provide training for caregivers to aging adults.

Mahmudul et al., (2002) in a study about "The role of agricultural education in Bangladesh" estimated that there are significant and positive relations between family size, and agricultural background, with effectiveness of these educations to increase income (the amount of duration and classes effectiveness).

The main purpose of this study was the effectiveness of educational and agricultural extension activities to increase the skill level of agricultural cooperative members of Semnan province. The specific objectives of the study were to:

- Study information and the other studies about the effectiveness of educational and extension activities
- To clarify the relationship between variables and effectiveness of educational and agriculture extension activities

It's necessary to mention if we want to increase the capacity building strategy in learning we should use educational program and one of the best methods in agriculture and cooperation sections is educational and agricultural extension activities which it has valid influence on capacity building on stakeholders. It's obvious that this study like the other studies has some limitations such as dispersal of statistical population, unable to popularization the findings to the other samples and societies and time consuming process of supplement questionnaire.

MATERIALS AND METHODS

The researchers conducted a study using an applied survey research design and it was causation-correlation according to the methodology. This study was conducted in Semnan, Shahrood, Garmsar and Damghan Township that they have 444 agricultural and

production cooperative companies and 3357 members. The target population of the study was all the cooperatives' members in these four townships. The target population was 209 persons using Cochran formula. The sampling method of this study was stratum random sampling. The data collection instrument was a closed-form questionnaire. A panel of experts reviewed the instrument for face and content validity. A pilot study was conducted to establish the reliability of the instrument. Reliability coefficient (Cronbach's alpha) was 0.91. The statistical analysis utilized the Spearman's rho and multivariate linear regression.

RESULTS AND DISCUSSION

Table 1 shows that the maximum frequency of members is 26 to 30 years and 23% of them are in this range of ages. The elderly member of the companies was 68 years and the youngest member was 23 years. It shows that the most members are young that can help to achieve the goal of educational plans. The main job of 31% of members was agriculture. 23.7% of person's job was ranching, 12.6% of them have free job and 26.8% of people have employee and 5.6% was multiple jobs. In regard of educational level of people the results show that 6.5% were illiteracy, 4% primary, 2% guidance, 29.6% high school, and the rest had academic degree. The results show that 36% of members with the most frequency of 71 people suggest that they participate in batten companies, 28.4% participate in greenhouse companies, 8.1% participate in birds companies, 14.2% were the member of milk companies and 13.2% were members of the other companies. The average years of participation in companies were 5.3 years, that minimum years of participation was 1 year and maximum was 20 years. The most frequency was related to category of 3 to 4 years participation in companies. Table 2 shows the relations between the variables of the study that was conducted with respective correlations.

The results of Spearman's correlation coefficient show that there are significant relations of 99% confidence between variables of basic job, visit of model companies, contact with change agents, display films, scientific trips, reading journals and leaflets, participation in extension and research projects, educational duration of product output, the ability of educators, human resource development, educational technology usage, members participation in design, performance and evaluation of the programs with the effectiveness of extension and educational activities to increase the skill of company members.

There are significant relationships of 95% confidence between variables of consult with expertise, visit of companies, educational films and videos, participation

in educational workshops, concord with educational contents, with the effectiveness of extension and educational activities to increase the skill of company members, and there is no relationship between variables of members age, educational level, annual income, membership background, the amount of income from company, cultivated land, radio and TV usage, local leadership, experienced co-workers, the members of model companies, speech, group discussion, question and answer sessions, seminars, practical environment, increase of products and income, participation in educational classes with the effectiveness of extension and educational activities to increase the skill of company members. Independent variables were used for a multivariate linear regression analysis. The regression analysis shows variables that were statistically significant. The results indicate that 77% ($R^2 = 59.3$) of the variance in the effectiveness of extension activities in changing the members skill of cooperation companies could be explained. The first variable that enter to equation was developmental role of extension that has the most role in effectiveness of extension activities ($\beta=0.770$). In the next steps, after developmental role of extension, the second variable that enters to equation was educational methods, and after that the steps of produce output, educational resources, and scientific activities (table 3).

The result of correlation coefficient shows that there was no relation between member's age and skill increasing, so the null hypothesis accepted and the research hypothesis was rejected, it was concluded that member's age and extension activities are independent. The researches of Motamed (2007) and Ghane (2006) confirm this finding.

The result of correlation coefficient shows that there was significant relation of 99% confidence between two variables of members' job and skill increasing.

The result of correlation coefficient shows that there was no relation between educational level and skill increasing, so the null hypothesis accepted and the research hypothesis was rejected, it was concluded that educational level and extension activities are independent. The researches of Mighati (1997), Koneshloo (2005) and Zavar (1995) confirm this finding.

The result of correlation coefficient shows that there was no relation between total annual income and skill increasing, so the null hypothesis accepted and the research hypothesis was rejected, it was concluded that total annual income and extension activities are independent.

The result of correlation coefficient shows that there was no relation between membership backgrounds and skill increasing, so the null hypothesis accepted and the research hypothesis was rejected, it was concluded that membership backgrounds and extension activities are independent. The research of Motamed (2007) confirms this result.

The result of correlation coefficient shows that there was no relation between The amount of income from company and skill increasing, so the null hypothesis accepted and the research hypothesis was rejected, it was concluded that the amount of income from company and extension activities are independent. The research of Khademi (2005) confirms this result.

The result of correlation coefficient shows that there was no relation between cultivated land and skill increasing, so the null hypothesis accepted and the research hypothesis was rejected, it was concluded that cultivated land and extension activities are independent. But the researches of Khademi (2005), Koneshloo (2005) and Aeeni (2001) indicated that there is significant relation between these variables.

The result of correlation coefficient shows that there was significant and positive relation of 95% confidence between two variables of accessibility to information sources (Consult with extension expertise, Visits of model companies, educational films & videos) and skill increasing. So the research hypothesis accepted and the null hypothesis was rejected. The researches of Motamed (2007), Ghane (2006), and Ghenaat (2009) confirm this result.

The result of correlation coefficient shows that there was no relation between two variables of Participation in educational classes and skill increasing. So the null hypothesis accepted and the research hypothesis was rejected.

The result of correlation coefficient shows that there was significant and positive relation of 95% confidence between two variables of participation in educational workshops and skill increasing. So the research hypothesis accepted and the null hypothesis was rejected. The researches of Motamed (2007) and Ghenaat (2009) confirm this result.

The result of correlation coefficient shows that there was no relation between the ability to use the educated content and skill increasing, so the null hypothesis accepted and the research hypothesis was rejected.

The result of correlation coefficient shows that there was no relation between two variables of the role of practical education in order to increase income and skill

increasing. So the null hypothesis accepted and the research hypothesis was rejected.

The result of correlation coefficient shows that there was significant and positive relation of 95% confidence between two variables of the use of educational methods (demonstration, personal education) and skill increasing. So the research hypothesis accepted and the null hypothesis was rejected. The researches of Motamed (2007), Koneshloo (2005), and Ghenaat (2009) confirm this result.

The result of correlation coefficient shows that there was significant and positive relation of 99% confidence between two variables of the effect of educational programs to produce crops and skill increasing. So the research hypothesis accepted and the null hypothesis was rejected.

The result of correlation coefficient shows that there was significant and positive relation of 95% confidence between two variables of educational content and skill increasing. So the research hypothesis accepted and the null hypothesis was rejected. The research of Motamed (2007), Sadeghi (2009), koneshloo (2005), Ghenaat (2009), Hedayat nejad (2000), and Aeeni (2001) confirms this result.

The result of correlation coefficient shows that there was significant and positive relation of 99% confidence between two variables of the factors about educator, technology, and participation and human resources with skill increasing. So the research hypothesis accepted and the null hypothesis was rejected. The researches of Motamed (2007), Ghane (2006), and Koneshloo (2005), Heydariyan (1996), Zavar (1995), Hedayat nejad (2000), Sadeghi (2009), Aeeni (2001), Khademi (2005), Molaei (2005) and Ghenaat (2009) confirm this result.

CONCLUSION

There are significant relation between two variables of the main job and the effectiveness of classes. Extension agents have effective relation with cooperative members, too. It can be useful to take advantage of radio and educational films and programming some visits of model cooperatives. In this regard the following recommendations proposed:

- Planning classes in order to members' job
- Have a plan to contact with extension agents
- Prepare practical environment and educational workshops for cooperative members to practice the methods and content
- It's important to use new methods but in accordance to members need and interests. In order to this point it should be considered to participated members in planning, doing and evaluating programs.

- It should be considered to promote technical section of programs and comparative to the new researches and findings.
- It can be effective to present leaflet, journal, and posters to educated members and use educational films for illiteracy members.
- The educators should consider economic, social, and technical situations of persons before planning the classes and present subjects according to their needs and interests.

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APPENDIX

Table 1: Frequency distribution of personal characteristics of respondents

Personal characteristic	Categories	Frequency	Valid percent	Cumulative percent
Age N=209 Minimum=23 Maximum=68 Standard deviation=1.0 Mean=39.37	Until 25	10	5.0	5.0
	26-30	46	23.0	28.1
	31-35	29	14.5	42.7
	36-40	24	12.0	54.8
	41-45	48	22.5	77.4
	46-50	6	2.0	79.4
	More than 51	30	14.0	93.5
The main job of members N=209 Minimum=employee Maximum=agriculture	No response	16	6.5	100
	Agriculture	63	31.3	
	Ranching	49	23.7	
	Free	25	12.6	
	Employee	58	26.8	
Educational level N=209	The other	14	5.6	
	Illiteracy	15	6.5	6.5
	Primary	8	4.0	10.6
	Guidance	4	2.0	12.6
	High school	62	29.6	42.2
Diploma	43	20.1	62.3	

	Technician	62	30.2	92.5
	Bachelor of art	15	7.5	100
Cooperative type N=209	Batten	76	36.0	
	Greenhouse	59	28.4	
	Birds	18	8.1	
	Milk	29	14.2	
	The other	27	13.2	
Agricultural activities background N=209 Minimum=1 Maximum=20 Standard deviation=3.7 Mean=5.3	1-5	42	22.7	22.7
	6-10	10	5.4	28.1
	11-15	9	4.9	33
	16-20	2	1.1	34.1
	More than 20	1	0.5	34.6
	Without any background	121	65.4	100

Table 2: The relations between variables

The first variables	The second variable	R	P
Members age	Skill	-0.037	0.820
Basic job	Skill	0.321**	0.000
Educational level	Skill	0.163	0.315
Annual income	Skill	-0.176	0.345
Membership background	Skill	0.048	0.786
The amount of income from company	Skill	-0.349	0.111
Cultivated land	Skill	0.027	0.868
Consult with expertise	Skill	0.310*	0.045
Radio and TV	Skill	0.236	0.133
Local leadership	Skill	0.286	0.067
Experienced co-worker	Skill	0.067	0.675
The members of model companies	Skill	0.220	0.162
Visit of model companies	Skill	0.319*	0.039
Educational films and videos	Skill	0.387*	0.011
Speech	Skill	0.019	0.903
Group discussion	Skill	0.179	0.277
Question and answer sessions	Skill	0.091	0.575
Seminar	Skill	0.016	0.922
Practical environment	Skill	0.232	0.144
Increase of product and income	Skill	0.231	0.142
Participation in educational classes	Skill	0.274	0.079
Contact with change agents	Skill	0.480**	0.002
Visits of model companies and farms	Skill	0.554**	0.000
Display films	Skill	0.492**	0.001
Scientific trips	Skill	0.581**	0.000
Participation in educational workshops	Skill	0.309*	0.050
Reading journals and leaflets	Skill	0.471**	0.002
Participation in extension and research projects	Skill	0.583**	0.000
Educational duration of product output	Skill	0.405**	0.008
Concord with educational contents	Skill	0.368*	0.018
The ability of educators	Skill	0.643**	0.000
Educational technology usage	Skill	0.576**	0.000
Human resource development	Skill	0.664**	0.000
Members participation in design, perform and evaluation of the programs	Skill	0.725**	0.000

** P<0.01, *P<0.05

Table 3: Multivariate regression analysis

Variable	B	Standard error of Beta	Beta	T	Sig
Constant	0.587	0.371	---	3.583	0.042
developmental role of extension	0.800	0.112	0.770	7.142	0.000
Educational methods	0.205	0.069	0.304	2.956	0.006
The steps of produce output	0.754	0.485	0.167	2.563	0.004
Educational resources	0.725	0.326	0.066	3.460	0.000
Scientific activities	0.401	0.182	0.272	2.129	0.006

THE FACTOR ANALYSIS OF EFFECTIVE FACTORS TO IMPROVE THE MANAGEMENT GREENHOUSE OF PLANT

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ABSTRACT

This study purposed to identify the effective factors to improve the management greenhouse of plants that was performed in Pakdasht city. Type of research is the practical and examined to Descriptive-scrolling method. Research instrument was a questionnaire that its validity was confirmed according to the view of professors and advisors. In order to determine the reliability of the questionnaire was completed number of 30 questionnaire by greenhouse-owners (outside the statistical population) and was calculated the Cronbach's alpha coefficient (in the range of 93% -77%). The research population consisted of all greenhouse growers of flowers and ornamental plants in the Pakdasht city that total number of persons was 822 and according to simple random sampling were selected the number of 182 peoples as samples to complete the questionnaire. Data were analyzed by using software SPSS17. In order to identify the effective factors to improve the management greenhouse of plants in Pakdasht city from the perspective of greenhouse owners was used of exploratory factor analysis. The results showed that 6 factors in improving the management of greenhouse plants has a role in the Pakdasht city respectively that the first is educational content in promotions training (by 22.47% of the variance), the second is the feature of promoters (the 9.52 % of variance), the third factor is educational-promoting (With 7.62 percent of the variance), the fourth factor is Scientific (6.77% of the variance) The fifth factor is communication (with 5.35 percent of the variance) and sixth step is technical (about 3.95 percent of the variance) that justify effective factors to improve the management greenhouse of plants in Pakdasht city in the perspective of greenhouse owners. This approach leads to new methods of production to achieve quality food

KEYWORDS: greenhouse owners, knowledge, skills, greenhouse management, pakdasht city

INTRODCUTION

In this century, overcoming to the crisis of shortages energy and food and optimal use of resources, has attracted the scientists attention, this approach leads to new methods of production to achieve high quality food and quantity with low cost per unit area (Beyes, 2001). A new method of its application that is not more than two decades in developing countries, exploitation of the greenhouse in which to production is used the surface instead of the creation space (Engindiez, 2000). Created the greenhouses and intensive exploitation, along with the use of new techniques, to beneficiaries who have limited land and water, it can possible that in spite of the limitations ;due to increased performance and better quality of production, to earn enough money (Rustaie, et al., 2011). In Iran, products cultivation of greenhouse has so much spread popularity in recent years, due to being profitable and having a good income to the farming in outdoor areas, has a lot of interest (Rahmani et al., 2013). It should be noted that commercially produced plants with high quality and the success and profitability of the business due to its high initial investment, it will only possible when producing comply all scientific principles, practical and

economical to construct and equip the greenhouse and by using of science and modern technology and applied a management and technical of all circumstances necessary to provide the growth optimal plant so produce the higher quality and quantity production in the markets of world. Any failure to pay any attention to this matter as an inappropriate choice to locate the construction of greenhouses, Choosing the wrong frame, coverage and lack of necessary equipment and most importantly the lack of proper management and technical control in greenhouses (planting, harvesting), Excessive use of chemical pesticides and chemical fertilizers and so causes the lack of appropriate productivity And damage will be imposed on the manufacturer (Jafarniya and Homaei, 2007). Undoubtedly, increasing the productivity in an agricultural sector need to increase the level of knowledge more than anything, and skills of individual agricultural

Farmers, this involves to provide training of agricultural farmers. But this training should be directed and based on the records of research where operators requires to

improvement and promotion their needs of knowledge and skills, this matter cannot be achieved through the component of determined and calculated program. Training is mediator that binds agriculture to the economy and increase productivity through awareness and builds a bridge between the concepts (Kemp et al., 2004). Since the production of flowers and ornamental plants have a special place in the national economy, greenhouse owners need for improved management of their organizations, to increase the quantity and quality of production move foot by foot to utility-technology. Greenhouse optimal management recognized strategies for the sustainable development of the agricultural sector; in addition to the function of livelihood in order to be more competitive agricultural sector. And development of it can be very effective. . According to favorable conditions in country are abundant in terms of climatic characteristics and resources, development and management of greenhouse can very good rule to job opportunities for educated workforce in increasing agricultural production, (Ghonchi et al., 2011). Success in greenhouse production of the system related to the provision range of data generated in different stages of the establishment, management and production.

On the other hand manufacturers of production greenhouse of Pakdasht city, most of their required information is received to distributed and different forms and in some circumstances when, where and how does not inconsistent and causes confusion, losses, damages and even bankruptcy; therefore greenhouse owners must have a real understanding of the training needs (needs the knowledge, attitudes and skills), fundamental efforts in order to elevated and pave the way that was full of ups and downs and Identify the important requirements and the hearts of those excellence proved opportunities Created for greenhouse owners. Considering the fact that production out of season is a special economic importance for producers in recent years. It seems that the increase in greenhouse cultivation not only helps to increase the production in each unit area, But also contribute to higher productivity of soil and water and can be possible to provides the out of season and the variety production which are available to the consumers. The need to knowledge management in the production of greenhouse crops has caused to be viewed as a technical, commercial agriculture. So many people are interested in obtaining information and have appropriate skills in this type of production system. But according to the budget allocation of technical not considered suitable for technical teaching so this can be ignored the inadequacy of the goals, cause the losses of human and financial capital of the country. It seems that, this type of production system requires a coherent program to educate and empower the audience (Sabouri and

Minaei, 2010). The farmers, who have access to extension services, earn more income in per hectare. The researchers recommend that extension agents must do more to have access to the farmers, the effective coverage areas and the transfer knowledge of the useful information to move them in increasing the profitability Measure. Adereti et al (2006), stated that the information is essential for farming activities and this work should be done by promoting, They conclude that a meaningful and useful promotional messages to help farmers that have a correct decision, they are discussed three criteria: accuracy, Timeliness and the connection to quality of stable and practical information.

Sabouri and Minaei (2010) classified the training needs of greenhouse owners in 5 groups: Stages (include land preparation, planting and germination of seeds); the steps of (aeration and temperature, humidity, light, combat pests, diseases and weeds); pruning of shrubs, proper irrigation, use of micronutrients; Warehousing, picking, packing and marketing. From the view of greenhouse is the best educational methods, meet face to face with the promoters and technicians Use of publications and magazines, displays result, participate in educational courses, watching the educational movies, showing the way and visiting experts from the greenhouse. Khanjari and colleagues (2009). Entitled The Effect of experts to promote research on the performance of the greenhouse that carried out in Sistan which results emphasize in the transfer of technology and expertise to promote the use of promotional visits for experts.

TabatabaiFar (2003), showed that the significant positive correlation between independent variables of education, cropping area of cotton and extension education programs with varying the levels of educational needs, the independent variables of age, attending educational courses, number of hits from cotton plantations, frequently meet and communicate with the promoter and existed a significant and negative relationship to use of educational journals and magazines with varying educational needs. Asadi and Akbari (2008), in his review of the most important ways to influence the attitude of the audience, the media (radio and television) and the least effect on print of newspapers and magazines, were introduced in their review of the most important ways to influence the attitude of the audience, the media (radio and television) and the least effect on print of newspapers and magazines, were introduced. PezeshkiRad and Agahi (2008), showed a vegetarian diet, To use of pesticides and marketing of manufactured products were most important of educational needs, Also the results showed that in order to visit the farms; Visit the pioneer farmers fields, promotional publications, and is desired the

educational films of farmers. Yasmin et al (2011), showed a significant positive correlation between participation in training courses to increase production and earnings. In the research of Rahima et al (2013), a factor that improves the diversification of crop production is included; Gender, education, commercial experience, membership in cooperative, ownership of resources, characteristics of land, access to extension services and transaction costs; according to the findings of this research is recommended to governments, that notice to women participation in promotional activities, investing in formal and informal education of farmers, creating an incentive for employees to promote and improve the extension. In this study try to investigate the role of advocacy in the flowers and plants management of greenhouse for evaluate the affecting factors of flowers and plants greenhouse of management.

The findings of this study would be necessary to strengthen the management of platform to provide optimal greenhouse owners. . Therefore, this study aimed to examine the affecting factors of flowers and plants greenhouse of management that has been done in Pakdasht city. Specific objectives of this research are:

- Prioritization of the affecting factors of flowers and plants greenhouse of management;
- Investigate the role advocacy training;
- Evaluation the effects of each factor in the flowers and plants management of greenhouse.

MATERIAL AND METHODS

The present study is an applied research and in terms of methodology, casual-Relative research by using of factor analysis the tools of collection Information is questionnaire. To develop a questionnaire, initially, were examined theoretical foundations of the resources and authorities; after taking into consideration the results of the studies, was prepared preliminary questionnaire .The final questionnaire was designed after e ensuring of the validity and reliability, and carry out the necessary reforms, To evaluate the validity study, a questionnaire was used designed to instructors and counselors; so was confirmed the validity of the questionnaire after performing necessary corrections and changes some of the questions, to test the reliability of the questionnaire were completed 30 questionnaires by greenhouse owners (outside of statistical population) And was calculated Cronbach's alpha (in the range of 93% -77%) for this present study was suitable the reliability coefficient. statistical population were all greenhouse growers of flowers and ornamental plants in the Pakdasht city. According to documents that the Department of Agricultural Extension in Pakdasht city, their number was 822 persons; and according to a random sampling were selected the number 182 subjects

to complete the questionnaire. In order to analyze the data collected was used of the SPSS17 software. In the statistical descriptive of Statistical average and standard deviation and were used of factor analysis in inferential statistics.

FINDINGS

According to some opinions, increasing age of persons can be effective to the management of their production units, in this study, it is possible, Based on information extracted from 182 questionnaires and can be seen in the table that all of the respondents have more than 25 years of age and the maximum age is 76 years. The highest frequency is in the 51 - 63 group (59 cases), average age of the respondents is 48. 61, deviation standard is 12. 65 And the variance is also 38.3. Other features are in the table. In this study, 3.10 % of the study populations are illiterate, 26.4 % less that diploma, Associate Degree 2.3 percent, 9. 8% of BA and 3.2 percent have MA or higher, the most frequent related to Diploma and the minimum frequency related to associated of Diploma, masters degree (MA) and above. The findings in relation to area under cultivation suggests that the average surface area is under cultivation of greenhouse owners is 6304.2; which shows that the majority of greenhouse owners of high area under cultivation. Minimum area under cultivation is 500 square meters and the largest area under cultivation is 30,000 square meters. As the table shows the average income of greenhouse owners is 1571000 in the month (one million five hundred and seventy-one thousand) which indicates a high level of income. The lowest of earnings is 500 thousand Tomans and the maximum of earnings is 9 million. According to the findings, the average number of the household is 4 people. The lowest number of households is 1 and the largest numbers of households are 7 peoples. As the table shows the average number of training courses is 5.2 times. The lowest number is 1 and the maximum number is 6 times.

Effective factors to improve the management greenhouse of plants in Pakdasht city to determine the most Effective factors to improve the management greenhouse of plants in Pakdasht city was used of factor analysis. The calculations done in Table 2 show that in order to assess the internal consistency was used of data to take advantage of factor analysis, KMO and Bartlett's test. The calculated KMO is (0.713) and the amount of Bartlett was significant (1217.2), ($P < 0.001$) which shows good correlation of the variables that considered for the analysis. As Figure 1 shows a set of graphs (Screw Plot) was used of eigenvalues and percent variance. That was identified in total (55.68) percent of the total variance based on six factors.

Table 1. Frequency distribution of respondents' personal characteristics

Individual characteristics	Strata	Frequency (n)	Cumulative percentage	Reliable percentage
Age: n =182 Minimum = 25 Maximum = 59 Standard deviation = 12.65 Average = 48.61	25-37	40	22.9	22.1
	38-50	50	51.4	28.6
	51-63	59	85.1	33.7
	64-76	26	100	14.9
	Unanswered	7	-	-
Education: n =182 Icon: Diploma Middle: Diploma	Illiterate	18	10.3	10.3
	Low literate	46	36.8	26.4
	Diploma	85	85.6	48.9
	Associate	4	87.9	2.3
	Degree BA and higher	17	97.7	9.8
	Unanswered	4	100	2.3
Area under cultivation: n =182 Minimum = 500 Maximum = 30000 Standard deviation = 6752.4 Average = 6304.2	500-8785	140	79.1	79.1
	7876-15251	21	91	11.9
	15252-22627	9	96	5.1
	22628-30003	7	100	4
	Unanswered	5	-	-
Income: n =182 Minimum = 500 Maximum = 9 million Standard deviation = 1.171 Average = 157,100	500-2200	141	77.8	7.5
	2201-3901	21	89	11.5
	3902-5602	1	89.6	0.5
	5603-7303	0	91.2	1.6
	7304-9004	3	100	8.8
Number of households: 182 n = View: 4-1 people Average = 4	1-4	142	78.9	78.9
	5-8	38	21.1	21.1
	Unanswered	2	-	-
Number of company n =182 Minimum = 1 time Maximum = 7 Average = 2.5 with	1-3	123	75	75
	4-6	41	100	25
	Unanswered	18	-	-
	Total	182	-	100

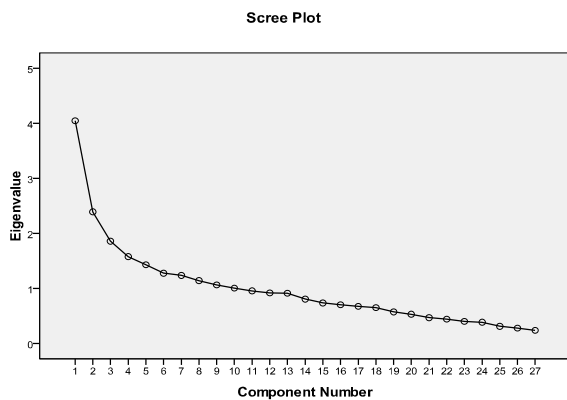


Figure 1: Screen Plot chart to determine the number of factors

As also shown in Table 2 can be seen in this study, according to the Kaiser criterion, Six factors were extracted with higher eigenvalues of one for the effective factors to improve the management greenhouse of plants in Pakdasht city. After rotation of varimax method, Variables related to effective factors to improve the management greenhouse of plants in Pakdasht city were classified in six factors.

Table 2: Operating extracted, maximum eigenvalues, percent of variance and cumulative

factors	maximum eigenvalues	Percent of the value variance	Percentage of the total variance
First	10.43	22.47	22.47
Second	4.21	9.52	31.99
Third	3.16	7.62	39.61
Four	2.94	6.77	46.38
Five	2.78	5.35	51.73
six	2.01	3.95	55.68

The first factor with eigenvalues was clarified of 10.43 alone to the Percentage 22.47 of its total variance (Table 3). The first factor has the highest share (22.47) and the sixth factor has lowest share (3.95) to explain the variable and a total of six factors could be explained the 55.68 percent of the total variance that shows a high percentage of the variance explained by this factors. The position of variables (27 main variables) in factors with the assumption fact of the variables with loadings greater than 0.5, after rotation of varimax method to designation and Nomenclature of factors to following table (3); so can summarize these factors in other variables. According To the component of variable factors, the first factors name to educational content in

Promotion teaching ,the second factor name to science factors, fifth factors name to communication promoters of features factors, the third factor name to factors, the sixth name to technical factors. education-promoting agents, the fourth factor name to

Table 3: Variables associated with each of these factors and the coefficients obtained from the matrix of the findings

name	Variables	Amount of coefficients
The educational content factors In Promotions teaching (1X)	Fitness to the topic	0.683
	Strengthen the learning students	0.641
	Establish the relationship between the environment and job environment	0.629
	Being In level of audience	0.554
	Learning opportunities for learners	0.553
	Developing an attractive, understandable preparation	0.508
Characteristics factors of promoters (2X)	Preparation for employment	0.501
	Characteristics of promoters (the transfer of knowledge, ability to work, the use of educational materials)	0.831
	provide training of Theoretical and practical method	0.762
	Practical experience and teaching experience In field or intended profession	0.747
	Strong motivation to teach and motivate for learners in action	0.698
Training-promoting factors (3X)	Having the spirit of innovation and creativity in action	0.657
	Hordes approach	0.624
	A team approach	0.564
	Individual approach	0.535
Scientific factors (4X)	Having the up to date of information in field of intended profession	0.566
	Having the power to apply theoretical knowledge with high skills	0.533
	Surrounded the relative To the day theoretical knowledge in relation to intended profession	0.505
	Rhetoric and the transmission power of their knowledge and skills to learn	0.502
Communication factors (5X)	Communication with other farmers	0.601
	Communication with local leaders and technical	0.586
	Communication with extension workers	0.584
	collaboration In Promoting research of projects	0.544
	Connection with Research	0.512
Technical factors (6X)	Operations in real environment	0.659
	Solve the problems of farmers in the greenhouse	0.638
	Application of scientific principles and laws	0.534

DISCUSSION AND CONCLUSION

By doing the factor analysis of 27 variables, the effective factors to improve the management greenhouse of plants in Pakdasht city were classified in six factors. Components factor analysis of effective factors to improve the management flowers and plants of greenhouse showed that changes related to 55.6 of the six factors educational content explained in the promoting training, Characteristics of promoters, educational promoting, scientific, communications and technical factors; the first factor is the value of 10.43 and alone is 22.47 percent of the total variance. It can be concluded that involved the content of education in promoting education than other agents, to improve the management flowers and plants of greenhouse. Ford (2005) showed the educational priorities of small farmers in the western United States of Tennessee that has been included of marketing of products, activities related to soil conservation, use of pesticides. Also in the study conducted by Latimer et al (2002), their educational needs including the management of plant nutrition, how to organize tasks related to automation of greenhouse, Activities related to the process maintenance of plants in greenhouse and were raised the

management of water in the greenhouse. Since the above studies, educational content is taken into consideration, is similar with the present study. The results Sabouri and Minaei (2010), Aieni (2009) is in line With the research and it confirms. The results Tabatabai Far (2003) showed that existed a significant and negative relationship between the frequencies of contact with promoters the varying of educational needs. The research mentioned, in terms of promoters features is similar with the present study. Assadi & Akbari (2008) in a study were introduced the most important channels for influence on the audience's view of the media (radio and television) and the least effective on the printed newspapers and magazines. The results of the study Pezeshki-Rad & Aghai(2008) showed that visit the farm, progressive farmers fields, publications, promotional and educational films was a desired and targeted of agricultural methods. Since the above research, training-promoting factors are taken into consideration, is similar with the present study. Medical Research of Sabouri and Minai (2010) is in line to the research and it confirms. Aieni (2006) Relationship practical application of teaching methods and visit the farm and the ability to apply theoretical

knowledge to increase the production is positive and significant quality of education. The research mentioned is similar in terms of scientific research. Tabatabaeifar et al. (2003) showed that high levels of contact to extension services, education, ownership of land and greater access to information leads to greater understanding of the importance of sustainable agricultural practices. Since in this study, the communication factors are taken into consideration is similar to this present study. Gaedi and HusseinNiya (2009) in this study showed that; familiar with the rules, Familiar with how to transfer the experiences and new knowledge to people who working in the farm, familiar with the modern methods of crop production, Familiar with the methods for monitoring the production process for quality control and maintain the marketability manufactured products and familiar to modern methods of packaging the manufactured products of training needs to be exploited. Since the above studies, technical factors are taken into consideration, which is similar to present study.

SUGGESTIONS

According to the results of this research and the important effectives of various factors on the improvement of greenhouse management, the following suggestions are offered:

- Teaching methods used in teaching owners of greenhouse should be caused the involved in the subject of teaching and greenhouse owners will be encouraged to learn.
- Must be such that learners automatically, independent, interestedly carry out the agricultural activities.
- trying by the experts and promotes in order to enhance the technical skills in agricultural efforts
- Advisors through educational promoting programs may be able to improve significantly the management of greenhouse growers, they can help farmers to better and more informed decisions, Acquiring skills that will help them to analyze for making their decisions.
- Promoters and agricultural experts should be surrounded on the theoretical knowledge about the job and have the strong incentive to teach in action.
- The experienced experts more contact with greenhouse owners of area and with frequent meetings transferred the necessary information about methods of improving their management of the greenhouse.
- Promotional service centers for send experts to greenhouses, Choose the people who have strongly associated in terms of psychological with greenhouse growers and attracted their views.
- Educational content developed and updated which based on scientific findings and new initiatives.
- Educational content should be prepare and compile as charming and comprehensible.

- Educational content should be developed based on the knowledge of learners.
- Of individual media such training more used as face to face because farmers can get better their issues with experts and also use individualized education Causes more interactions of greenhouse owners with the experts and greenhouse owners can have more time with experts to exchange ideas.
- Visiting the successful greenhouses leads to encourage farmers to use modern methods of cultivation.
- Practical and grouper training to improve the management of experts to consider the greenhouses is more effective and better.
- Since the most greenhouse owners have cell phones, it is best to communicate with them Experts have call contacted with greenhouse owners and transfer self-information to them.
- Beneficiaries and farmers are encouraged to participate in group activities.
- the organization of Jihad Agriculture, centers and Services of areas prepare the visiting of the progressive and successful greenhouses in the field of producing.
- Training – promotion courses on farm extension and research and will be held on-the farm research in the field of promotion and demonstration farms of greenhouse cultivation.

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CONFERENCE PAPERS ADDENDUM

EMPIRICAL EVIDENCE ON LOCUS OF CONTROL AMONG OWNER AND MANAGER AND ITS RELATION TO SUCCESS FIRMS

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ABSTRACT

The aim of this study was to verify whether there is a difference among owner and manager with respect to locus of control, and show whether there is a significant correlation among the variable locus of control and success of the company. They surveyed 58 owners and 52 managers from the small and medium enterprises in the San Luis Potosí area. The information was obtained through the Locus of control questionnaire of Spector (1988). Independent two-sample *t*-test and Pearson correlation coefficient was utilized to analyze data. The finding allows us to say: the locus of control is not a variable that allows categorize the owner and manager. Also, in this study it allowed us to know that the locus of control owner contribute to the success of the SMEs. Even when the work locus of control is an attribute that no difference in both other-and owner-manager is beneficial strengthen developing an organizational culture with high ethical standards, because the managers, with a culture as it is, develop and strengthen over their locus of control.

KEYWORDS: locus of control, success firms, owner and manager locus of control.

INTRODUCTION

Globalization of markets and the precipitated technological changes, as noted Kauffman (2000) placed the company in a different setting affecting its objectives, functions, decisions and competitive advantages. These changes have influenced unfavorably and forceful in small and medium enterprises (SMEs) to raise transnational parameters for products: higher quality at lower prices. Many small and medium enterprises, in this period of change, have found it necessary to suspend activities. This incident arose because SMEs are not able to compete internationally renewed with quality and in demand in the international market price (Iturbide, 2003).

Being the core business systems regional, national or international backbone of any economy, whether local, its importance seems to be an indisputable fact, and one of the main criteria for achieving growth is defined by the owner or administrator. In this sense, the general work of the leader as a creator of wealth and employment agent is a desirable and difficult at a time attitude. However, it remains a necessary way not only

by increasing individual economic benefits, but primarily to the growth in the economy and the social development of a country.

Faced with this state and national scene, which is so problematic for SMEs, it is necessary to analyze, with a much deeper perspective, the factors affecting the development and sustainability of these economic units, so that the generated strategies are appropriate for the new environment.

This new environment leads organizations to behave differently and in search of organizational variables to make a difference, experts mention that through the owner and manager, a company can add value to their operations (Chiavenato, 2002; Robbins, 2004). At present, it has been considered the leaders of enterprises as an important tool for business development, growth of the company and as a promising way to increase financial performance (Bark, 1981; Sykes, 1986, and MacMillan, 1993, cited by Chesbrough, 2000).

Organizationally, the owner or manager is responsible for achieving the goals in the business, and their relationship with the staff aims to build a participatory manner the activities and philosophy of the organizational and functional structure of the company, planning joint activities, form teams for core, establish a win-win activities essential to cope with the changes of the new work environment (Guns, 1996). Hence, the organizational characteristics are determined, ultimately, by who runs the corporation.

In the same spirit, Miles and Covin (2002) reveal that the starting point for the work activities should therefore be focused internally or externally based on the personal characteristics of who runs the organization. Robbins (2004) has considered the locus of control as one of the most influential features in the behavior of organizations and one of the attributes that is related to the success of administrative functions, also, Boome and De Brabander (1996) showed that this quality is significantly associated with obtaining the profits of the company. Thus, the locus of control in the context of the corporate world has been one of the psychological characteristics that has been used to differentiate between owners and managers and has also been related to the success thereof (Perr, 1990; Kaufmann and Walsh, 1995, cited by Boydston, Hopperd and Wright, 2003).

Therefore, the aim of this study was to verify whether there is a difference among owner and manager with respect to locus of control, and show whether there is a significant correlation among the variable locus of control and success of the company.

From the above analysis seeks to answer the following research question:

1. There is a difference among owner and manager with respect to locus of control, and show whether?
2. There is a significant correlation among the variable locus of control and success of the company?.

To guide and give direction to the study, the following hypotheses were tested at a significance level of 0.05.

H₁: There is a difference in the locus of control at work between the owners and managers of SMEs in San Luis Potosi.

H₂: There is a statistically significant correlation between the locus of control of the owner and manager and the success of the company.

The study allows knowing more deeply the particular personality of the owners and managers who encourage their behavior and that leads them to success in the

organization. Furthermore to understanding the behavior of wider and deeper way, the most important is that the study would contribute significantly to strengthen theories on Mexican organizations, considering that, there is little research in Mexico in the fields of organizational theory and one of the main areas is focused at the behavior of manager, who manages the company.

This research provides elements not just for contribute to strengthening the model proposed by Spector, as well, for government agencies in Mexico, to consider factors associated with the behavior of the leaders, because they are those who administer businesses. Especially in these current times when the federal government is supporting economically to this sector with different programs aimed to remain, compete and grow in global environments that companies live in the present.

REVIEW OF LITERATURE

Small and medium enterprises, in recent years, have attracted great interest as an object of study because they are characterized as a key to stability, wealth and economy of a country (Robinson and Pearce, 1983) sector. A large number of investigations (Ibrahim and Goodwin, 1986, Gilbert, Menon and Schwartz, 1990, Lussier and Corman 1991) are intended to explain the causes that limit their activities, which do not allow them to survive the early years.

Although there's not exactly knowledge of the failure rate, the researchers report that is high. The statistics presented in their studies, reported that one in three companies has closed its doors after a year of activities (Ireland and Van Auken, 1987 cited by Boyle and Harsha, 1991). Other authors (Cooper, Woo and Dunkelberg, 1989) show that 67% of new businesses fail within four years. Timmons (1999) mentions that 20% of new businesses fail within a year and 66% within six years, and Monk (2000) indicates that the failure rate in the first 5 years, ranging between 48 and 68%, depending on the size of the company. In Mexico, 65% of the established companies disappear before two years (Secretaría de Economía 2001).

Previous research has shown what really happened in small businesses that do not allow them to evolve. From modern empirical knowledge, obvious and specific mechanisms of success or failure of small and medium enterprises have been studied from a variety of approaches (Duchesneau and Gartner, 1990).

It is important point out that from the time when business activity emerges, success is an obvious idea in the owner and administrator, but as Serra (2002)

mentioned in the current environment, characterized by a globalized economy, dynamic and increasingly competitive, the future of SMEs is uncertain because the environment of firms becomes increasingly complex and changes are getting faster. Moreover, markets are constantly evolving and the key factors that determine success change, based on them, a company must obtain a decisive advantage against other, durable and defensible advantage lifting robust enough to deter competition barriers. Therefore, it is essential to define the key success factors (CSFs).

It is important therefore to identify what success is, although there is no agreement on the concept, Wijewardena and Cooray (1995) suggest that the company has achieved success when the owner or manager estimates that sales have increased over a two years period. Luck (1996) explain that a company is successful if the owner or operator has obtained a surplus in earnings over the time has been proposed as a goal. By contrast, Lusier (2000) notes that the owner or administrator found to have been successful because the profits earned are greater than the amount of assets invested in the company.

From previous concepts, it appears that the owner or administrator is a key factor in organization and hence the success of it, but it is widely known that the owner and administrator assume different behaviors according to their characteristics of personality. In this sense, Foley and Green (1989) comment that the individual attributes and specific behaviors who heads the organization injure or favor significantly the behavior of the same and show that no rational behavior of the owner and administrator is the root cause lack of success in business.

Along the same lines, Chell (1991) could observe that personal characteristics are vital for the creation and development of the organization, which can inhibit growth, enhance and ultimately threaten the survival of the company. For many years there had been studies about trend towards business success in relation to the characteristics of the leader's personality. It is assumed that these fundamental characteristics are different.

Some authors have proposed attributes that differentiate owners and managers and have chosen different characteristics such as their risk (Brockhaus, 1980) were inclined to stipulate other risk, locus of control, and ambition (Olson, 2000) and (Borland, 1975; Timmons, 1978, quoted by Olson, 2000) simply by locus of control. In the context of the corporate world, the locus of control is an important framework in which many of the behaviors occur and is one of the psychological

characteristics that have been used to differentiate successful owners and managers.

In fact, literature argues that the locus of control of the owners and managers is different. To Gilad (1982) and Ward (1992) owners have an internal locus of control while managers are characterized by an external locus of control. Honda and Zuffa (1997) also identify that owners have an internal locus of control and administrators an external locus of control and the first work harder than its counterpart. Instead Spector (1982) alludes to no difference between owners and managers in relation to locus of control work.

Durán (2001) mentions that the locus of control is a theoretical concept that has been developed to explain the subject's beliefs from which it establishes the origins of everyday events and therefore, their own behavior and notes that the social learning theories locus of control is the center where the motivating force that leads people to behave in a certain way and not another in the same situation occurs.

Rotter (1966) mentions that it is a personality trait that explains the perception from which the individual determines the causes of life events. Thus, the locus of control can be defined as the belief that the person has about how and where the pleasant or unpleasant events that originate perceived to act. The term internal control refers to the belief that people have that their behavior determines what happens on the other hand, external control is defined as the belief that the events that take place in your life and which people external forces are involved. Therefore, if an individual believes he has little control over the rewards and punishments they receive, you will not find enough reason to change their behavior, because not considered to influence the likelihood of such events occur.

The study of this variable by Frucot and Shearon (1991) show that the level of education and culture contributes to the development of locus of control held by business leaders, although some authors suggest that the locus of control is a natural characteristic of each person (Gable and Dangelo, 1994).

Some authors (Hurrell and Murphy, 2000) indicate the locus of control has been developed in different fields, one of them is work. The work locus of control is the perception that an individual has on the control that may be exercised with respect to the working environment, for stimuli and results. If an individual believes that the results and the rewards obtained by their own actions brought in the workplace, the person indicates an internal locus of control; however, when people believe that the results and rewards are obtained by external

environmental forces work, the individual has an external locus of control Spector (1982).

Empirical research indicates that the locus of control is significantly related to professional behavior, some authors (Gibb and Scott, 1985; Phares, 1976 cited by Nwachukwu, 1995) indicate that individuals with an internal locus of control activity business, establish more difficult goals, exhibit internal motivation and are more committed to their work, while an individual with an external locus of control looks an external reason to do their job and a better salary or economic stimulus. Spector (1982) states that owners and managers with an internal locus of control can control the working environment and achieve the expected results and rewards.

In the same spirit, Boone and De Brabander (1996) reveal that locus of control influences the profitability of the organization. Thus, leaders with an internal locus of control are confident in their decisions and in their capacity to influence the environment and get better profits, while the leaders with an external locus of control are passive in their business and perceived incidents their environment, a cause that affects their profits.

On the other hand, Lonergan and Maher (2000) notes that the locus of control of the leader influences productivity, managers with an internal locus of control show less delay in the fulfillment of its obligations, in contrast to those with locus of external control. Moreover, as Strasser, Cummings and Dunham (1989) mentioned, managers with an external locus of control could be more sensitive to environmental ambiguity, basically they see the environment as a source of rewards, incentives, rewards and general welfare; however, owners with an internal locus of control have more control is less sensitive to the effects of the environment.

According to Holmes and Cartwright (1994) locus of control is related to job satisfaction and benefit the growth of the company. Job satisfaction is the attitude assumed by the person about their work. The person who gets to be quite good in terms of employment adopts positive attitudes towards work and are generally characterized by an internal motivation and a high internal locus of control.

When reviewing the empirical research that has addressed the locus of control at work and as a professional behavior contributes to that attribute is the owner and manager is positive disposition towards self-concept and self-image as a leader. These ideas led him to express a professional consistency, leading

effectively and efficiently perform the organizational role as an entrepreneur.

The conclusions of the studies described above are for reference and project some light on the problem analysis, i.e, on the personality characteristics and particularly on the locus of control of the owners and managers in the success of small and medium businesses San Luis Potosí. Although this relationship has been empirically examined (Spector, 1982), investigations have been limited to other countries and very few researchers to Mexico (Box, Vargas and Watts 1999; Buitron, 1999) have clearly demonstrated no significant difference between owners and managers in relation to their locus of control.

METHODOLOGY

The sample comes from the owners and managers of SMEs registered with the Ministry of Economy of the state of San Luis Potosí, 2005. In the study participated 58 owners and 52 administrators. Sample was define according to three criteria: 1) companies in the service, trade and industry, 2) labor force between 10 and 250 workers, and 3) start operations at least two years of activities.

Variables defined for this study are the success of the company and work locus of control. Success is considered if the owner or operator has overcome business goals related to profits obtained for two consecutive years and locus of control of the work is the ability of an individual to believe that rewards and results of their activities are controlled by their own actions and / or external force

The sampling was random probability and sample size was calculated considering a confidence level of 95% and the allowable error was 5%. Spector instrument composed of 16 questions on the belief that the skills of the owner or administrator influence the overall success of the work was used for data collection. For all responses, the range was from 1 (strongly disagree) to 6 (strongly agree). The reliability of the instrument for this research ranges from 75-85 for the instrument measuring the overall locus of control. The validity has been demonstrated with the scale of locus of control and organizational variables, and other measures of locus of control (Hoff-Macan, Trusty & Trimble, 1996), so it was considered suitable for use in this research. A high score on the scale represents the person presents an external locus of control and a low score an internal locus of control.

The empirical research is based on the statistical technique analysis of mean difference, this technique created a "t" value with the corresponding level of

significance, to test that the defined groups come from populations with the same variance, Levene's test was used and significance was confirmed finally getting the critical value of "Z". Besides the t test was used to determine if the owners and managers of SMEs in San Luis Potosí manifest an internal locus of control, the probability of error for the tests was 0.05. The Pearson correlation coefficient was also used to check the correlation between locus of control variables and successful owner and manager of the company. Values range between -1 and +1. Pearson A value of 0 indicates

the absence of a relationship, i.e the two variables are independent. Large values of this coefficient (r), whether positive or negative, indicate a strong relationship between the two variables.

RESULTS

Considering the leaders involved in the management and direction of SMEs, it is possible to distinguish between age ranges, marital status and gender.

Table 1. Demographic characteristics of the leaders of smes SLP

	Gender (%)		Marital Status (%)			Age (years)
	Male	Female	Single	Married	Other	
Owner	45.50	7.3	4.50%	46.40	1.80	29-62
Manager	86.40	6.4	3.60	42.70	0.90	25-59
Total	86.40	13.7	8.20	89.10	2.70	

Source: own.

The above table shows that a high percentage (89.1%) of the owners and managers of SMEs in San Luis Potosi are married, a low (8.2%) proportion are single, 86.4% were men, a small percentage are women and age varies between 25 and 62 years. Regarding H_0 there is no difference in the locus of control at work between the owners and managers of SMEs in San Luis Potosi. Table 2 shows the results of estimating the mean difference of the locus of control of work of the owner

and manager are seen first, the statistical value of Levene equal variance and level of significance ($F=1.980$ $p = 0.165$), shows that the population variances are equal, to test the significance of its value the decision rule is: if the value of "p" calculated is greater than or equal to (α) the null hypothesis is not rejected.

Table 2 Independent Sample Test

		Leven Test F	Sig.	t	Sig.	Mean Difference	Sd
Locus of control at work	Assumes the same variance	1,980	.165	-.729	.469	-1.77	2,422
	Assumes the same variance			-.723	.473	-1.77	2,444

Source: own.

The value obtained (0.165) in column 4 of Table 2 is greater than 0.05, this means that there is sufficient evidence to conclude that there is no difference in the locus of control at work between owners and managers SMEs in San Luis Potosi. Finally it is confirmed by the value of Z if the null hypothesis is accepted or not. The decision rule is to "reject H_0 if the Z value calculated is

greater than the critical value (in tables)", in this process the calculated value Z (0695) is less than the value of Z obtained from tables is $Z_{tab} = \pm 1.96$ this indicates that there is insufficient evidence to reject H_0 and conclude that the locus of control of work owners and managers is the same. Regarding the second hypothesis H_2 . Table 3 shows the results of the correlation between variables.

Table 3. Correlation between locus of control and success of the company

		Locus of Control of work	Success (Exceeding the target in Utilities)	t_{calc}	t_{tab}
Locus of Control of work	Pearson correlation	1	.162		
	Significance		.046		
	N	110	110		
Test statistic				1.7060	1,658

Source: own.

It was found that the Pearson correlation between these variables is ($r = 0.162$ and $p = 0.046$). Once calculated the correlation coefficient, a hypothesis test is performed to assess the significance of it and confirm whether or not there is a statistically significant association between the two indices. The t value obtained in this process is 1.7060 and the value of t in tables is 1.6587, as calculated t is greater than the correlation obtained t tables not from a population characterized by a correlation of zero. This determination provides the necessary statistical evidence to say that there is a significant linear relationship between the locus of control of the owner and manager and the success of the company.

However, a significant correlation does not necessarily have to be a strong correlation; it's just a different map from scratch, it is important to further interpret the correlation coefficient in terms of the proportion of shared or explained variability, the proportion of shared variance between the two variables is ($0.162^2 = 0, 02592$), this value indicates that 2.59% of the company's success depends on the locus of control of the owner and administrator.

DISCUSSION

The objective of this research was to determine if there are differences in the locus of control of labor between the owners and managers of SMEs from SLP and identify if there is statistically significant correlation between the locus of control of the owner and manager and the success of the company.

In this study, we found that the population variances of locus of control of the owners and managers are the same, the values of F in relation to locus of control were ($F = 1.980$ and $p = 0.165$), indicating that the locus of control is not an attribute to categorize the owner or administrator. These results are consistent with the studies of Box, Vargas and Watts (1999) and Buitron (1999), they studied the psychological characteristics (locus of control) of the mexicans owners and administrators and found no difference between them.

These results, however, are not consistent with the findings of previous research supporting the hypotesis that locus of control allows differentiation between owners and managers (Gilad, 1982 and Ward, 1992)

In this study, it was also found that the locus of control of the manager contributes to the success of the company ($r=0.158$ y $p=0.049$), the above coincides with those reported by Whetten and Camereon (2005) and Boone and De Brabander (1996) mentioned that there are two key attitudes that contribute to the success of the

company and one of them is the locus of control, even though the variable has an acceptable significance, however, this is very weak, as it is not can explain 97.5% of the variations in the success of the company.

FINAL REMARKS

The owner or manager has a key role in the history of the company, both in its inception and in its subsequent development. However, its administrative management is very limited, as only one or two individuals; absorb the responsibility and control of the situations. In small and medium enterprises, the administrative process and address of the business are unique, are characterized by the peculiarity of being highly customized undoubtedly the attributes of personality-locus control of the owner or administrator are very important and are related to the dedication and hard work.

Even when the work locus of control is an attribute that no difference in both other-and owner-manager is beneficial strengthen developing an organizational culture with high ethical standards, because the managers, with a culture as it is, develop and strengthen over their locus of control.

Success in business requires while the support and involvement of management, the locus of control of the person who runs the company allow to establish conditions to encourage the company to be more competitive.

At this time, knowledge, talent and individual initiative of the owner or administrator properly aiming at the common good, are the most powerful competitive weapon. Thus, the proper preparation of the leader as mentioned Font, Gudino and Sanchez, (1999), becomes one of the success factors for the company.

This research gave sufficient weight to indicate whether there are significant differences between the locus of control of the work of the owners and managers of companies of a same region and its relationship to success, however a limitation was not addressing sociocultural and environmental variables economic study would be desirable because they can be associated with the success of the company. This used to design intervention strategies in organizational and individual levels, able to change the situation described here in the medium and long term.

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HOW DO HIGH-SCHOOL STUDENTS PERCEIVE MATHEMATICS

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ABSTRACT

The aim of this study was to measure the anxiety toward mathematics on high school students; thus, we utilized a Muñoz and Mato anxiety scale (2007) with a significant coefficient Cronbach's alpha ($\alpha=0.953$ overall) and grouped into five dimensions ($\alpha=0.839$). A survey was personally administered to 299 students from two high schools at Tuxtepec, Oaxaca in Mexico. Statistical procedure was the factorial analysis with an extracted principal component in order to measure data as refer García-Santillán, Venegas and Escalera (2012). The Bartlett's Sphericity test and the KMO index (0.875), X^2 calculated, 1257.558 with 10 df > X^2 tabulated, Sig. 0.000 $p < 0.01$, MSA (ANSIEVAL .832^a; ANSITEM .871^a; ANSICOM .918^a; ANSINUM .863^a; ANSISIMA .914^a) allow us to know that the variables of Muñoz and Mato scale help us to understand the student's anxiety toward mathematics. In our globalized world, the challenges are strong, and therefore it is necessary to attack the problem (phenomena) immediately and find solutions that allow that students develop greatest skill and competencies in mathematics. Then, it is necessary to find new ways of teaching and learning process that allows, from the basic levels of education, to stimulate the interest of students toward mathematics.

KEYWORDS: anxiety mathematics, attitude toward mathematics, mathematics abilities, temporality toward mathematics, evaluation toward mathematics.

INTRODUCTION

The subject of mathematics teaching is frequently heard in academic discourse. In a theoretical approach, anxiety is a factor that has been examined by several researchers, following the seminal work of Fennema and Sherman (1976). They designed a scale of 108 factors to measure the level of student's anxiety toward mathematics, and very specifically, anxiety towards statistics

Blanco (2008) carried out a critical review about students' attitude toward statistics. He measured specifically students' attitude toward statistic, during teaching-learning process, as well as some indicators of efficiency and student performance. His study refers the research of Glencross and Cherian (1992, 1995) who cited the most important studies in the Anglo-Saxon context such as: Statistics Attitudes Survey- SAS

(Roberts and Bilderback, 1980); Roberts and Saxe (1982) Validity of a Statistics Attitude Survey; Attitudes toward Statistics- ATS (Wise, 1985); Statistics Attitude Scale (McCall, Belli y Madjini, 1991); Statistics Attitude Inventory (Zeidner, 1991); Students' Attitudes Toward Statistics (Sutarso, 1992); Attitude Toward Statistics (Miller, Behrens, Green aned Newman, 1993); Survey of Attitudes Toward Statistics –SATS (Schau, Stevens, Dauphinee and Del Vecchio, 1993, 1995); Quantitative Attitudes Questionnaire (Chang, 1996), and Auzmendi's scale (1991, 1992).

In the world, some institutions like Organization for Economic Cooperation and Development (OECD) have established evaluations in order to measure mathematics, like the International Program Student Assessment (PISA, for its acronym in Spanish) that

measures reading comprehension, math and science skills in elementary school students.

Latin American countries have had the lowest scores in these kind of tests. In Mexico, for example, the Ministry of Education created in 2006 the National Assessment of Academic Achievement of School (ENLACE) to basic education and in 2008 the test was adapted to asses high school students. Mathematics results of ENLACE 2013 showed that 63.7% of the students of the last grade of school have a poor level of mathematical skill (SEP, 2013).

This fact has been a cause for new action plans of mexican university authorities, focusing on identifying the possible causes of this phenomenon called "low performance in math skills". The first step in this plan is to identify student's attitude towards mathematics. An empirical reference is the work of García-Santillán, et.al. (2012), they replicated the scale of Auzmendi (1991, 1992). Their results show that if students perceive the usefulness of statistics in their professional life, then enjoy the subject and this creates confidence in their abilities to use it as a tool, but results show also that when motivation is inadequate, students feel fear of discipline.

Also García-Santillán, Escalera-Chavez and Venegas-Martínez (2013) measured student's perception towards financial mathematics in two institutions (one private and other public). Results reported that students perception toward financial mathematics is improved when the class is conducted as a workshop and teachers use information technologies, such as virtual learning communities, programming in spreadsheet, financial simulators among others didactic strategies.

Based on the above arguments, the question, objective and hypotheses are:

RQ₁: What variables explain students' anxiety toward mathematics?

O₁: Identify the set of variables that explain student anxiety toward mathematics

H_{1j}: Students' attitude toward mathematics could be explain by a set of variables

REVIEW OF LITERATURE

There have been several studies in order to identify a set of variables that explain the perception and students attitude toward mathematics. In the specific case of statistics, Wise proposed in 1985 two important dimensions to classify student's attitudes toward statistics: attitudes toward the statistics course and attitudes towards the use of statistics in their field of study. Auzmendi (1991, 1992) reports that attitude is the

sum of beliefs, feelings, and behavioral predispositions toward the object in question. About the construct "attitude", Gal and Ginsburg (1994), Gal, Ginsburg, and Schau (1997), point out that it is the "sum of all the emotions and feelings experienced during the learning phase".

To Gómez-Chacón (2000) attitude, positive or negative, determines personal and behavioral intention. Schau, Stevens, Dauphinee and Del Vecchio (1993, 1995) define attitude with four dimensions: affective, positive feelings towards statistics, cognitive and thinking skills in statistics.

Some authors have development scales to measure feelings and anxiety toward mathematics. Fennema and Sherman (1976) developed a scale of 108 items in order to measure nine categories. Dutton and Blum (1954, 1968) designed the Dutton Scale composed by 50 items which measure the feelings arithmetic. Other authors such as Richardson and Suinn (1972) designed the Mathematics Anxiety Rating Scale (MARS) with 98 items in four categories, anxiety towards evaluation of the subject in general, anxiety towards numerical daily activities or professional daily activities, anxiety toward passive observation and anxiety toward performance, all this, with a significant reliability. Plake and Parker (1982) adapted and reduced Richardson and Suinn Scale to 24 items, keeping the original two factors, they called the Revised Mathematics Anxiety Rating Scale (RMARS).

In the specific field of financial mathematics, a study conducted by García-Santillán, Venegas-Martínez and Escalera-Chávez (2013) among undergraduates students, have shown that students' motivation towards the subject of mathematics, is due to the usefulness which students are facing in their real life, ie, low utility generates low motivation towards learning of them. In 2004, Tapia and Marsh measured anxiety toward mathematics with a test called attitudes towards mathematics inventory (ATMI), composed by 49 items, under the following categories: confidence, math usefulness, likeness, motivation and expectations of parents and professors, with highly significant reliability ($\alpha = .97$).

METHODOLOGICAL DESIGN

Population, sample and instrument

The study used the test designed by Matto and Muñoz (2007) denominated "anxiety test toward mathematics. 299 students were surveyed in 2013. Sample consisted of two high school students from Tuxtepec, Oaxaca Mexico. Students were from the first, third and fifth level.

Statistical Procedure

For evaluation and interpretation of the data collected, we follow the statistical procedure of multivariate factor analysis. For this, we established the following criterion: Statistical hypothesis: Ho: $\rho=0$ there is no correlation Hi: $\rho \neq 0$ there is a correlation. The statistical test is χ^2 and the Barlett's test of sphericity KMO (Kaiser-Meyer-Olkin), and additionally the value of MSA (Measure sample adequacy) for each variable of model. This statistical is asymptotically distributed with $p(p-1)/2$ freedom degrees, a significance level: $\alpha = 0.01$, $p < 0.01$ or < 0.05 load factorial of 0.70 ; and loads increased to 0.55

If Ho is true, values worth 1 and its logarithm would be zero, therefore the statistical test's worth zero, otherwise with high values of χ^2 and a low determinant, it would suggest that there is a high correlation, then if the critical value: $\chi^2_{calc} > \chi^2_{tables}$, there is evidence to reject of Ho. So, the decision rule is; Criterion: KMO > 0.5 ; MSA > 0.5 ; $p < 0.01$ Thus: decision is reject: Ho if $\chi^2_{calc} > \chi^2_{tables}$.

In order to measure data obtained, we follow the procedure proposed recently by Garcia-Santillán *et al* (2012, 2013 and 2014) and obtains the following matrix:

Students	Variables
1	X11 X12 ... X1p
2	X21 X22 ... X2p
...	...
299	Xn1 Xn2 ... Xnp

Where:

X11, X12..... Xn1 is given by the following equation:

$$X1 = F1 a_{11} + a_{12}F2 + \dots + a_{1k}Fk + u_1; X2 = F1 a_{21} + a_{22}F2 + \dots + a_{2k}Fk + u_2 \dots \dots \dots Xp = ap1F1 + ap2F2 + \dots + apkFk + up$$

Therefore, the expression is as follows:

$$X = Af + u \quad \hat{U} X = FA' + U \quad (1)$$

Where:

Data Matrix	Factorial load Matrix	Factorial matrix
$X = \begin{pmatrix} x_1 \\ x_2 \\ \dots \\ x_p \end{pmatrix}$	$f = \begin{pmatrix} F_1 \\ F_2 \\ \dots \\ F_3 \end{pmatrix}$	$A = \begin{pmatrix} a_{11} & a_{12} & \dots \\ a_{21} & a_{22} & \dots \\ \dots & \dots & \dots \\ a_{p1} & a_{p2} & \dots \end{pmatrix} \quad F = \begin{pmatrix} f_{11} & f_{12} & \dots & f_{1i} \\ f_{21} & f_{22} & \dots & f_{2i} \\ \dots & \dots & \dots & \dots \\ f_{p1} & f_{p2} & \dots & f_{pi} \end{pmatrix}$

With a variance equal to:

$$\text{Var}(X_i) = \sum_{j=1}^k a_{ij}^2 + \Psi_i = h_i^2 + \Psi_i; i = 1, \dots, p \quad (2)$$

$$h_i^2 = \text{Var} \left(\sum_{j=1}^k a_{ij}F_j \right) \dots y \dots \Psi_i = \text{Var}(u_i) \quad (3)$$

This equation corresponds to the communalities and the specificity of variable X_i . Thus, the variance of each variable can be divided into two parts:

- A) In their communalities h_i^2 representing the variance explained by common factors, and.....
- B) The specificity Ψ_i that represents the specific variance of each variable.

Thus obtaining:

$$\text{Cov}(X_i, X_l) = \text{Cov} \left(\sum_{j=1}^k a_{ij}F_j, \sum_{j=1}^k a_{lj}F_j \right) = \sum_{j=1}^k a_{ij}a_{lj} \quad \forall i \neq l \quad (4)$$

With the transformation of the correlation matrix determinants, we obtained Bartlett's test of Sphericity, and it is given by the following equation:

$$d_R = - \left[n-1 - \frac{1}{6}(2p+5) \ln|R| \right] = - \left[n - \frac{2p+11}{6} \right] \sum_{j=1}^p \log(\lambda_j) \quad (5)$$

Where:

N = sample size, ln= natural logarithm, λ_j ($j=1, \dots, p$) values pertaining of R, R = correlation matrix.

In order to compare the magnitude of the observed coefficients correlation with the magnitudes of the coefficients partial correlation, it is carried out a measurement of the sample adequacy (KMO) proposal by Kaiser, Meyer and Olkin, and similar to KMO index, the measure of sampling adequacy for each variable (MSA) can be calculated, in which it only includes the coefficients of the variable to be tested. Both measurements are given by the following expressions:

$$KMO = \frac{\sum_{j \neq i} \sum_{i \neq j} r_{ij}^2}{\sum_{j \neq i} \sum_{i \neq j} r_{ij}^2 + \sum_{j \neq i} \sum_{i \neq j} r_{ij}^2(p)}$$

$$MSA = \frac{\sum_{i^2} r_{ij}^2}{\sum_{i^2} r_{ij}^2 + \sum_{i^2} r_{ij}^2(p)}; i = 1, \dots, p \quad (6)$$

Where: $r_{ij}(p)$ is the ratio of the partial correlation among variables X_i and X_j in all cases. Thus, with all above mentioned. Now we have the next empirical outcomes.

DATA ANALYSIS AND DISCUSSION

To analyze data obtained from the application of the test of Matto and Muñoz (2007), a reliability test was performed using coefficient Cronbach's alpha (α). Cronbach's alpha (α) is a squared correlation coefficient

which measures the consistency of the items averaging all correlations among all questions. The closer it gets to 1, is better reliability, considering that starting from 0.80 is a very acceptable value. Thus, the Cronbach's alpha can be set as a function of the number of items and the average of correlations among the items.

$$\rho = \frac{N * \bar{r}}{1 + (N-1) * \bar{r}}$$

Where: N = Number of items (or latent variables), \bar{r} = average of correlations among the items.

The information collected from population (299) high school students was processed. The results that are shown in Table 1 were obtained:

Table 1. Reliability test

Concept	Cases	%	α
Valid cases	296	99.0	$\alpha=0.953$
Excluded (a)	3	1.0	
Total	299	100.0	24 factors

Dimensions	Variable	$\alpha = 0.839$		
		MSA	KMO	Bartlett
with 5 dimensions	ANSIEVAL	.832	0.875	
	ANSITEM	.871		
	ANSICOM	.918		
	ANSINUM	.863		
	ANSISIMA	.914		

a. List wise deletion based on all, variables in the procedure

Source: own

The result obtained from the total items is (0.953) and grouped into five dimensions is (0.839), both are very acceptable if we take the reference to Hair, et al (1999) $\alpha > 0.6$, therefore, the scale have characteristics of consistency and reliability which is required for the study, so the validity of test is confirmed.

The main characteristics about population of study, like: gender, semester or grade are described, and after this, the result from the factorial analysis with extracted components rotated:

The students surveyed were 52% female and 48% male; 29% first semester, 8% second semester, 42% third semester, 2% fourth semester, 17% fifth semester and 2% sixth semester.

Bartlett's test of Sphericity

To make sure that the procedure factorial analysis which was applied in this case, is appropriate and that contributes to explain the phenomenon, the Bartlett test of Sphericity with KMO, and the measure of sample adequacy of each variable (MSA) was performed, all this, with the aim of identify whether there is any

correlation among the variables that are being studied and allow us justify the use of this technique.

The Bartlett test of Sphericity is a statistic used to test the null hypothesis which states that the correlation matrix is an identity matrix, which presents a variation across 0 and 1, and small values demonstrate that factor analysis would not be appropriate, because the correlations between pairs of variables cannot be explained by other variables. In this case there are lack of strong correlations between the variables, then the factorial model would not be suitable, if the value in KMO is < 0.5 , i.e., with that value may not be used factorial analysis with the sample data which are analyzed.

Table 2 shows the results of the Bartlett test of Sphericity, *KMO*, *MSA*, χ^2 , with significance ($p < 0.01$). Observed values χ^2 (1,257.558 with 10 df) shows that are high, the measure of sampling adequacy (overall) KMO (.875) is located in the rank of acceptance because, this should be higher than 0.5, indicating that the variables are intercorrelated.

Table 2. Correlation matrix- KMO, MSA, χ^2

Variable	MSA	KMO	Bartlett test of Sphericity (χ^2)
ANSIEVAL	.832	0.875	1257.558 df 10
ANSITEM	.871		
ANSICOM	.918		
ANSINUM	.863		
ANSISIMA	.914		

Source: own

Therefore, values displayed in the above table are very well suited to perform a factor analysis, therefore, the null hypothesis which refers to variables not correlated is rejected, being on the contrary, this means that the variables included in the model let explain the phenomenon, in a way that may be perform factor analysis.

Measure of sampling adequacy (MSA)

Another difference is the measure of sampling adequacy (MSA), the values shown in Table 3, reveals that each variable exceeds the threshold value of 0.5, which indicates the strength of relationships between variables and therefore appropriateness factor analysis.

In the diagonal of the correlation matrix anti-image, we can observe measures sampling adequacy for every variable (MSA). To determine if the selected factorial model is appropriate to explain the information collected, the values in the diagonal of the matrix of correlations anti-image should have a value close to 1.00, hence, the correlation coefficients anti-image that appear in diagonal, range from 0.832^a to 0.918^a, are

significant and it is confirmed that factor analysis it is optimal to explain the phenomenon studied.

Table 3. Anti-image Matrix

		ANSIEVAL	ANSITEM	ANSICOM	ANSINUM	ANSISIMA
Covariance anti-image	ANSIEVAL	,188	-,116	-,048	-,082	,004
	ANSITEM		,265	-,051	-,024	,004
	ANSICOM			,296	-,078	-,063
	ANSINUM				,218	-,112
	ANSISIMA					,550
Correlation anti-image	ANSIEVAL	,832^a	-,522	-,206	-,405	,012
	ANSITEM		,871^a	-,183	-,101	,010
	ANSICOM			,918^a	-,309	-,157
	ANSINUM				,863^a	-,325
	ANSISIMA					,914^a

a. Measure of sampling adequacy

Source: own

Table 4 shows the values of correlations obtained from the variables studied, where we can see that they are all inter-correlated and the correlation among the variables

present high values (> 0.05) in all the cases shown, which leads us to think that there is an concordance among the set of variables in the model, practice as well as statistics, which means, that factorial analysis is appropriate.

4. Correlations Matrix

		ANSIEVAL	ANSITEM	ANSICOM	ANSINUM	ANSISIMA
Correlations	ANSIEVAL	1.000				
	ANSITEM	.846	1.000			
	ANSICOM	.789	.747	1.000		
	ANSINUM	.839	.765	.800	1.000	
	ANSISIMA	.569	.523	.600	.659	1.000

(a) Determinant = .014

Source: own

Moreover the value of the determinant (0.014) is lower than <0.05 which also gives evidence of the presence of significant correlations in the set of variables studied. Let us remember that, with the transformation of the correlation matrix determinants, we obtained Bartlett's test of Sphericity as shown in table 2, and is given starting from the equation:

$$d_R = - \left[n - 1 - \frac{1}{6}(2p + 5) \ln |R| \right] = - \left[n - \frac{2p + 11}{6} \right] \sum_{j=1}^p \log(\lambda_j) \quad (5)$$

a) Components Matrix, Communalities, Eigenvalue and total Variance

Once that Factor Analysis is accepted like the appropriate technique to analyze data, we proceed to examine the factors and components. Table 5 shows the component matrix and communalities as well as eigenvalues, whose explanatory power will explain the total variance.

Table 5. Components Matrix, Communalities, Eigenvalue and total Variance

		ANSIEVAL	ANSITEM	ANSICOM	ANSINUM	ANSISIMA
Covariance anti-image	ANSIEVAL	,188	-,116	-,048	-,082	,004
	ANSITEM		,265	-,051	-,024	,004
	ANSICOM			,296	-,078	-,063
	ANSINUM				,218	-,112
	ANSISIMA					,550
Correlation anti-image	ANSIEVAL	,832^a	-,522	-,206	-,405	,012
	ANSITEM		,871^a	-,183	-,101	,010
	ANSICOM			,918^a	-,309	-,157
	ANSINUM				,863^a	-,325
	ANSISIMA					,914^a

b. Measure of sampling adequacy

Based on the criterion of eigenvalue greater than 1 (3.874) suggests the presence of 1 factor (graphic 1),

from whose explanatory power may explain the total variance in 77.48% of total variation in the data.

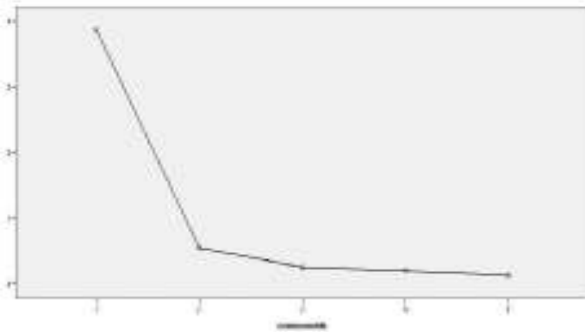


Figure 1. Plot component

Furthermore, in Table 5 factor weights obtained by the extraction principal components method are shown. The above corresponding to each factors that integrate component 1, where it may notice that all have a factorial weight > 0.50 , being ANSINUM (.928) the largest weight (anxiety towards numerical operations), followed by ANSIEVAL (.927) and less factorial weight, but always observing behavior > 0.5 is ANSISIMA (.746). And at the side of the proportion of variance explained through the communalities, we have ANSISIMA (.982) the highest value, and at the opposite extreme or lesser value we have ANSICOM (.812).

CONCLUSIONS

This paper shows how the factors: "anxiety towards mathematics assessment", "anxiety toward temporality", "anxiety toward understanding problems", "anxiety towards numbers and mathematical operations " and "anxiety toward mathematics in real life situations", help us to understand the students anxiety toward mathematics. The findings are consistent with other authors such McLeod (1992, 1994) and Muñoz and Mato (2007), which reveal that the presence of student anxiety in the learning process of mathematics, which was becoming to a negative impact on student learn.

The study of mathematics could be analyzed from different perspectives, from the perspective of the contents of mathematics, from the student perception and attitude, considering their needs, their expectations regarding their usefulness in the future, their attitudes, beliefs and feelings to confront them, the greatest myths that emerged around them, from the point of view of teachers, from the educational system, their curricula and teaching-learning models involved, among others.

This study focused on the student and their emotions towards mathematics, considering the appearance from anxiety as a determinant of object of study, based on the ideas of McLeod (1992, 1994), who emphasizes the need to incorporate the affective side on the analyzes, in order to have a bigger picture and that we may understand the complexity of the subject.

In this study, results show that "anxiety towards evaluation (ANSIEVAL) mostly explain the problem. The others factors, "Anxiety toward temporality" (ANSITEM), Anxiety toward understanding problems (ANSICOM), Anxiety face numbers and mathematical operations (ANSINUM) Anxiety and mathematics in real life situations (ANSISIMA) show the result of confronting the student to the study of mathematics. In our globalized world, competition have become more aggressive, the challenges are strong, and therefore it is necessary to attack the problem (phenomena) immediately and find solutions that allow that students develop greatest skill and competencies in mathematics. Then, it is necessary to find new ways of teaching and learning process that allows, from the basic levels of education, to stimulate the interest of students. As a result, it is expected that students appreciate the wide application of the field of mathematics and live the learning process with a positive attitude, which generate enjoyment and satisfaction and not frustration.

FURTHER RESEARCH

Given scope of the problem, there are several alternatives for future research, and may be as follows:

- Carry out research in other southeastern states of Mexico with the purpose of having a complete overview of the area.
- Based on the above information, carry out comparative studies across states.
- Expand the scope of comparison towards other countries (Latin America, Europe, etc.).
- Deep in the way people interact with technology to be incorporated in the teaching activities, among others.

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THE IMPACT OF THE GROWTH RATE OF THE GROSS DOMESTIC PRODUCT (GDP) ON POVERTY REDUCTION IN NIGERIA

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ABSTRACT

This study is on the impact of GDP growth rate on poverty reduction in Nigeria. The study made use of secondary data sourced from the Central Bank of Nigeria statistical bulletin and the National Bureau of Statistics between 1986 and 2012. The model for the study has as its dependent variable the Unemployment rate whose reduction should imply poverty reduction and its explanatory variable is the GDP growth rate. Using the Ordinary Least Square (OLS) regression techniques; our study revealed that there is a weak relationship between the unemployment rate and the Nigerian Gross Domestic Product (GDP) growth rate and that instead of an inverse relationship, it was positive. That is, as GDP was growing the unemployment rate was also growing. The study holds that when citizens cannot work to earn they will remain poor. This implies that the GDP growth has not impacted positively on the poor through job creation sufficient enough to reduce the percentage of the unemployed and the incidence of poverty over the period of study. We therefore recommend that there is the need to reassess the growth direction so as to give priority to key sectors like the agricultural and the industrial sectors that have the capacity to generate and absorb more labours thereby solving employment problem and at the same reducing the poverty incidence on the citizens.

KEYWORDS: Impact, Gross Domestic Product, Growth rate, Poverty, Reduction, Key Sectors.

INTRODUCTION

Poverty reduction has become a central goal for development. It can be achieved by economic growth and /or by the distribution of income. Issues related to the benefits of growth accrued to the poor have become a priority of development policy in the 1990s (Son & Kakwani, 2004). There is little doubt that economic growth contributes significantly to poverty alleviation. The evidence is mounting and coming from various sources: cross-country analyses (Besley and Burgess, 2003; Dollar and Kraay, 2005; Kraay, 2006; and López, 2004), cross-regional and time-series comparisons (Ravallion and Chen, 2007; Ravallion and Datt, 2002), and the evaluation of poverty evolution using household data (Bibi, 2005; Contreras, 2001; Menezes-Filho and Vasconcellos, 2004). At the same time, it is clear that the effect of economic growth on poverty reduction is not always the same.

In fact, most studies point to considerable heterogeneity in the poverty-growth relationship, and understanding the sources of this divergence is a growing area of investigation (Bourguignon, 2003; Kakwani, Khandker, and Son, 2004; Lucas and Timmer, 2005; and Ravallion, 2004). The Nigerian national capacity as reflected in the recently rebased GDP cannot be played down, because the nation's economy currently ranked as the largest in Africa, the challenge however, has been how this economic strength can be used to engender

sustainable growth and poverty reduction. This study therefore, intends to look at the relevance of the growth in the GDP to poverty reduction in Nigeria between 1991 and 2012.

STATEMENT OF THE PROBLEM

The persistent problem of poverty in the developing world has led many to question the efficacy of economic growth and development as a means of poverty alleviation (Roemer and Gugerty, 1997). Indeed, the lack of convergence in standards of living across countries is one of the great unresolved issues in development and growth economics. In Nigeria for example, the incidence of poverty and the rate of unemployment in Nigeria have increased significantly between 2004 and 2011 (NES, 2012). Within that time, incidence of poverty rose from 54.4% in 2004 to 69% in 2010. In other words, the number of Nigerians living in poverty rose from 68.7 million in 2004 to 112.5 million in 2010. In the same period, the unemployment rate rose from 13.4% to 21.4%. It then rose further to 23.9% in 2011.

Whereas, the GDP within the same period also has been growing at an average of 6% per annum between 2004 and 2011 (NES, 2012). This growth in GDP no doubt has placed the nation's economy on the frontline in Africa in terms of capacity. It is the aim of this paper to

find out whether the GDP growth is impacting positively on poverty incidence in Nigeria.

RESEARCH QUESTIONS

The research questions that shall guide this study are;

- i. Is GDP growth rate compatible with poverty reduction in Nigeria?
- ii. If not, why is the GDP growth rate not bringing about poverty reduction in Nigeria?

OBJECTIVES OF THE STUDY

The objectives of this study are:

- i. To examine the impact of the GDP growth rate on poverty reduction strategy in Nigeria.
- ii. To find out why the GDP growth has not been bringing about commensurate poverty reduction through job creation.

RESEARCH HYPOTHESIS

The hypotheses that shall guide this study are as stated thus:

Hypothesis one

H₀: GDP growth rate has not impacted on poverty reduction in Nigeria.

H_a: GDP growth rate has impacted on poverty reduction in Nigeria.

Hypothesis two

H₀: There are no factors responsible for the lack of impact of GDP growth rate on poverty reduction in Nigeria?

H_a: There are factors responsible for the lack of impact of GDP growth rate on poverty reduction in Nigeria?

SIGNIFICANCE OF THE STUDY

The significance of a study aimed at examining the impact of GDP growth rate on poverty reduction in Nigeria cannot be over-emphasized, given the fact the Nigerian GDP has been growing at an average of 6% per annum between 2004 and 2011. As such, doing a study that would help to find out the extent to which this GDP growth rate has impacted upon poverty reduction should be considered apt and necessary. This is because; the study findings could serve as veritable tool for government policy planners and executors. In addition, it will add to existing literatures and a reference for scholars and future researchers in this area.

LITERATURE REVIEW

Conceptual Framework

The concept of poverty has a multi-disciplinary dimension for the economist; however, poverty can be properly situated within the realm of development economics. Central to the quest for policies and programmes that will reduce poverty is the issue of the conceptualization of poverty. Conceptually, three

dominant views are identified as the meaning of poverty in the literature (Oyeranti and Olayiwola, 2005).

According to Oyeranti and Olayiwola (2005), the first view sees poverty as a severe deprivation of some basic human needs at the individual or household level. Put differently, poverty is a material deprivation, and this can be assessed in monetary terms. While this conceptualization of poverty makes the quantitative analysis of poverty straightforward and permits comparisons over time and between countries, it fails to recognize non-material forms of deprivation such as illiteracy and social discrimination among others. The second view has a direct link with the work of Sen (1999), and it defines poverty as the failure to achieve basic capabilities such as being adequately nourished, living a healthy life, possession of skills to participate in economic and social life, permission to take part in community activities to mention a few. This conceptualization forms the basis for the belief that poverty is multi-dimensional. Although, the capabilities framework offers many advantages over the income-consumption conceptualization, yet it is argued by Karlsson (2001) that it requires a greater variety of data and that no consensus exists on how capability deprivation at the household level is to be computed.

The third conceptualization of poverty came into limelight in the 1990s and has a fundamentally different approach to the understanding of poverty: subjective poverty assessments. Karlsson (2001) presented five conclusions from the voices of the poor series, these are:

- a) Poverty needs to be viewed in a multi-dimensional way. Hunger is part of everyone's understanding of poverty. Equally strong is the sense of powerlessness, voicelessness, and humiliation that comes with being poor.
- b) The state has been ineffective. People everywhere fear police, they hate corruption, and they trust only their own institutions.
- c) Non-governmental organizations play a limited role. People rely on informal networks.
- d) Households are under deep stress. Gender relations are crucial to understanding poverty, particularly the positions of men.
- e) The social fabric is often poor people's saving grace, and it is under threat.

Measuring Poverty: In a study by Roemer and Gugerty (1997), they put forward that there are many indicators available for measuring poverty; in a cross country analysis the choice of indicator will be limited by the need for a consistent cross-country measure. While this study relies on income distribution data such as that described above, it is useful to review briefly the major

tools used in the definition of poverty and in the conversion of national data to internationally comparable standards. The welfare approach to poverty alleviation typically used by economists assumes both that individuals know what is best for themselves and that monetary measures of consumption or income can serve as an indicator of well-being (Roemer and Gugerty, 1997). Using this approach, the analyst defines a poverty line as a level of income, and all those under that line are considered poor. Under an alternative non-welfarist approach, standards of nutritional or other basic human needs are defined by the observer, who then estimates the income level needed to satisfy those needs. That required level of income becomes the poverty line. The welfare approach associates the standard of living with individual *consumption*, generally measured using *expenditure* data, and wherever possible including consumption from own production. Where expenditure data are not available, *income* can be taken as a proxy for consumption. Most of the data on poverty measures now available are based on comprehensive *household surveys*. This is the ideal form of survey, particularly if it is national in scope. One issue that arises in using household surveys to measure poverty is that the survey unit is the household, whereas we want to measure the welfare of *individuals*. If household income were the unit of analysis, then when comparing two households with equal per capita income, the larger household would wrongly appear to have higher welfare than the smaller one. Where only household information is possible, some kind of conversion to an individual (per capita) basis is necessary (Deaton and Muellbauer, (1980).

A poverty line can be defined in absolute or relative terms. An **absolute poverty line** is set in terms of a particular living standard, defined in a common currency and held constant for all the countries, regions, or areas under consideration. One example might be setting an absolute poverty line at 20% of the U.S. median income and using this income level as the cut-off to define poverty in all countries. An alternative approach is to define poverty at a certain dollar income per day; one dollar a day is a common poverty line for developing countries. Absolute poverty levels imply a certain command over goods and services necessary to rise above poverty. To make poverty lines comparable across countries, economists generally prefer to calculate income or expenditure on a purchasing power parity, or PPP basis. PPP takes into account the differences in relative prices, and therefore purchasing power, among different countries. One dollar typically buys more basic goods and services in India than in the United States, and that should be taken into account when estimating living standards. A **relative poverty line** is set at a constant proportion of the mean or

median income in a country, for example, 25% or 50% or even 100% of mean or median income. Each country thus has a different relative poverty line, expressed in dollars, and each country's relative poverty line changes as incomes rise. If we use 50% of median income as a relative poverty line and compare the U.S. and a developing country, clearly those with incomes equal to 50% of the median in the U.S. will have income levels higher than those at 50% of the median in a developing country like India, even after converting expenditures or income to common (PPP) dollar prices. Once a method for defining a poverty line has been chosen, the analyst must then decide how exactly to measure those individuals below the poverty line. Three measures of poverty are commonly used (Foster, Greer and Thorbecke (1984), Atkinson (1987) and Foster and Shorrocks (1988) and Ravallion (1992)): n the headcount index (*HCI*), which measures the prevalence of poverty; n the poverty gap index (*PGI*), which measures the depth of poverty; and n the Foster-Greer-Thorbecke (*FGT*) index that measures the severity of poverty. A great deal of theoretical work has gone into defining consistent and equitable poverty measures during the last 25 years. Unfortunately, when analyzing developing countries the data are often poor enough that these measures are difficult to calculate reliably. Nevertheless, we present a brief description of the major indicators. The **headcount index (HCI)**, the proportion of the total population considered to be poor, is defined as the fraction of the population whose standard of living (income or expenditure) is below the poverty line. The headcount index is relatively easy to estimate and easy to communicate. It is quite useful in addressing overall changes in poverty. The key weakness in this measure is that it only measures changes of income that cross the poverty line and ignores shifts below the poverty line. If a poor person becomes poorer, this is not reflected in the headcount index. The **poverty gap index (PGI)** alleviates some of this problem by measuring the aggregate amount of poverty relative to the poverty line. The poverty gap represents the transfer of income to the poor that would be necessary to eliminate poverty, assuming an absolute poverty line. The poverty gap index is simply the average poverty gap across the entire population. The main weakness with the poverty gap index is that it does not indicate the severity of poverty. For example, suppose there are two countries. In Country A all of the poor all have incomes just below the poverty line. In Country B there are two groups of poor: one subgroup has incomes just below the mean and the other has much lower incomes. The poverty gap index is averaged across all the poor and could therefore mask the desperate poverty of the very poor group in the second country. The **Foster-Greer-Thorbecke** measure is sensitive to this problem of extreme poverty. It is most commonly defined as the square of the poverty

gap, divided by the population. By using the square of the poverty gap, the *FGT* gives heavier weight than the *PGI* to the poverty of the very poor, because all income gaps are squared. In the example above of two countries with the same headcount and poverty gap indices, the Foster-Greer-Thorbecke index will be higher for the second country with the group of desperately poor. The drawback to this method is that it is less straightforward to interpret. It is essentially composed of two parts: an amount due to the poverty gap and an amount due to inequality among the poor. The choice of poverty indicator does not matter if the distribution of income has not changed within the society. When all members of society have gained income in equal proportion, then all of the measures discussed above will lead to the same poverty ranking. If instead poor individuals clustered around the poverty line gain in income, while the poorest households lose, the headcount index will register a decrease in poverty while the *FGT* index might rise. If, however, income from individuals grouped around the mean is redistributed to the poorest, the *HCI* could stay the same while the *FGT* could decline.

The Debate over Poverty Reduction Strategies

Roemer and Gugerty (1997) hold that most economists believe that economic growth benefits nearly all citizens of a country, even if not equally, and therefore reduces poverty. The extent to which these benefits are realized by various groups is reflected as change (or lack of change) in the distribution of income. If economic growth raises the incomes of everyone in a society in equal proportion, then the distribution of income will not change. Two arguments are often made against the proposition that economic growth reduces poverty. First, the Kuznets curve hypothesis proposed by economist Simon Kuznets in 1955 holds that as incomes grow in the early stages of development, income distribution would at first worsen and then improve as a wider segment of the population participated in the rising national income. If income distribution became dramatically less equal with growth, poverty might not be declining. Our study finds that income distribution does not change dramatically in most countries, even over relatively long periods of time. In addition, the data in this paper indicate that the Kuznets hypothesis does not seem to hold for most individual countries that are currently developing. Second, the obvious depth and persistence of poverty has created doubts about the ability of economic growth to reduce poverty; these doubts are especially prevalent among development professionals working directly with the poor in developing countries. In addition, stabilization and structural adjustment measures that are prescribed to promote growth are widely perceived to deepen poverty, particularly in the short run, casting further doubt on the

wisdom of attacking poverty through faster growth. While there is little empirical evidence on the relationship between structural adjustment and poverty alleviation, this paper demonstrates that the policies promoted by structural adjustment, namely openness to the world economy and sound fiscal and macroeconomic management, do tend to reduce poverty through their effects on growth. Unfortunately, other than through the effect of raising incomes, few data are available to address the relationship between economic growth and the welfare of the very poorest members of society.

Economic Structure and Income Distribution

As noted above, for growth to occur without a reduction in poverty, income distribution must become more unequal (Roemer and Gugerty, 1997). Could rapid growth take place without any reduction in poverty? It is possible but unlikely, as many studies now show. Moreover, it is possible for income distribution to worsen somewhat while the incomes of the poor nonetheless increase. The extent to which a given rate of growth affects poverty depends upon many factors, but particularly on economic structure and economic policies. Growth is more likely to lead directly to a reduction in poverty when the economic assets of a country are distributed relatively equally or when economic growth is based on the intensive employment of abundant factors of production, which for most countries is labor (Roemer and Gugerty, 1997).

In largely rural economies based on small-scale farming, as in many African and Asian countries, most of the poor are engaged in agriculture. When such a country grows through agricultural exports, or when growth in manufacturing increases the demand for food and materials supplied by the rural sector, growth benefits both poor farmers and the even poorer laborers they employ. In land-poor but labor-abundant economies, such as those of East Asia, rapid growth of manufactured or service exports creates a large pool of new jobs, absorbs the supply of low-productivity workers, and eventually causes a rise in real wages that further reduces poverty (Roemer and Gugerty, 1997). In contrast, mineral-rich economies typically have very concentrated income distributions; the country's wealth is in very few hands. Thus, when growth comes from mineral exports, the market mechanisms that would involve the lower income groups in that growth are weak (Roemer and Gugerty, 1997). The 3 best means for poverty alleviation in such countries may involve government programs to channel mineral revenues to the poor through education, health, rural works and other activities that will attract private employers. Development strategy and economic policies may also have differential impacts on the reduction of

poverty via their impact on growth. Economic strategies and policies also affect distribution by altering the way an economy generates and absorbs economic growth. Outwardlooking policies, for example, encourage a country to intensify its production in industries that employ abundant, and therefore low-cost, resources. If these economies are either labor-abundant or both land- and labor-abundant, these policies will enhance the impact of growth on poverty alleviation (Roemer and Gugerty, 1997). But if the economy is mineral-rich, or if it has concentrated agriculture in the hands of a few wealthy landowners, the impact on poverty will be weak. The market reforms espoused in structural adjustment should enhance the impact of growth on poverty. The reduction in controls reduces rent-seeking, which tends to concentrate income and wealth. More importantly, it opens market access to a wider group of participants, including the powerless and the poor. This effect can be especially strong when the controls that are targeted for elimination have affected the rural economy, such as export marketing boards, price and marketing restrictions on food grains, or when they have restricted entry to the informal sector, especially rural trading and curb side retailing in cities. The analytic arguments presented here suggest that growth tends to reduce poverty and that openness and outward trade orientation decrease poverty through their effects on growth. The data presented in this paper support these assertions.

Empirical Evidence on Growth and Poverty Reduction

The early hypothesis of the Kuznets curve led to a large development literature on the potential for economic growth to widen inequality and worsen the plight of the poor, a phenomenon called *immiserizing growth* (Robinson (1976), Adelman and Robinson (1989), Papanek and Kyn (1981)). The initial studies on the Kuznets curve hypothesis used cross-sectional data and compared poor countries to rich countries in order to test hypotheses about income distribution and growth. As data covering longer time periods for individual countries have become available, the evidence points in the opposite direction: growth appears to lessen poverty.

Even early studies like Ahluwalia, Carter and Chenery (1979) and Fields (1980) found that increases in poverty and economic growth were a very exceptional combination. A 1979 study of 12 growth periods in various countries found no increase in poverty and the real per capita income of the poorest 20% rose in every period of growth. A more recent study by Fields (1989) indicates that of 18 countries with data on poverty over time, in only one case was economic growth not accompanied by a fall in poverty. Moreover, Fields found that more rapid economic growth tends to bring

greater declines in poverty. While this preliminary evidence was encouraging, more conclusive results were precluded by the lack of data. In 1996, however, a new database was compiled by Klaus Deininger and Lyn Squire at the World Bank. This database contains the most comprehensive data that exist on income distribution across countries. The data cover 58 countries, beginning in 1960, and for each country give the distribution of income by quintile. In compiling the database, every effort was made to ensure that only reasonably high quality data based on comprehensive household surveys were included. Of the 58 countries included in the database, 26 are developing countries. The database makes it possible for the first time to test propositions about the Kuznets curve and the relationship between growth and poverty over time. We used the Deininger-Squire data set to identify 61 intervals, covering 26 developing countries, for which growth in national average and quintile incomes could be identified. We used relatively restrictive criteria in defining our sample: intervals should be at least 5 years in length, but as long as a decade if possible, and based on consistently defined household surveys.

Using the same data set but including all 58 countries, Deininger and Squire (1996b) identify 91 intervals or episodes for which income growth and changes in income distribution are available. They find that changes in income distribution are generally small, so that growth is clearly associated with increasing incomes in each quintile of the population. In more than 81% of their 91 growth episodes, the incomes of the poorest quintile rose. Another study by Ravallion and Chen (1996) analyzes a more selective set of household survey results, covering the period since 1980. Their results are striking and give strong support to the hypothesis that growth reduces poverty in developing countries. Ravallion and Chen use 64 intervals that cover periods from one to seven years. Twenty-one of these intervals are from Eastern Europe and Central Asia (former Soviet or transitional countries), and forty-three are from developing countries. For each episode, Ravallion and Chen calculate the change in the headcount index of poverty (H) and the growth in the mean income for the sample as a whole.

A great deal of evidence has been generated in the last five years that supports the proposition that more open economies have higher rates of growth. This section reviews the main findings of these studies. An important study by Dollar (1992) looks at the relationship between exchange rates and growth by constructing a measure of openness indicating the extent to which the trade regime distorts the real exchange rate from its free-trade level for the period 1976-1985 and uses this indicator in a regression of 95 countries. Dollar estimates that

reducing the level of exchange rate distortion to that of Asia would raise GDP growth by 1.8% in Africa and 0.7% in Latin America. Reducing exchange rate variability to the Asian level would add an additional 0.8% to annual growth in Latin America and 0.3% to growth rates Africa. Sachs and Warner test the effects of openness on growth using their openness variable described above. In regressions of the annual growth of per capita GDP from 1970 to 1989, incorporating data for 114 countries, Sachs and Warner find large, negative and highly significant coefficients for the openness variable. Open economies have annual growth rates as much as 2.8 percentage points higher than closed economies, on average. Sachs (1996) has used these results to show how much faster African countries could grow if they adopt the kind of open policies that have characterized East and Southeast Asian countries. He attributes a difference of 1.8% a year in income growth to the closed-economy policies of African countries, including exchange rate overvaluation, import restrictions and export restrictions (marketing boards). Two other factors--lower savings rates¹² and less efficient internal markets--reduce growth rates by another 2.8% a year below Asian levels, so that on the whole different policies can explain 4.6% of the difference between African and Asian growth rates. Using a different regression framework, Easterly and Levine (1996) find that three variables associated with soundly managed, open economies--the exchange rate premium, the fiscal surplus as a share of GDP, and ratio of liquid financial assets to GDP--can account for a growth differential of 1.5 percentage points between African economies and East and Southeast Asian economies.

These studies focus on the relationship between growth and economic structure. A study by Fischer (1993) investigates the effects of shorter-term, macroeconomic variables with longterm growth. Fischer finds that low budget deficits (or higher surpluses), low inflation and market-based official exchange rates¹³ are associated strongly and significantly with more rapid economic growth. By extension, then, sound macroeconomic management, because it establishes conditions for sustainable growth, is associated with reduced poverty. Finally, in their study of six African countries cited above, Demery and Squire (1996) construct an index that measures the combined effects of three macroeconomic policies: a reduction in the fiscal deficit, a reduction in seignorage, and a devaluation of the real effective exchange rate. They find that in all six countries, a favourable change in the macroeconomic policy index was associated with a favourable change in the incidence of poverty. In Cote d'Ivoire, the only country with increased poverty, the macroeconomic index worsened. These studies all demonstrate the

important connection between outward oriented policies and economic growth. Because economic growth is such a key factor in poverty reduction, openness becomes an important policy variable that can be used to reduce poverty. But economic structure and government spending decisions also matter, as discussed below.

Poverty and Economic Structure

Countries that are relatively rich in natural resources tend to have slower economic growth (Roemer and Gugerty, 1997). Furthermore, for reasons already discussed, in resource-rich societies the distribution of income is expected to be more concentrated and market forces alone will be less effective in translating GDP growth into substantial reductions in poverty. Thus, on both counts, we would expect the growth of income of the poorest groups to be slower in resource-rich economies. To test this proposition, we utilized three indices compiled by Sachs and Warner to represent resource endowment: · the ratio of natural resource exports to GDP · the ratio of natural resource exports to total exports · the ratio of arable, pasture, and forest land to population. All indices are based in 1971, a year predating all but a few of our observations and thus indicative of an initial resource endowment.

The results are qualitatively similar to those on openness. Resource exports as a share of total exports and land per person have a negative effect on growth. The coefficients are negative and significant at the 1% level or better.¹⁴ Growth of incomes for the poor is lower in well-endowed economies. But resource endowment does not explain much of the variance in income growth of the poor: adjusted R-squareds are below 25%. And, as with openness, when the growth of GDP is inserted into these regressions, the resource endowment coefficients lose significance, though they retain the expected negative sign. Resource endowments appear to work against poverty reduction through their depressing effect on economic growth, as Sachs and Warner (1995b) have demonstrated. Regressions were run showing the effects of openness and resource endowment on income growth of the poor. Regressions 1 and 2 use the share of resource exports in total exports as the indicator of natural resource wealth. All coefficients are negative and all but one is significant at the 5% level or better. This indicates that high levels of resource exports are associated with lower growth rates. The openness variables are positive; the positive impact of an open economy can offset the negative impact of resource dependence. In regressions 3 and 4, land is used as the indicator of resource wealth, and the story is broadly similar, though only one of the coefficients on openness is significant at the 5% level. Resource wealth in terms of land appears to have a negative effect on

growth. None of these regressions, however, explains more than a third of the variance in income growth of the poorest. When the growth of GDP per capita is included, the openness and resource endowment variables lose their significance, although the signs remain the same. Openness retains its positive sign, suggesting again an open economy may help to offset the negative impact of resource dependence. As in the regressions above, the openness and resource variables appear to have little or no impact on poverty that is separable from their impact on economic growth.

THEORETICAL FRAMEWORK: THE RESOURCE CURSE

In considering the curse of resource wealth on poverty reduction, it is important to keep in mind a few outliers: resource-rich countries that have enjoyed both rapid GDP growth and dramatic reductions in poverty. Indonesia and Malaysia, both rich in natural resources including petroleum, have had rapid growth in GDP per capita since 1970 and substantially reduced poverty. In Indonesia, for example, average incomes grew by 4% a year from 1970 to 1993 and the headcount index of poverty fell from 60% to under 15%. In Malaysia, per capita income grew by over 3% a year and the headcount index of poverty fell from 18% to 2% over the same period. These countries avoided the curse of wealth through shrewd government policies. First, both governments maintained sound macroeconomic policies that avoided exchange rate overvaluation and other symptoms of Dutch disease during the resource booms of the 1970s. Second, they invested in the education and health of their people, especially of the rural poor. Third, Indonesia (and to a lesser extent Malaysia) invested in rural infrastructure and agricultural development that benefited agricultural smallholders, especially on densely populated Java. And fourth, Malaysia undertook a determined policy of redistribution of assets and jobs towards the majority Malay population, which included most of the poor. Resource wealth does not condemn a country to entrenched poverty. Instead, resource wealth can be turned to an advantage in the war on poverty, but it takes a determined and skilful government to do so. It is the political economy of resources that drives the growth and poverty results.

In Nigeria, there is abundance of resource wealth of both human and natural endowments. Yet this resource wealth cohabit with abject poverty, reasons been that these human and natural resources have not been properly harnessed to bring about commensurate impact on the poverty of her citizen. This is the resource curse syndrome. However, recent happenings with the rising GDP could be suggesting that the economy is been revamped. This position is what this study aimed to test

what has been the impact of this rising GDP on poverty situation in the country.

RESEARCH METHODOLOGY

Specification of the Model

In specifying the model, it takes queue from the Kuznets hypothesis proposed by economist Simon Kuznets in 1955; which holds that as incomes grow in the early stages of development, income distribution would at first worsen and then improve as a wider segment of the population participated in the rising national income. What this intuitively transformed to mean is that income spreads when citizens can work and earn income. As such, if the GDP growth rate represents economic growth, then the unemployment rate can represent the poverty reduction index. It is expected that as the economy grows income distribution should lessen the hold of poverty through employment generation as an aftermath of the growth. Therefore, a model in which the dependent variable is the annual time series data of Nigerian unemployment rate (UNEMrt) while the independent variable is the gross domestic product (GDP) from 1991-2011, can be specified in the form:

$$Y=f(X_1)$$

$$Y=b_0+b_1X_1+U$$

Where;

Y = Unemployment rate (FPI)

X₁ = Gross Domestic Product growth rate (GDPgr)

U = the stochastic variable or the error term and b₁ is the coefficients of the parameter estimate of the variable X₁, and b₀ the intercept of the Model.

As such, we used the ordinary least square multiple regression technique to estimate the values of the parameters b₀ and b₁. Besides, we will also conduct the student's t-test and the standard error test to know and to test the statistical significance of the parameter estimates respectively, and the test of goodness of fit for the model using the R² and adjusted R² techniques. This will enable us to know the percentage of variations between the dependent variable and the explanatory variables which very central to helping to understanding the impact of economic growth on poverty reduction.

And finally, we conduct the F-statistic test to determine the overall significance of the regression model and the Durbin –Watson test for the presence or absence of autocorrelation.

EXPECTED RESULT

On apriori ground, it is expected that fall in unemployment rate should be spurred by rising GDP growth rate; as such unemployment rate should have a negative relationship with the gross domestic products

growth rate. Since, it is expected that as the GDP grows there should be poverty reduction through employment generation resulting from the growth.

Estimation Techniques and Data Sources

In the estimation of the specified model, the ordinary least square (OLS) multiple regression technique was employed. The estimation will be carried out with the use of an econometric package known as 'E-Views'. In order to facilitate time series analysis, data on, FPI, GDP, interest rate, exchange rate and market capitalization were collected from the following sources: Central Bank Nigeria (CBN) – Statistical Bulletin and National Bureau of Statistics (NBS).

PRESENTATION AND ANALYSIS OF RESULTS

Presentation of Results

Using the annual time series data of the entire variables so chosen, we have our estimated model result to be:

Dep. Var. =	Coefficient	Standard Error	t-statistics
UNEMrt			
Intercept {c}	3.98	2.27	1.75
GDPgr	1.14	0.39	2.91

	R ² = 0.25	F-stat=8.46 (Prob. 0.0)	d.w. = 0.43
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Source: Author's computations

INTERPRETATION OF RESULTS

On apriori grounds or economic relationships- The explanatory variable's parameter estimate possesses a positive sign. This implies that the GDP growth rate and the unemployment rate have a positive relationship. This does not conform to apriori since it has positive sign instead of negative sign. It was expected that as the GDP grows it should generate employment opportunities thereby reducing the incidence of poverty through income distribution.

On statistical criterion-

- i. Based on the coefficient values, a unit rise (instead of a fall) in the unemployment rate is caused by 1.14 rise in the GDP growth rate. That is, as the GDP growth rate was rising the unemployment rate was also rising alongside. This is not in line with expected theoretical propositions. Using the rule of thumb of 2, it is evident that the t-value for the parameter estimate of the variable was statistically significant. This was also not expected to be since the relationship was wrongly signed.
- ii. The R² value of 0.25 shows that there is very weak relationship between the dependent variable unemployment rate and the independent or explanatory variables the GDP growth rate. The model has been able to explain only about 25% of the relationship or variations; this is highly insignificant. This validates the fact that the GDP

growth rate has not in any spur poverty reduction by its inability to reduce the unemployment rate.

- iii. The F-stat; of 32.77 with probability value 0.00 assumes a very huge value when compared with the table value of 5.95. This implies that in the overall, our model is statistically significant in explaining the relationship between FPI and the explanatory variables.

Econometric Criterion

Using the Durbin-Watson value of 0.14, this value is much closer to zero (0) and it falls outside the critical region or the region of indecision, this suggests the presence of positive autocorrelation.

POLICY IMPLICATIONS OF RESULTS

The statistical significance of the GDP growth rate estimate given that the relationship with the explanatory variable was wrongly signed implies that the GDP growth has not been creating sufficient jobs to reduce the unemployment rate in the economy over the period of study. The reason for this is not far-fetched since the international flow of foreign investment into Nigeria has been encouraged by various economic policies within the period, following the internationalization of the capital market in 1995 and the abrogation of laws that constrained foreign participation in the Nigerian capital market. The non-statistical significance of other parameter estimates of GDP, interest rate and the exchange rate implies that a country's GDP size, interest rate and exchange rate do not necessarily determine the flow of international currency into the Nigerian economy.

CONCLUSION AND RECOMMENDATION

The result of the estimate showed that in spite of the Nigerian GDP growth rate employment opportunities haven't grown sufficiently to mitigate the poverty incidence on the army of the unemployed in the economy. This finding is in line with the content of the communiqué of the Nigerian Economic Society (2012) when they put forward that the optimism about GDP growth which averaged over 6% annually in 2004-2011 is counterbalanced by the sustained growth in the rate of unemployment and rising incidence of poverty and inequality. They stated further that this paradox of *jobless growth* poses a significant threat to economic, social and political stability. This study has revealed that the Nigerian economy over time has been growing but not sufficient to reduce the poverty incidence on the populace through job creation. Hence, we made our recommendations based on the results that, it is important that we become interested in the direction of the growth of the growth of GDP so as to ascertain whether the economy while growing also has absorptive capacity to create room for more jobs or

employments for the army of the unemployed in the economy. As a result priority should be given to those sectors like the agricultural and the industrial sectors that will be able to generate and absorb more labours thereby solving employment problem and at the same reducing the poverty incidence on the citizens.

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AN ASSESSMENT OF THE LEVEL OF SUSTAINABLE ENTREPRENEURSHIP IN WOMEN-LED AGRIBUSINESSES IN MAURITIUS

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ABSTRACT

Sustainable entrepreneurship is a continuing commitment by business to behave ethically and contribute to economic development while improving quality of life of workforce, families, local and global community and future generations. Entrepreneurs in the agribusiness sector contribute to the national economy in terms of income generation and social development. The study was carried out in 2014 with 30 women entrepreneurs with the aim of assessing the level of sustainable entrepreneurship in their agribusinesses and to find out whether the entrepreneurs possess the characteristics to be qualified as sustainable entrepreneurs. The enterprises were surveyed to investigate whether new innovative products, services or ideas are offered since the creation of the business, and to what extent the women entrepreneurs considered sustainability issues in their daily business activities. Data generated from the study were analysed using Statistical Package for Social Science (SPSS). The findings reveal that the women entrepreneurs are more or less aware of the environmental and social impact of their activities but less aware of economic impact. They have a moderate understanding of the concept of sustainable development and sustainability relating it to environmental issues mostly. Not a single woman interviewed has implemented a quality control procedure despite being aware of International Standard Organisation (ISO) certification, Euro Retailer and Producer Good Agricultural Practices (EUREPGAP) and good management practices due to cost implications except for good management practices. It was also noted that despite the creation of innovative products, very few concrete actions are taken in production processes that alleviate social and environmental conditions.

KEYWORDS: agribusiness, entrepreneurship, sustainability, sustainable development, sustainable entrepreneurship

PROBLEM STATEMENT

Women entrepreneurs do not undertake their businesses in a sustainable manner by putting sustainable development at the core of their enterprises. The limited research on sustainable entrepreneurship in agribusiness in Mauritius represents a gap in the literature that needs to be filled. Only a couple of studies have addressed the issue of sustainable entrepreneurship in agribusiness in Mauritius.

RESEARCH OBJECTIVES

The research objectives set are:

- (1) To identify the different sustainable practices carried out by the women entrepreneurs.
- (2) To assess whether the enterprises run by women are in line with sustainability issues;
- (3) To assess whether the women entrepreneurs possess the characteristics to be qualified as sustainable entrepreneurs.

RELEVANCE OF PAPER

This paper applies the concept of sustainable entrepreneurship in the field of agribusiness, with the aim of assessing from the women entrepreneurs' perspective, the level of sustainability entrepreneurship and whether sustainability issues are part of their

agribusinesses. With sustainability issues taking a strong hold on the Mauritian society at large and the business sector in particular, this study addresses the dimension of sustainability and the sustainable development-agripreneurship nexus.

THE CONCEPT OF AGRIBUSINESS

John H. Davis and Ray Goldberg, two Harvard economists in 1957 (Gupta, 1993, Rawlins, 1980) first coined the term agribusiness and they defined agribusiness as the sum total of all operations involved in the manufacture and distribution of farm supplies; production operations on the farm; and the storage, processing, and distribution of farm commodities and items which are made from them (Hardwar,2005).

The Agribusiness Sector in Mauritius

The contribution of agriculture to the economy has been declining over the years owing to the development of new important industries such as the tourism industry, the textile industry, Information and Communication Technology (ICT) and the services sector. The contribution of agriculture to the economy has decreased from 23% in the late 1970's to 3.3 % in 2013 (Central Statistics Office CSO, 2013). The share of the

sugar sector in Gross Domestic Product (GDP) is estimated to be around 2.2%.

The Mauritian agriculture, excluding forestry is dominated largely by sugar cane cultivation. In 2013, nearly 54,000 hectares of agricultural land were devoted to sugar cane production, just less than 8,200 hectares to food crops, nearly 700 hectares to tea and 2 hectares to tobacco. Food crops production is 118, 121 tonnes in 2013. Mauritius is considered to be self-sufficient in vegetables, poultry meat and eggs production. Compared to 47,200 tonnes of poultry produced in 2012, the production of poultry in 2013 was 46,700 tonnes, representing a decrease of 1.07%.

ECONOMIC IMPORTANCE OF THE AGRO-INDUSTRIAL SECTOR

The Blueprint for a 'Sustainable Diversified Agrifood Strategy' for Mauritius 2008-2015 clearly specifies the agricultural diversification programme of the government and the latter's commitments towards self-sufficiency in certain agricultural commodities and food products. The agro-industry in Mauritius consists of five sub-sectors: small cottage industries and backyard enterprises, semi integrated processing industries, intensive farming and associated agro-processing industry and large agro-processing industries. The agro-processing industries including edible oil refining, animal feed compounding and wheat flour milling have particular importance for Mauritius due to its promising export potential. Small entrepreneurs also process seasonal fruits and vegetables for export markets. A variety of speciality foods such as canned tuna, vegetables & fruit pickles, fruit paste and jams, salted banana chips as well as instant noodles and biscuits are available for exports.

CONCEPT OF SMALL ENTREPRENEURIAL FOOD PROCESSING BUSINESS AND POVERTY

Small entrepreneurial business is about identifying, valuing and capturing opportunities to reach new heights and succeed. It has been noted that the second type of progress that is technological advancement, after direct financial boost, comes the build-up of small entrepreneurial business which improves the economic situation of nations (Ana Maria Peredo, Robert B. Anderson, Craig S. Galbraith, Benson Hoing, Leo Paul Dana, 2004). Women can be particularly affected by poverty. Female-headed households are most affected by this crisis as it is somewhat difficult for them to raise their children as well as generate income on their own. In Nepal for instance, as put forward by Paul Vandenberg (2006), 54% of female living under this circumstance face poverty. Women agripreneurs in Mauritius have been able to overcome absolute poverty

by engaging in entrepreneurship (Hardwar, Unnoop, 2014).

CHARACTERISTICS OF SUCCESSFUL ENTREPRENEURS

Stephen key (2013) acknowledged in the "5 Qualities of Successful Entrepreneurs", that to be a successful entrepreneur, both internal and external factors play an important role. Having a passion for the business, showing dedication and commitment towards the business, being open-minded and flexible, the desire to face challenges to be an expert, the ability to always think out of the box and having continuous flow of ideas are what contribute to the success of an entrepreneur.

CONCEPT OF SUSTAINABLE DEVELOPMENT

In 1987, a report commissioned by the United Nations and written by Mrs G.H. Brundtland, entitled "Our Common Future" publicises the idea of sustainable development: Sustainable development is most commonly defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." World Commission on Environment and Development (WCED) (1987). A decade later, the European Union (EU) formulated the three pillar model of sustainability at its Copenhagen Summit. Sustainable development is thus the balance between environmental, social and economic development and rest on the three main pillars commonly known as the triple Ps: People, Planet and Profit. Market-based solutions addressing the sustainability issue are leading to the emergence of new 'green' firms (Schaper, 2010). In a market system, there is a need for entrepreneurs who through the process of "creative destruction" (Schumpeter, 1935), can displace "conventional production methods or processes, products, market structures and consumption patterns" in order to achieve environmental, social or economic goals in line with the three pillars of sustainable development by producing superior environmental and social products and services (Schaltegger and Wagner, 2011). These entrepreneurs who include environmental, social and economic goals as part of their core business activities are referred to as sustainable entrepreneurs.

THE LINK BETWEEN SUSTAINABLE DEVELOPMENT AND ENTREPRENEURSHIP IN AGRIBUSINESS

Hisrich and Peters (2002) define entrepreneurship as "the process of creating something new with value by devoting adequate time and effort and assuming the accompanying financial, psychic, and social risks, and obtaining the resulting rewards of monetary, personal satisfaction and independence". Lots of research works and literature have addressed the relationship between entrepreneurship and sustainable development such as:

ecoentrepreneurship, social entrepreneurship, sustainopreneurship and sustainable entrepreneurship. Literature exists on ecopreneurship (Blue, 1990, Bennett, 1991, Anderson and Leal, 1997, Staber, 1997, Pastakia, 1998, Schaltegger, 2002, Schaper, 2010, Schaltegger and Wagner, 2011), which shows that ecoentrepreneurship (or ecopreneurship) deals exclusively with environmentally oriented entrepreneurship whereby environmental entrepreneurs or ecopreneurs create and develop business activities whose net environmental impact is positive (Schaper, 2010). According to Schaltegger and Wagner (2011), ecopreneurship is defined as “entrepreneurship through an environmental lens” and put forward that the core motivation and main goals of ecoentrepreneurs are to obtain economic returns through business activities which contribute to solve environmental problems.

Sustainopreneurship is a concept that has emerged from conceptual development and ecopreneurship through sustainability entrepreneurship. The three dimensions include:

1. Sustainopreneurship sets out to create innovations to solve problems related to sustainability.
2. Sustainopreneurship sets out solutions to market through creative organizing.
3. Sustainopreneurship adds sustainability value with respect for life support systems.

Sustainable entrepreneurship as defined by Schaltegger and Wagner (2011) is an innovative market-oriented and personality driven forms of creating economic and societal value by means of break-through environmentally or socially beneficial market or institutional innovation. A sustainable entrepreneurial firm needs to have solutions to environmental and social problems as core business, supply superior environmental and social products, and target their innovations towards influencing the mass market and the society at large in a substantial way (Schaltegger and Wagner, 2011).

The concept of sustainable entrepreneurs as actors to reconcile economic growth with a contribution to sustainability has become of interest to researchers with a focus on environmental entrepreneurship. Sustainable entrepreneurship needs to satisfy the three P's (People, Planet and Profit). The first P (People) refers to how a firm adopts social and ethical issues such as issues of labour welfare, human rights, gender relationships, attitude to fraud and corruption amongst others. The second P (Planet) refers to the relationship between the sustainable entrepreneur and the natural environment. Related issues include use of clean technology and processes, eco-design of products, environmental protection and care. The third P (Profit) is not only

about the economic returns for the firm but also how funds are used and allocated for employment, investment in clean technology through adequate machinery and infrastructure, and distribution of profit among staff (Crals and Vereek, 2005).

The Essence of Sustainopreneurship or Sustainable Entrepreneurship in the Agribusiness Sector

The shift to sustainable agricultural practices which are both environmentally friendly and socially acceptable has emerged since the 1970's with a focus on the production dimension of agriculture. However, the products of agricultural systems do not stop at the farmgate, but reach the final consumer through a series of commercial activities along the agricultural and food value chain. Understanding the scope of business activities involved in the agri-food value chain is key to appreciate the importance of sustainability issues in the agribusiness sector. One interpretation of sustainable agriculture focuses on ecoagriculture, permaculture, organic, environmentally-sensitive, biodynamic, low-input and community-based. The other interpretation focuses more on agricultural sustainability and goes beyond farming systems. In Herencseny village in Hungary, entrepreneurs have established a model farm to alleviate poverty which can facilitate the achievement of numerous ecological and societal goals for the community. Universities such as Delft University, Netherlands and University of Victoria, Canada now offer courses in sustainable entrepreneurship. Other Universities follow suit.

RESEARCH METHODOLOGY

Sampling and Data Gathering

The surveys were conducted island wide. Women entrepreneurs in the agribusiness sector were thus chosen representing different types of activity (processors, input suppliers and hydroponics producers). Out of a list of 200 entrepreneurs selected for the empirical research, only 30 were interviewed. The study used both primary and secondary data collection methods since it involved exploratory research. Primary data included data collected using different methods for instance the survey. Secondary data were collected from sources such as documents, records, journals, and digests of statistics. In the study, an interview schedule through a carefully worded questionnaire was prepared and used as a research instrument for collecting data.

DATA ANALYSIS

SPSS 19 was used for cleaning and eventual analysis. All responses (closed-ended) were coded so that a number represents a particular response (for instance 1 for “no” and 2 for ‘yes’). As part of the data cleaning process, consistency and validity checks were made and frequency runs on all variables were made to check for

any existing inconsistencies and outliers. Necessary data corrections were done accordingly.

RESULTS

This section presents the results of the research work highlighting the different sustainable practices put in place at the level of the enterprises.

Entrepreneurial Attributes

Respondents during the survey were asked to reveal their characteristics, which determine their economical performance. 47.5% of them said they take calculated risks, 45% considered themselves as hard workers, 35% said they are determined and persistent and 27.5% have creative thinking abilities.

Skills of Women Entrepreneurs

Respondents were also asked to rank their skills by perceived importance in their enterprises. It is worth noting that the women are strong in certain skills. All plan their work to a more or less extent, 67.5% often identify and solve problems, 60% often take risk, 60% often set priorities and meet deadlines, 55% often use negotiating skills. However, they lack important skills. This is confirmed by the survey, whereby 37.5% never use Internet for information search in business decision, 35% rarely write business correspondence and reports and 35% rarely keep records while 7.5% do not keep records at all.

Table 1.0: Rating of skills of the entrepreneurs

Skills	Never	Rarely	Sometimes	Often
Set priorities and meet deadlines	-	7.5	32.5	60
Use negotiating skills	-	5.0	40.0	55.0
Identify and solve problems	-	5.0	27.5	67.5
Use of oral communication with employees	20.0	15.0	27.5	37.5
Write business correspondence and reports	30.0	35.0	22.5	12.5
Use internet for information search in business decision	37.5	27.5	15.0	20.0
Delegate responsibilities	25.0	25.0	35.0	15.0
Encourage and motivate	10.0	27.5	35.0	27.5
Understand needs and wants of customers	-	2.5	15.0	82.5
Identify market opportunities	-	7.5	40.0	52.5
Take risks	2.5	7.5	30.0	60.0
Manage finances	2.5	25.0	22.5	50.0
Keep records	7.5	35.0	20.0	37.5

GOALS OF THE ENTERPRISES

Goals of Enterprises in 2014

39 % stated that the goal of their enterprises in 2014 was to focus on customer needs while 16 % stated that their goal was to achieve maximum profits and 16 % stated they added value in their products. 12% stated that their goal was to produce maximum and safeguard the environment.



Figure 1.0: Goals of enterprises in 2014

Concept of Quality

The women are aware of Euro Retailer Produce Working Group Good Agricultural Practices

(EUREPGAP), Good Management Practices (GMP), Hazard Analysis Critical Control Point (HACCP) and International Standards Organisation (ISO) certification as represented by 27%, 25%, 23 % and 19% respectively. Only 6 % are not aware of any quality control procedures. However, among the quality control procedures only GMP was implemented by women entrepreneurs.

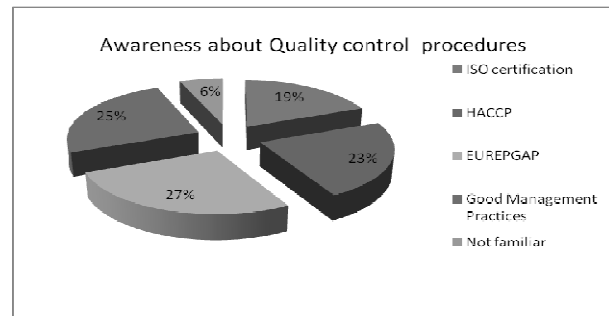


Figure 1.1: Awareness about Quality control procedures

INNOVATION AND TECHNOLOGY

Perception About Innovation

Women (Figure 1.2) defined innovation as new product development (20%), research (20%), creativity (20%) followed by new idea (13%).

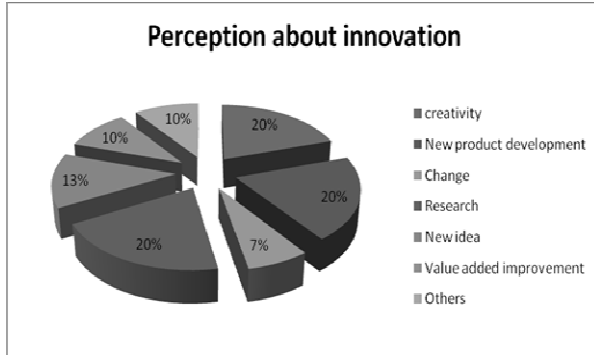


Figure 1.2: Perception about innovation

Attitude To Innovation And Types Of Innovation

Women entrepreneurs (94%) do look for innovation in their enterprises out of which 56% have developed a new product, followed by new technology (19%) and new method (13%).

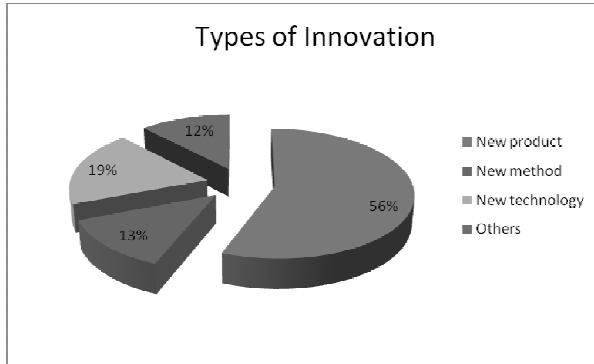


Figure 1.3: Types of Innovation

Sustainability pillars addressed by innovation

Table 2.0: Pillars addressed by innovation

Type of innovation	% of entrepreneurs	Pillars addressed by innovation		
		People	Planet	Profit
New product	20			X
	5		X	
	6	X		X
	14	X	X	X
New technology	16	X		
	6	X		X
New method	14			X
	7			X
	5		X	X

Table 2.0 represents the 3 main pillars (people, planet, profit) addressed by the entrepreneurs while introducing innovation in their enterprises. It can be noted that for only 14% of entrepreneurs, the three pillars are taken into consideration while developing new product. In most of the other cases, only one or two sustainability pillars are taken into consideration.

Measures taken to safeguard the environment, to improve social aspect and ensure welfare of labour

Table 3.0: Environmental Measures

	Environmental Measures		
	Current Practices (CP)	Perception on CP	Improvement
1. Procurement of inputs	-Raw materials stored in proper recipients -Ensure containers have their etiquettes upon receipt -Ensure labels are well defined -Storage in dry area	-Quality poor if date of expiry has lapsed	-More stringent checks
2. Production processes	-Respect environment since regular visit by sanitary officer -No use of extractors	-Chemicals cause harm to health and degrade environment	-Emphasis on bio-pesticides
3. Recycling of wastes	-Wastes used in compost -Litters put in plastic bags/use of dust bins -Limited quantity and ensure all stocks are sold -Expired products are returned to suppliers		-Followed training courses on Good Management Practices (GMP)
4. Distribution of inputs	-Use of plastic crates (Good Management Practices) -Use of carton box -Sold in pouch in laminated cartons -Transparent pouch used -Ensure storage and transportation done in sealed containers	-Cause nuisance to environment	

Table 4.0: Social and Labour Welfare Measures

	Social and Labour Welfare Measures		
	Current Practices (CP)	Perception on CP	Improvement
1. Procurement of inputs	-Protective equipment (respiratory masks, gloves, hair cap, boots, aprons...) -Toilet provided -Drinking water provided -First aid kit (medical) -Proper storage of products in store (lighting) -Periodic medical examination for employees	-Decrease risks of diseases and contamination.	-Better respiratory masks to be used
2. Production processes	-Proper ventilation -Careful housekeeping -launder clothing before reuse -Windows to allow aeration -Good lighting -Seating for employees -Proper electrical installation -Careful handling of heavy and inflammable products	-May cause injuries and fire	
3. Distribution of inputs	-Safety when loading and unloading products	-Important for health	-More attention to be paid to health and safety

Understanding of Sustainable Development (SD)

Table 5.0: Knowledge about SD

Thematic Responses	% of respondents
Environment	62
Social Issues and labour welfare	0
Economic	0
Others (No response, no idea, personal development, continuity, innovation, discipline)	38

Perception as Sustainable Entrepreneurs

90 % of entrepreneurs consider themselves as sustainable entrepreneurs or sustainopreneurs.

DISCUSSION

The results have contributed to important empirical evidence of how entrepreneurial the entrepreneurs are. The findings of the study show that about 40% of women stated that their business goal is to focus on the needs of their customers, while only 16% stated that their goal is to achieve maximum profits. Very few of them considered the goal of their business as safeguarding the environment.

According to Woolthuis (2010), sustainable innovations create win-win situations by integrating economic health, social equity and environmental resilience. In practice, the attitude of the agripreneurs surveyed towards the three pillars of sustainable development is very variable. Only 14% addressed the 3 pillars together while developing a new product. The emphasis lies mainly on two pillars (Planet and Profit) whereby there is awareness by the entrepreneurs on the proper use and

disposal of chemicals; use of food wastes as compost; and recycling of containers for distribution of products. This environmental awareness and compliance is explained by the legal sanctions that prevail in the business environment with respect to pollution of the environment. The women entrepreneurs receive regular visits from health and sanitary public officers and may incur penalties and fines if environmental laws are infringed. Hence, respect of the environment is more due to legal compliance than to a real motivation of the entrepreneurs to care about the planet. The social dimension is quasi-inexistent in the perception of the entrepreneurs about sustainable business practices.

90% of the respondents considered themselves as sustainable entrepreneurs. But when probed further about their understanding of the concept, it was observed that they all had a poor or erroneous conceptualisation of what is sustainable development linked to their business activities. Hence, the majority of the agripreneurs (62%) associated sustainable development with environmental issues. The women have not established a quality control procedure since they believe that it will cost a lot of time, effort and money to implement it. Few of them have implemented Good Management Practices. If Small and Medium Enterprises (SMEs) cannot afford to invest in ISO certificates, it will be difficult for them to be recognized as sustainable entrepreneurs. There is also no motivation for the entrepreneurs to invest their time and efforts in quality procedures as the exigencies of the local market are very low.

The problems faced by women entrepreneurs with regards to sustainable development centre around poor access to financial resources and networks, lack of skills and knowledge, lack of public support measures and soaring prices of raw materials. However, there are no incentives that encourage the entrepreneurs to adopt a sustainability perspective in their businesses.

Based on the assessment to see whether the women have the necessary skills, characteristics and are entrepreneurial in their endeavours, it is noted that they have few attributes, lack important skills (such as keeping records, managing accounts and finances, thinking creatively), have weaknesses and hence need improvement through training and commitment to enhance their skills.

CONCLUSION

From this study, it can be concluded that the women entrepreneurs do not qualify as sustainable entrepreneurs as their motivation centers too much on profit maximization with most of them abiding to environmental laws more due to existing legal enforcement rather than due to a real commitment to preserve the environment and the planet through sustainable practices. Awareness about societal needs is present to some extent with the production of innovative products and processes. The entrepreneurs' knowledge about sustainability is poor that the demand from the local market does not act as a driver enough to motivate them to invest their time and efforts in sustainable practices.

Skills needed to deal with people are not innate; they may be learnt as stated by Peter Drucker (1985). The successful entrepreneur must not only use these skills but also learn to use them. Personal characteristics and skills are so important nowadays that even investors rather than betting on the "horse" (business plan) bet instead on the "jockey" (entrepreneur). Women entrepreneurs are motivated to do business in a sustainable manner by putting sustainable development at the core of their business. However, in order to achieve this, decision-makers should put forward policies that promote sustainable business development. For instance, excellence awards can be attributed to businesses addressing the three pillars of sustainability.

LIMITATIONS OF STUDY

Due to time limitations, a real level of profit and turnover by the different enterprises was not obtained since exact figures were not obtained from entrepreneurs and women were reticent to provide them. However, they did reinvest a major part of their profit in the business. These limitations will be taken up as part of a future study. The impact of sustainable

entrepreneurship on poverty alleviation could also be investigated.

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ANALYSIS OF INVESTMENT PERFORMANCE OF RESIDENTIAL PROPERTY IN GOVERNMENT HOUSING ESTATES IN AKURE, NIGERIA

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ABSTRACT

Residential property is one of the basic human needs; hence real estate investments are consistently faced with the types of property and the place to invest because property values are not uniformly distributed in cities. This paper focuses on the diachronic development of spatial morphologies of property values within the same neighbourhood in Akure – a medium sized city in south western Nigeria. The thrust of the paper is to compare the investment performance of residential properties in both Ijapo and Alagbaka Housing Estates which are Government Residential Areas (G.R.A) in Akure Nigeria. Part of the objectives of this study is to identify the types of residential properties, examine the growth in rental values and identify the kind of trends residential property values follow in these two neighbourhoods. To achieve this, a survey was conducted on practicing estate surveying and valuation firms in Akure to get information on rental values of residential properties available in these areas. A time frame of ten years (2005-2014) was adopted in order to a Dghg Skm. determine how residential property values have changed over this period under review. Simple descriptive statistical models were used in the analysis and presentation of the data while the Levene's Test for Equality of Variances and the Independent Samples tests were used to test the variability of the investment performance in the two locations. The study shows that residential property values experienced a continuous increase during the period under study. However, the result revealed that the rate of investment in Alagbaka is higher as compared to its counterpart as the result for the different categories of residential properties confirmed that Alagbaka has higher mean rental values as against Ijapo. However, the Levene's Test for Equality of Variances indicates that the variability in the two locations is not significantly different; the significant value for all the properties are greater than .05. (i.e .977) The Independent Samples Test also reveals that there is no statistically significant difference between the two locations. Based on the findings of this study, recommendations were made for improved investment performance. The findings of this paper will be useful for an understanding of the property market in Nigerian cities and other parts of the developing country. The result of which will also be beneficial to investors and policy-makers in their decision-making processes.

KEYWORDS: estate surveyors and valuers, investment performance, rental values, residential property.

INTRODUCTION

Rapid urban growth, especially in the last two decades, has put enormous pressure on land in Nigerian cities. The consequences especially for urban development are many. Residential property, a sub-sector of real estate, has been described as the second most important need of man after food. In Nigeria, a substantial proportion of all investments are in real estate. Rough estimate put the value of dormant investment in real estate at about N8.5 trillion (Hayford, 2006). Barlowe (1974) confirmed that two – thirds of the investment in United States of America is made up of real estate. Ibbotson, Lawrence and Kathryn (1985) also observed that the largest share of world's (37%) and U.S (40%) wealth in the context of the totality of real estate, equities, bonds, cash, and commodities. According to Ajayi (1998) and International Valuation Standard (2007) so much of a nation's wealth lies in its real estate assets that the valuer has a duty to contribute his expertise to

efficiency in the use of scarce resources. Given the significant role that housing wealth appears to play in the overall economy, the income flow is of importance to a property investor and also for the economic policy makers

Due largely to rising demand and higher yield on property investment, activities in the residential segment of the real estate sector has gone up considerably. Residential properties are common and increasingly popular form of investment in Nigeria and all over the world. Residential property is man's second most basic need after food. It protects man against the harsh effects of weather.

The performance of the property investment has greatly increased in popularity over recent years and property itself has long fascinated investors. Unlike many other investments, such as shares bonds, property is a tangible

asset. Property investment otherwise also called the real estate is also a medium where bundle of rights in landed properties are being exchanged. It is an avenue where transaction in land and property owners, building users, estate agents and lawyers is created. The property market is the sum total of all the smaller and larger markets operating in different types of interest in land (Ajayi 2006).

Nigerians prefer to invest in real estate than any other investment media. Yet real estate especially residential property remains inadequate and the value kept increasing. With the slow growth in real estate investment and the fact that about 50% of the Nigerian population is not yet over 25 years of age, strong demand for real estate is expected to persist in all urban areas. The situation is further compounded with the perceived notion among Nigerian property investors that commercial property performs better than residential property investment. However, the investors can no longer base their decision on intuitive grasp of the market which Ajayi and Fabiyi (1984) considered inadequate for success in property ventures.

According to Ajayi (1998), investors in property often times are uncertain about the outcomes of their actions. Future events are difficult to forecast in precise term and over time such forecast becomes unreliable. The study stated further that risk is the level of probability that required return measured in terms of capital value and income would be achieved. Uncertainty implies that neither alternative outcomes nor their probabilities could be identified. In Nigeria, a lot of risks and uncertainties affect real estate development and there is lack of information or model to predict property values to reduce the effect of such risks and uncertainties.

These fluctuations property values are of great importance to the estate surveyors and valuers since they provide vital information about the rental and capital value of such properties. It is equally important to determine the trends in the values of residential properties in order to predict future levels which help to show realizable income from real property investments. These level of income from real property investment are useful in which could be threatened by uncontrolled and unstable fluctuations in property values. This study therefore analyses the spatial distribution of property values within two locations in Akure, Nigeria with a view to determining their investment performances.

JUSTIFICATION FOR THE STUDY

Rapid urban growth, especially in the last two decades, has put enormous pressure on land in Nigerian cities. The consequences especially for urban development are many. One of these is the increase in value of real estate

commodities. The urban explosion has in most developing countries produced violent increases in urban land and housing prices and has overwhelmed the capacity of the market to provide adequate housing and of the government at all levels to provide either adequate physical urban infrastructure or adequate urban services. The statistics compiled by United Nations illustrate some aspects of these deficiencies (HABITAT, 1976). Land and housing prices in major cities of the Third World rose during the decade of the 1960s by 10 to 20 percent more than consumer price indexes. In peripheral areas of some cities, the rise in prices was even higher. Poor families, for whom the cost of land can represent 50 percent of the housing expenditure – unless they become squatters illegally occupying the land they build on – are forced to settle further and further out from town centres. Even so, housing conditions for the poor are abysmal. Living space per person is restricted, often to ten persons per room and several families sharing a dwelling (HABITAT, 1976). These factors posed a challenge to policy that the developing countries and the international community will have to face. The response may be more rational if the underlying realities are more widely under listed. However, investors in real estate will continue to take advantage of this type of property market to realize a reasonable level of income from real estate investment.

Therefore, an understanding of the metropolitan spatial distribution structure in property - value distribution is essential for real estate decision making yet knowledge accumulated in this area is limited because of data and methodology constraints. The paper extends knowledge of the area by analyzing distribution pattern of housing prices in two selected public housing estates in the study area. Again, property values are not uniformly distributed in cities. They differ from one place to another even within the same neighbourhood (Akhtar, 2004). An understanding of the spatial analysis of these values will assist a rational investor in taking a decision where to invest and what type of property to invest on and what is the flow of income realizable from the investment.

Urban planners and administrative bodies require reliable information to assess the consequences of urbanization, to ensure a sustainable functioning of cities and to minimize negative impacts of rapid urbanization. Information on housing prices will add to data required for urban planning and development.

RESEARCH LOCALE

Akure, the study area, was chosen on the pragmatic basis that it offers access to richer data on residential properties than most towns in Ondo state because of its

dual role as a state capital and as the headquarters of Akure South local government council. This makes Akure the seat of most federal establishments in the state. The increased relative political influence of Akure as a state capital is responsible for its vast expansion from an area of about 16km² in 1980 to about 30 km² in 2000. This has created greater opportunities especially for government residential housing estates, hence justifying the choice of Akure where samples of different classifications of housing estates could be drawn for investigation purposes. Four estates were identified in this category out of which 2 were chosen for the research. The residential density neighbourhoods include - Ijapo Housing Estate, Alagbaka quarters, Ala quarters and Federal Low Cost Housing Scheme (Shagari Estate)

Ijapo Housing Estate and Alagbaka Government Reserved Area which are the two sampled government estates are high class residential areas. Both estates were developed after 1976. Alagbaka estate which is located at the eastern periphery was built by the Ondo State government for senior and the medium government workers. Ijapo housing estate which is located in north of the city were started by the old western state housing corporation. Some developments in the area have also taken off since Akure became the state capital. The estate houses the senior staff of the state housing corporation. As times goes by individuals who have the means buy plots and build either for their use or for rent, the standard however, have to comply with the corporation's regulation. These estates have been classified as low density residential neighbourhood (Fasakin, 2002, Okoko, 2004 and Ogunleye, 2011)

Owing to the increased demand for sites in the city centre, it can either grow laterally or vertically. The lateral expansion enables users that are unable to compete for the high land/rental values at the centre find suitable and cheaper locations outside the city centre. This, no doubt, shows that residential users are unable to compete effectively with commercial users and have been found to locate in the periphery of the urban area. They eventually form a cluster together and confer the benefits of accessibility and complementarities on such locations. This action unknowingly creates a high demand for land in such sites and a consequent rise in land/rental values to a point where it becomes the position of highest land/rental values. This is the the type of scenario that has been created Ijapo and Alagbaka housing estates which are the focus of this study.

REVIEW OF RELEVANT LITERATURE

Real estate or immovable property is a legal term encompasses land with anything permanently affixed to it. Real estate (immovable property) is synonymous

with real property called realty, in contrast with personal property (also sometimes called chattel). There are many types of property available for an investor and a variety of interests in such properties. Millington (1982) identified them as freeholds, short or long term leaseholds, ground rents, offices, shops, factories, warehouses and each of these interests or rights or types of property will have different features which make them more or less attractive to investor depending upon circumstance and the requirements of the particular interests. Property is thus seen as subject of ownership which concerns the right of individual, persons, sovereign power and the exercise of such rights of ownership are use and the nature of such rights are subject to influence human activities. The property types include industrial, agricultural, commercial and residential. A residential property which is the focus of this study is a multidimensional good differentiated into a bundle of attributes that vary in both quantity and quality (Can 1990)

The word "value" could command different meaning to different people depending on the context within which it is used. But value in real estate is the present worth of anticipated future benefit from ownership. It is the capacity of an economic good to command other goods in exchange. It also represents that price at which demand and supply coincide in the open market. Value then is determined by the intersection of demand and supply and for an object to have value, it must possess four elements or ingredients of value which are scarcity, utility, demand and transferability.

Extrinsic value constituted of objective value as molded by the market forces of supply and demand. By contrast, intrinsic value is a measure of objects inherent utility to render services or satisfaction in use. Other concepts of value include that of Ricardo (1817) and Mill (1848). The nature of value include market value, mortgage value, insurance value, compensation value, rental value, going concern value, liquidation or forced sale value, e.t.c. The concept of value for the purpose of this study has been taken as the amount of money which the property will bring to the owner if let or leased and this can be expressed as the rental value of such building determine at the lowest point of profitable production cost whereas market price may be higher because of temporary or disturbed market situations.

Rental housing in developing countries in general and Nigeria in particular has been badly neglected both by government and in the housing literature. Olaore (1991) examined the nature of the factors that are responsible for high rental values of shelter. The study identified among other things infrastructural index, distance from the Central Business District (CBD) and residential

accessibility. Population density was also observed to be of great influence, it however has a depressing effect on rental level. Olusola (1997) concluded that the rental housing market has become the seller's market where the highest bidder gets the jewel.

Adeniyi (1985) pointed out that the magnitude of the housing problem varies from country to country and from city to city, but without deliberate under estimation of the infrequently inadequate housing conditions. Housing problem in the developing countries is basically an urban one. Acquaye (1985) while examining the housing problem revealed an inadequacy both qualitatively and quantitatively in most developing nations. The study attributed this to increase in population growth, urbanization, industrialization and improvement in general prosperity.

Okpala (1981) attributed the acute housing situation to rapid migration to the urban areas, the costly land prices in the cities and the financial inability of many traditional land owners to build bigger and better houses and in many cases even build at all. The study of Vagale (1985) opined that one of the main reasons for the anti-social rents for residential accommodation is this continually widening gap between supply of and the demand for houses, at rents, which the economically weaker sections of the community can afford.

Onibokun (1985) identified high cost of problems and went further to show the varying degree of escalation in the period between 1974 and 1979 experiencing gradual increases. The study attributed this trend to the unabated inflation pressure on most building materials. Ogunleye (2012) examined the trends in residential land values in Akure, Nigeria for a time frame of five years (1996 – 2000) using the statistical averages and time series analysis. The result showed that land values experienced an upward increase in different areas but the increase is more pronounced in the low density areas.

Urban neighbourhood is a grouping of homes and their environment- political, social, economic and physical. Neither its centre nor its boundaries can be easily or clearly delimited. In its widest sense, it can be said to include the people and other things, natural, man-made, perceptible and imperceptible, accessible and inaccessible that are outside the dwelling unit. It includes not only the physical but also the social and psychological variables which are external to the dwelling unit. The neighbourhood can thus be said to be a functional area in which the local residents identify in terms of attitude, lifestyles and local institutions. In the present context, the term neighborhood would be seen as the immediate vicinity or near situation of the household abode in terms of physical structures and the

general layout of that environment. It is the minimum planning unit desirable for the development of residential areas.

METHODS

The research focuses on the distribution pattern of residential property values in Akure. The scope of this research therefore, requires a comprehensive data set containing variables on types of residential properties, the practitioners' characteristics, rental values among others. There are different actors that shape the dynamism of urban property markets. These include investors, original land owners, estate agents, households and even government. The research identified two aggregations or study group for investigation; these are residential properties and estate surveyors and valuers in the study area. This type of property was selected to ensure homogeneity which is an essential requirement for this study as property also falls into different categories such as residential, industrial and commercial uses. The research is based on primary and secondary sources of data. There is no comprehensive data on housing population of Akure. However fragmentary data which are available with Ondo State Ministry of Lands, and Housing and Ondo State Development and Property Corporation were obtained and used for this study.

The primary data was collected from interviews, personal observations and responses to questionnaires administered on practicing estate surveyors and valuers. Secondary data were obtained from Ondo State Development and Property Corporation. In addition, data were sourced from published sources including government publications such as Ondo State land and housing policy.

The second categories involve a survey of estate surveyors and valuers. These are practitioners that are members of the Nigerian Institution of Estate Surveyors and Valuers (NIESV), registered with Estate Surveyors and Valuers Registration Board of Nigeria (ESVARBON) and are recognized by the Estate Surveyors and Valuers' Registration Act, popularly referred to as Decree No. 24 of 1975 with the responsibility among other things to carry out the sales, letting and management of all classes of properties; and determine the value of all descriptions of property and of the various interest therein. Therefore, the list of all estate surveyors and valuers who are consultants in private practice obtained at the secretariat of the Nigerian Institution of Estate Surveyors and Valuers, Ondo State branch constituted the population of the estate surveyors and valuers that was studied. Their total is 20 and since the population is within a manageable size and they can easily be reached, all the practicing

estate surveyors and valuers within the sample frame were taken for the study. They were asked variety of questions, one of which covered the rental values of residential properties. This was done with a view to establishing opinions on rental values in the past 10 years. This was accomplished by examining the rental value of residential property over a period of 10 years (2005 – 2014). The data obtained were analysed using the measure of central tendency while The Levene's Test for Equality of Variance and the Independent Sample Test were also used to confirm if there are significant variability in the rental values within the two locations.

DISCUSSIONS

The survey identified three different categories of residential properties within the two locations, These are the single family bungalows and the bungalows comprising blocks of two flats (semi – detached bungalows). They both have self-contained facilities and low density accommodation. They are very modern in nature. The duplexes are storey buildings that are of double or twofold nature. They are either detached or semi – detached. They are also very modern in nature. These estates were developed by government agencies in high compliance with development control ethics hence the houses have uniform high building standards.

Table 1: Analysis of Rental Value in Ijapo Government Residential Estate

Accommodation Type	2005 #	2006 #	2007 #	2008 #	2009 #	2010 #	2011 #	2012 #	2013 #	2014 #
Detached building	100,000	125,000	175,000	175,000	200,000	275,000	350,000	450,000	510,000	510,000
Duplex	125,000	125,000	225,000	225,000	300,000	390,000	410,000	515,000	620,000	635,000
Semi detached	100,000	100,000	150,000	125,000	150,000	250,000	300,000	325,000	425,000	450,000

Source: Field survey, 2014

The above table shows the average value of various properties over a ten/s year period in Ijapo Government Residential Estate, Akure. From Table 1, it could be

deduced that there have been persistent rises in residential property rental value over the period under study.

Table 2: Analysis of Rental Value in Alagbaka Government Residential Estate

Accommodation Type	2005 #	2006 #	2007 #	2008 #	2009 #	2010 #	2011 #	2012 #	2013 #	2014 #
Detached building	100,000	155,000	185,000	185,000	250,000	275,000	350,000	450,000	520,000	520,000
Duplex	120,000	125,000	200,000	225,000	350,000	400,000	450,000	525,000	550,000	650,000
Semi detached	80,000	100,000	125,000	160,000	200,000	225,000	300,000	350,000	450,000	500,000

Source: Field survey, 2014

Table 2 above shows the rental value of the various properties over a period of time in Alagbaka G.R.A in

Akure. The data also revealed that there have also been upward increase in residential property rental value over the periods under review.

Table 3: Analysis of Rental Value in Ijapo Government Residential Estate

Year	Detached building	Growth (%)	Duplex	Growth (%)	Semi detached	Growth (%)
2005	100000		120000		80000	
2006	155000	35	125000	4	100000	20
2007	185000	16	200000	38	125000	20
2008	185000	0	225000	11	160000	22
2009	250000	26	350000	36	200000	20
2010	275000	9	400000	13	225000	11
2011	350000	21	450000	11	300000	25
2012	450000	22	525000	14	350000	14
2013	520000	13	550000	5	450000	22
2014	520000	0	650000	15	500000	10

Source: Computed from field survey, 2014

Table 4: Analysis of Rental Value in Ijapo Government Residential Estate

Year	Detached building	Growth (%)	Duplex	Growth (%)	Semi detached	Growth (%)
2005	100000		125000		100000	
2006	125000	20	125000	0	100000	0
2007	175000	29	225000	44	150000	33
2008	175000	0	225000	0	125000	-20
2009	200000	13	300000	25	150000	17
2010	275000	27	390000	23	250000	40
2011	350000	21	410000	5	300000	17
2012	450000	22	515000	20	325000	8
2013	510000	12	620000	17	425000	24
2014	510000	0	635000	2	450000	6

Source: Computed from field survey, 2014

Tables 3 and 4 shows the growth rate (%) in the rental values of residential property within the two estates. The table shows varied growth rate for the period under study as between 4% - 38%.

Table 5: Group Statistics of Mean Rental Value of Detached Bungalow

	Location	N	Mean	Std. Deviation	Std. Error Mean
Rental Values	1	10	299000.00	153619.299	48578.688
	2	10	287000.00	157765.649	49889.879

Source: Computed from field survey, 2014

Table 6: Levene's Test of Mean Rental Value of Detached Bungalow

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Rental Values	Equal variances assumed	.031	.861	.172	18	.865	12000.000	69633.964	-134295.529	158295.529
	Equal variances not assumed			.172	17.987	.865	12000.000	69633.964	-134302.964	158302.964

Source: Computed from field survey, 2014

The study went further to analyse the mean rental value for the different categories of residential properties in the study areas. The Levene's Test for Equality of Variance was also used to confirm if there is significant variability in the rental values within the two locations. Table 5 shows the analysis of the mean rental value for detached building within the two locations. The result revealed that Alagbaka has higher mean rental value of N299, 000 as against N287, 000 at Ijapo. However, the Levene's Test for Equality of Variances in Table 6 indicates that the variability in the two locations is not significantly different; the significant value is greater than .05. (i.e .861) The Independent Samples Test reveals that there is no statistically significant difference between the two locations. It can therefore be concluded that the differences between rental Means are likely due to chance. The significant (2-tailed) value is greater than 0 i.e .865.

Table 7: Group Statistics of Mean Rental value of Duplex House

	Location	N	Mean	Std. Deviation	Std. Error Mean
Rental Values	1	10	359500.00	186747.750	59054.824
	2	10	357000.00	188873.856	59727.157

Source: Computed from field survey, 2014

Table 8: Independent Samples Test of Mean Rental Value of Duplex House

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Rental Values	Equal variances assumed	.001	.971	.030	18	.977	2500.000	83992.890	-173962.514	178962.514
	Equal variances not assumed			.030	17.998	.977	2500.000	83992.890	-173964.135	178964.135

Source: Computed from field survey, 2014

Table 7 shows the analysis of the mean rental value for duplex houses in the two locations. The result also confirmed that Alagbaka has higher rental value with a mean rental value of N359, 500 as against N357, 000 at Ijapo. The Levene's Test for Equality of Variances in Table 8 indicates that the variability in the two locations

is not significantly different; the significant value is greater than .05. (i.e. .971) The Independent Samples Test reveals that there is no statistically significant difference between the two locations. It can therefore be concluded that the differences between rental Means are likely due to chance. The significant (2-tailed) value is greater than 05 i.e.977.

Table 9: Group Statistics of Mean Rental Value of Semi-detached Bungalow

	Location	N	Mean	Std. Deviation	Std. Error Mean
Rental Values	dimension1	10	249000.00	146530.240	46336.930
		10	237500.00	132418.738	41874.482

Source: Computed from field survey, 2014

Table 10: Independent Samples Test for Mean Rental Value of Semi-detached Bungalow

			Levene's Test for Equality of Variances		t-test for Equality of Means						
			F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
										Lower	Upper
Rental Values	Equal variances assumed		.079	.782	.184	18	.856	11500.000	62454.650	-119712.351	142712.351
	Equal variances not assumed				.184	17.819	.856	11500.000	62454.650	-119808.204	142808.204

Source: Computed from field survey, 2014

Note: 1Dollar = 198 Naira

Location 1 = Alagbaka Housing Estate

Location 2 = Ijapo Housing Estate

The analysis of the mean rental value for semi-detached building in the two locations were also analysed. The result as revealed in Table 9 shows that Alagbaka has higher mean rental value of N249, 000 as against N237, 500 at Ijapo. The variability in the two locations as shown by the Levene's Test for Equality of Variances in Table 10 is not significantly different; the Sig. value is greater than .05. (i.e .782) The Independent Samples Test reveals that there is no statistically significant difference between the two locations. It can therefore be concluded that the differences between rental Means are likely due to chance. The significant (2-tailed) value is greater than 05 i.e .856.

Generally, the rental values of residential properties within the study area witnessed an upward increase during the period under study. Annual rental growth rates varied significantly from 7.6% to 50% . The upward trend maintained by the rent agrees with the various observation of Oruwari (1989), Asaju and Olawumi (2002) and Ogunleye (2011 and 2012) and Nigeria's urban rent have been rising. The strong positive relationship between time and rents could imply that rent grows significantly with time. These differences were attributed to the level of inflation being experienced in the various years coupled with the rate of urbanization occasioned by the movement of individuals, corporate bodies and government parastatals to Akure, the capital of Ondo State. This led to high demand for accommodation which did not match its supply. The mean rental values for the properties revealed that Alagbaka has higher mean rental value than Ijapo Estate. However, there are no

significant differences in the investment performance within the two locations.

This is a green light for investors who are interested in real estate business in any of the two locations for investment decision making. The study has also revealed an idea of income realizable from such investment. Investment decision should however, be based on pre – development investment appraisal.

CONCLUSION AND RECOMMENDATIONS

This study carried out a comparative analysis of investment performance of residential properties in two government housing estates of Ijapo and Alagbaka in Akure and showed that rental value for all the categories of properties maintain an upward increase during the period under study. However, the mean rental value for the different categories of properties found within the study area is higher in Alagbaka than Ijapo estate. However, there is no significant difference in the variability of the investment returns.

Non availability of good housing and related infrastructure constitutes a major source of population deprivation. It has been argued that the public, as against the private sector in the production process, has led to almost a total neglect of housing provision. Effective policies to make housing and basic infrastructure available would have significant improvement on rental values. It is therefore necessary that infrastructural facilities like electricity, pipe borne water, motorable roads, e.t.c. are provided to enhance the quality of the neighbourhood. Since the state government is in charge of the housing estates, there is the need for effective implementation of government policy on planning and zoning regulations. This will help in providing high quality neighbourhood which will enhance property value.

There should be a revolving housing loans scheme to be made available through most of the commercial banks. Financial institutions should therefore be encouraged by the government to give priority attention to residential property developers by advancing loans at a lower rate. By this, the developers will be motivated invest in real estate. Government could introduce some incentives to make loans competitive among banks. This is likely to reduce the banks' slow administrative bureaucracy and other bottle – necks which normally prevent access to loans.

Much has been written on the inadequate implementation of the Land Use Act as it hampers development (Omotola, 1982, Olanrewaju, 1989, Ogunleye, 2000). There is the need to improve the implementation procedure for construction, In spite of

the management problems of sites, services and housing programmes, it offers the best way of making land available for real estate development.

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SUSTAINABILITY AND STRESS PROPERTIES OF SELECTED HARDWOOD TIMBER SECTION IN LAGOS, NIGERIA

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ABSTRACT

Hardwood Timber sections are usually used for structural members in various areas in construction works; hence the knowledge of wood strength properties is important. Reconnaissance survey of common hardwoods used in Lagos was made, Ikorodu area was used to gather respondent social and timber technical data with the aid of questionnaire. The physical and mechanical properties five (5) selected hardwood timbers species was carried out in accordance with BS 373 (1957); the species scientific names are *Hallea ciliata*, *Uacapa guineensis*, *Albizia zygia*, *Sacoglottis gabonensis* and *Symphonia globulifera*. Small clear specimen samples of 20 x 20 x 20 mm, 20 x 20 x 60 mm and 20 x 20 x 300 with respect to BS 373 were used to carry out the test on Shear strength, Specific gravity (SG), Moisture Content (MC), Maximum Compressive Strength parallel to grain (MCS//), Modulus of Elasticity (MOE) and Modulus of Rupture (MOR) respectively. 35 x 35 x 750 mm specimen was used for the third point bending test. The result showed *Uacapa guineensis* having the highest MOE of 21635.1N/mm² with a minimum MC of 20.4%, and *Symphonia globulifera* and *Uacapa guineensis* having Shear strength of 7.34 and 7.33 N/mm² respectively.

KEYWORDS: hardwood, hallea ciliate, uacapa guineensis, modulus of elasticity, modulus of rupture.

INTRODUCTION

Wood is a very versatile raw material and is widely used in construction, especially in this nation where there is an abundance of good quality timber. Timber is the most sustainable building product available and naturally renewable, it can be used in a range of structural applications including marine works: construction of wharves, piers, cofferdams, and heavy civil works: bridges, piles, shoring, pylon, domestic housing: roofs, partitions, shuttering for precast and in situ concrete, for brick or stone construction. Timber species are in varieties; they are divided into softwood and hardwood; however hardwood is of high priority. The term softwood and hardwood does not refer to the density of the wood, but rather the type of tree that the wood comes from, hardwood comes from angiosperms (broad leaves) while softwood comes from gymnosperm (narrow leaves).

However this study is intended to evaluate the strength properties of available timber hardwoods and check if standard practices are adhered to during the process of handling. The obvious fact of important notice is that non-standard section sizes is dominant in the market while seasoning is not assured. Information from this report will be useful to users of timber for strength classification and policy makers for attention on enforcing adherence to standard practices. Obviously the suitability of a particular hardwood timber type for any given purpose will depend upon

various factors such as performance, cost, appearance, durability and availability. Commonly available hardwood local and English names are; Okilolo, Eku, Iroko, Itara, Akun, Abura, Ayunre, Omoh, Afara, Oriro, Teak, Mansonia and Mahogany Timber used for structural applications must be graded and clearly marked to show it complies with the correct standards and strength requirements laid down by building codes and regulations. (Chanakra A. 2003)

Wahab et al., (2014), reported the result of bending strength of timbers of structural and laboratory sizes and it was found that the values of the bending strength of real structural size are lower when compared to smaller sizes. However, several properties have not been estimated and some have been inadequately estimated, partly because the assessments were based on a small quantity of material and partly because there is variation in mechanical properties even in the same log of timber.

The Specific gravity of timber is found to predict the mechanical properties of wood like its strength, dimensional stability with moisture content change, ability to retain paint, fibre yield per unit volume, suitability for making particle-board and related wood composite materials and suitability as a raw material for making paper (Wani, 2013).

Also the a study into the effect of the specific gravity on several mechanical properties of some world woods

shows the logarithmic regression of the specific gravity versus the particular mechanical property for each data collected shows a 95% confidence level as determined by correlation analysis and covariance analysis revealed significant differences in specific gravity – mechanical property relationships for soft and hardwood from different geographical location for non conclusive trends. (Armstrong et al., 1984)

Antwi et al., (2014), studied the strength and some physical properties of *Allanblackia Parviflora* for Furniture Production in Ghana, and reports that almost all the strength tests conducted showed a consistent trend, the heartwood portion of each division was slightly stronger in terms of resistance to failure than its corresponding sapwood portion. Comparing the strength of *Allanblackia parviflora* to an existing classification (grade), strength is ‘medium’ in *Allanblackia parviflora* and this could be related to one of the trees variety in Nigeria known locally as (Orogbo-erin) i.e *Allanblackia floribunda*. (Forestry Research Institute of Nigeria, FRIN 1980)

Ogunsanwo and Akinlade (2011), researched into the effects of age sampling position on wood property variations in Nigeria grown *Gmelina arborea*, and discovered that the MOR, MOE and MCS// generally decrease from the base to top of timber logs, for all age classes except in the medium age class of 28 year old trees, where variation in MOE was inconsistent and all the properties studied increased from inner wood to outer wood sections.

An assessment of the environmental characteristics of timber and wood products from a user’s perspective should consider.

- The procurement of the raw materials including forest management practices.
- The amount of energy used to extract and process timber into finished building components.
- The imports of timber throughout use-phase including imports and benefits on greenhouse erosions’, energy efficiency and air quality.
- The fate of the products, its recyclability, reliability and biodegradability.
- The social sustainability of the supply chain and actions within it. (Ecospecifier, 2014)

Sustainability considerations of about timbers in Indonesia market was critically evaluated based on the policy reform of the HPH system as a means to achieve sustainable forest management generally, with priorities in three objectives. First, they have sought to increase the government’s capacity to enforce the technical aspect of sustainable concession management practice,

such efforts have largely been oriented towards designing more effective mechanisms for monitoring concessionaires’ harvesting practices to ensure that they adhere to the selective cutting guidelines stipulated in the HPH contract. Secondly, forest economists have advocated a sharp increase in the government’s timber royalties and fees to halt the flow of resources rent that is, revenue above a ‘normal’ rate of return-to concession holders. From a fiscal perspective, they maintain that the government’s failure to fully capture timber rents implies the loss of funds that might otherwise be used by the state for formal budgetary allocations.

Thirdly, policy analysts have long called on the Indonesian government to lift the prohibitive restrictions on log exports that it has maintained since the early 1980s. They emphasize that these restrictions have led concession holders to sell virtually all of the products to Indonesia’s wood- processing industries at prices that are well below international market rates. Under-pricing of this sort is believed to promote inefficiency both at the point of log harvesting and during processing operations. Taken together, these three sets of prescriptions – selective cutting, full rent capture and market-based efficiency, represent the essential pillars of what can be called the ‘sustainable logging’ paradigm, which can be reviewed to ensure sustainability. (Barr, C. 2002)

METHODS AND PROCEDURES

STUDY AREA

Ikorodu environment is the study area as a representation of Lagos area with the samples of timber species a replicate of what is available during a state wide survey. All the three main sawmills in Ikorodu were visited for investigation. This area is precisely along Shagamu Expressway and Ijebu-ode Expressway, located on co-ordinates 0734588 Northing and 0557280 Easting.

RECONNAISSANCE SURVEY

A reconnaissance survey was carried out to various timber selling points in Lagos environs to gather information on available hardwood timbers commonly used. Ikorodu being a major access way for timber log entry into Lagos, three (3) sawmills (Itamaga, Okegbegun and Odoguyan- Flower bustop sawmill) were later identified as source information area for the samples of timber and other social parameters. Lots of hardwood species were discovered, out of which five most utilized were chosen for the research study; they are *Hallea ciliata* (Abura), *Uacapa guineensis* (Akun), *Albizia zygia* (Ayunre), *Sacoglottis gabonensis* (Itara) and *Symphonia globulifera* (Okilolo). The survey also gathered some information about the available hardwood timber sizes, colours, standard length,

physical defects, cost, availability and usages. (Forestry Research Institute of Nigeria, 1980)

Two hundred Questionnaires were administered saw mill machinist, merchant and timber craftsmen in these environments; in order to get factual information which includes:

- Sources of timber in the market and Seasoning methods
- Types of timber used for form work and furniture work
- The major natural defects of hardwood
- Standard sizing of timber section
- Factors that enhances the durability of the hardwood timber in use
- Rate of accidents during the processing

Selection of Species

Five (5) numbers species of hardwood were selected, three (3) samples were taken for each species were chosen in accordance with the BS 373, 1957.

Table 1: Scientific/vernacular names of species tested and their colours

S/N	Vernacular names	Scientific names	Colours
1.	Abura	Hallea ciliate	brownish
2.	Akun	Uacapa guineensis	brownish
3.	Ayunre	Albizia zygia	yellowish
4.	Itara/Atala	Sacoglottis gabonensis	Creamy
5.	Okilolo/Aba	Symphonia globulifera	Whitish

Source: Vernacular names of Nigeria planks, Forestry Research Institute of Nigeria (1980)

Thorough investigation was done to ensure that the hardwood timbers are properly identified with their respective local names, because of their popular use for comparison to be made on their properties.

SAMPLING TECHNIQUE AND TESTING

After the purchase of the species which are free of excessive knots and some other physical defects such as cracks, splits, decay as well as insect attack, three (3) cut to size section were taken at random, timbers were taken for test to compare with an acceptable limit in accordance with BS 5268: part 5 (1989). The timber log sized 50 x 150 x 3600mm were taken to the wood workshop machines in order to cut the woods to sample sizes. Physical and Mechanical parameters of timber sections were determined with the appropriate sizes in accordance with BS 5268: part 2 (2002). The physical parameter determined is the moisture content and the specific gravity. Timber section samples was obtained at top (sample 1), middle (sample 2) and bottom (sample 3) for all the specimens for the determination of some mechanical properties i.e. nine samples were tested per

specie. Samples of 35 x 35 x 750mm were prepared for the third point bending stress test, the Shear strength parameters from the 20 x 20 x 20mm samples, Compressive strength on 20 x 20 x 60mm, while Modulus of Elasticity (MOE) and Modulus of Rupture (MOR) were carried out on the 20 x 20 x 300mm samples. The samples were tested at the in the Timber Mechanics Unit, Forestry Research Institute of Nigeria (FRIN) situated at Jericho, Ibadan, Oyo state using the Hounse field Tensometer machine, except for the third point bending test carried with a Magnus frame at the Structures laboratory of the Civil engineering department, Lagos State Polytechnic, Ikorodu.

Specific Gravity (SG)

The Specific gravity indicates the amount of actual wood substances present in a unit volume of wood, the wood specimens were subjected to a gravimetric procedure in which specimen were completely saturated with water by boiling. Each cube was then removed from the water blotted to remove excess water and weighed. They were oven-dried to a constant weight at 103°C. Specific gravity was determined using the procedure developed by (Smith 1954) as seen in equations 1 and 2, using the formula. (Ogunsanwo and Akinlade, 2011)

$$G = \frac{1}{w_s - w_o / w_o + 1/153} \text{----- (1)}$$

Where; G = Specific gravity

W_s = Saturated weight of wood

W_o = Oven dry weight of wood

153 = constant developed by (Stam, 1929) as the actual weight of wood substance.

And also the procedure developed by Panshin and Dezeuw (1980) as;

$$G = \frac{\text{Oven dry } \div \text{ Displaced water weight}}{w_w} = \frac{w_o \%}{w_w} \text{----- (2)}$$

Where; G = Specific gravity

W_o = Oven dry weight of wood

W_w = weight of water displaced.

Moisture Content

Moisture content was taken as a percentage of the water in the timber after being oven dried to a constant weight. It is certainly, well known that the moisture content in timber has a tremendous effect on the strength of timber pieces. Within the range of 20-25% maximum moisture content the strength of timber does not alter, but as timber dries its strength increases. Modulus of Rupture is the determinant of the deformation of the timber. The exact moisture content below which there is an increase of strength is known as the “fibre saturation point” and it is not the same for every species.

Modulus of Elasticity (MOE)

The Modulus of elasticity (MOE) was calculated from the values obtained at the point of failure recorded during test for (MOR). This provided for the calculations of deflection which was used to estimate the modulus of elasticity (MOE) using equation 3 below.

$$MOE = \frac{PL^3}{4\Delta bd^3} \text{----- (3)}$$

Where P is load in Newton (N)
L is span in (mm)
b is width in (mm)
d is depth in (mm)
Δ is the deflection at beam center at proportional limit

Modulus of Rupture (MOR)

The bending strength of wood is usually expressed as MOR, which is the equivalent fibre stress in the extreme fibers' of the specimen at the point of failure was then calculated using the expression in equation 4;

$$MOR = \frac{3PL}{2bd^2} \text{----- (4)}$$

Maximum Shear Strength

The shear strength was computed using sample size 20 x 20x 20 mm with the formula in equation 5 below.

$$\frac{P}{bd} \text{ N/mm}^2 \text{----- (5)}$$

Where bd is cross sectional area (A)

Maximum Compressive Strength Parallel to Grain (MCS //)

Wood samples were loaded at the rate of 0.01mm/sec, and the corresponding forces at the point of failure were taken directly. This was divided by the cross sectional area of the test specimen to obtain value for maximum compressive strength parallel to grain. The formula in equation 6, below was used to compute the maximum compression strength parallel to grain, using standard size of 20 x 20 x 60 mm. (Ogunsanwo and Akinlade, 2011)

$$\frac{P}{bd} \text{ N/mm}^2 \text{----- (6)}$$

Third Point Bending Test

The Third point bending test was carried out using 35 x 35 x 750mm. Load was applied at the middle of the plank. The flexural stress (N/mm²) is simply computed using maximum applied load (N), divided by the cross-sectional are b-width and d-depth (mm) of the specimen.

RESULTS

The use of these samples is receiving attention among the plank users in the market. Notable among the wood species gathered from the questionnaires shows that *Uacapa guineensis*, *Symphonia globulifera* and *Milicia excelsa* (Iroko) has the highest rating for usage in the construction of roof members of buildings which are structural elements; while furniture makers prefer others in the order of *Mansonia altissima* (*Mansonia*), *Gmelina arborea* (Melaina) and *Khaya grandifoliola* (African Mahogany) with *Hallea ciliata* as the fifth on the preference list. (The Wood Database, 2014)

Ceiba pentandra (Araba) softwood is the commonly used timber for formwork. Social data were extracted from the respondents and displayed in Table 2.

Table 2: Respondents data

Parameters	Category	Frequency	Percentages
Gender	Male	126	63
	Female	74	37
Age Class	18 – 28	40	20
	29 - 40	88	44
	41 - 49	47	23.5
	50 and Above	25	12.5
Marital Status	Married	145	72.5
	Single	55	27.5
Education	No formal Education	14	7
	Primary	25	12.5
	Secondary	114	57
	NCE/ND/Technical	27	13
	College Graduates	20	10

The data in Table 2, shows that the timber trade is male dominated in Lagos, Nigeria, with over 60%. The most active age of those in the trade ranges from 29 to 40 years with 44% and 41 to 49 with 23.5%. The level of education shows the majority falling on and below the secondary school corresponding to the West African School leaving Certificate with 57% finishing the secondary school mostly with deficiency in their subject below the credit passes; while we still have 7% without any formal education in this computerized age.

Table 3: Respondents types

Parameters	Category	Frequency	Percentages
Professional bias	Timber Merchants	110	55
	Timber Accessories Merchants	36	18
	Timber Machinist	30	15
	Timber Machinist	12	6
	Carpenters/Furniture makers	12	6
	Timber transporters		
Years of Experience in Timber Trade	1 -10	87	43.5
	11-20	71	35.5
	21-30	25	12.5
	3land above	17	8.5

The information in Table 3 is to investigate the respondent types and thus giving the credibility of the collected data, from the right sources or the concerned

stakeholders of the trade. 55% of the respondents are timbers merchants who have to learn during their course of apprenticeship and practice as a merchant the names, identification, age range of timber supplied, fresh or seasoned timber, sources from other states, e.t.c; with percentage of those with 11 to 20years and above in the trade around 56.5%.

The timber sources are mostly from the western states (Ogun, Ondo, Oyo, Osun and Ekiti), some from the east (Edo, Delta, Bayelsa) and the middle belt (Kogi State) of Nigeria. Information and findings shows that the timbers are not seasoned either using the kiln or the air by deliberate staking, but they get to lose their moisture with the period of process of felling, log-cutting, sizing, transporting and storage pending sales in the market under sheds while the tropical hot weather assist the moisture maintained in the timber sections.

Table 4: Timber handling data

Parameters	Category	Frequency	Percentages
Transport means from other State into Ikorodu	Lorry/ Truck	195	97.5
	Mini-Van	5	2.5
Transport means from Ikorodu inward Lagos metropolis	Lorry/ Truck	113	56.5
	Mini-Van	87	43.5
Reason for non-standards in size	Affordability/Market price forces	186	93
	Machinist error	14	7
Factors for durability	Maturity/Seasoning of timber	170	85
	Exposure/Colour /Surface treatment	30	15
Intervention Support for Seasoning plant	Government	77	38.5
	Intervention	33	16.5
	Private sector investment	52	26
	Low interest Bank loan	38	19
	Technical Education/Enlightenment		

Table 4 displays the handling data of timber sections; movement of timber into Ikorodu an access point into Lagos is mostly (97.5%) by Lorries/Trucks, while further distribution into the metropolis has the mini-van been more patronised with 43.5% as against 2.5% usage from outside the state mainly due to the low capacity of haulage.

Timber sections were found to be of varying sizes below the standard specifications 25 x 300mm, 50 x 300mm, 50 x 50mm, 50 x 75mm, 50 x 100mm, 75 x 100mm and 50 x 150mm all to length of 3600 mm. The major reason of the finding for smaller section is due to the economic status of the end users, with 93% with low capacity to afford the cost of the full timber standard

section size. Of course when a customer is offered to pay less for a timber section, it is preferred with believe that the section will be adequate for its purpose without any checks on the stress capability. It was observed through the questionnaires administered that most customers prefer to buy the hardwood timber species at the non-standard prices not considering the inadequacy in the sections.

It is generally accepted that the age and seasoning adequacy are the main factors affecting durability of timber sections with 85% of the respondents in agreement. The need to improve on the current practices of timber handling made the respondents to agitate for financial and technical support, in order to be able to have better sections for the end users from control on the age of timber logs taken from the forest to proper seasoning plants request by 38.5% of the respondent.

Availability issues of hardwood timbers from the questionnaire administered shows that the logs are readily available in the dry season, while it is scarce in the rainy season due poor access roads to most areas where the timbers are sourced.

Table 5: Rate of accident during timber processing

Per month	Frequency	Percentage
0-4	93	46.5%
5-8	54	27%
9-12	30	15%
13-15	23	11.5%

The rate of accident during timber processing is as shown in table 5 above. It is gathered that the rate of accident during timber processing is quite significant with 46.5% for up to 4 per month, though timber machinist are always given proper orientation as to focus on their job before commencement of work for the day. As there is no emergency life saving unit at sawmill, but only having the first aid box.

Table 6: Major structural defects in hardwood

S/N	Types of Defect	Rate of occurrences	Percentage (%)
1	Knots	70	35%
2	Decay	30	15%
3	Lateral crack	20	10%
4	Insect attack	40	20%
5	Age related defect	10	5%
6	Accident fracture/shrinkage	5	2.5%
7	Moisture content/poor seasoning	25	12.5%
	Total	200	100%

The major structural defects in hardwood are discussed in Table 6 above. It was gathered from the questionnaires distributed that the defect with high occurrence on timber log is the knots defect. The knots

occur where a branch has grown out of the trunk. A lot of knots mean the timber is difficult to work on and is weakened.

Physical and Mechanical Properties

Table 7: Average Physical and Mechanical Properties

Species	Max. Shear (K N)	Specific Gravity	Max. Compression Strength // N/mm ²	Modulus of Rupture N/mm ²	Modulus of Elasticity N/mm ²	Moisture Content (%)	Strength Class
Hallea ciliate	6.52	1.98	45.44	87.5	11,897.31	55.4	D 40
Uacapa guineensis	7.33	3.03	50.0	152.5	21,635.1	20.4	D 70
Albizia zygia	6.15	1.77	65	52.50	8,438.96	66.5	D 30
Sacoglottis gabonensis	5.84	1.65	40.56	78.75	12,538.18	72.8	D 40
Symphonia globulifera	7.34	2.23	40.81	113.75	16,154.77	51.8	D 50

Specific Gravity (SG)

Uacapa guineensis is the heaviest with mean specific gravity of 3.03 as shown in Table 7 above, while *Sacoglottis gabonensis* has the smallest weight of all with specific gravity of 1.65.

Moisture Content

Samples timber from *Uacapa guineensis* shows average moisture content with the least value of 20.4 which effect could be seen in the higher values of the mechanical strength properties such as MOR, MOE and MCS//.

Modulus of Elasticity (MOE)

The mean MOE of the samples of ranges from 8438.96N/mm² to 21635.10N/mm² for all timbers, with *Albizia zygia* and *Uacapa guineensis* having the minimum and maximum displayed values respectively.

Modulus of Rupture (MOR)

The mean Modulus of Rupture (MOR) of the samples ranges from 52.5N/mm² to 152.5N/mm² for all timber section tested, *Albizia zygia* having the smallest value as seen in the values of MOE.

Maximum Shear Strength

The mean maximum shear strength was found for *Symphonia globulifera* with a value of 7.34N/mm² followed up with *Uacapa guineensis* with 7.33N/mm².

Maximum Compressive Strength Parallel to Grain (MCS//)

Albizia zygia gave the highest value of 65.0N/mm² despite its low MOE and MOR values.

Third Point Bending Stress Test

The results of the third point bending are as shown in Table 8, *Symphonia globulifera* has an average stress of 143.7N/mm² being the highest, while *Sacoglottis gabonensis* with smallest value of specific gravity and maximum compression shear correlates with value of bending stress value.

Table 8 :Third Point Bending Test for Sample Two

SN	Scientific names of hardwood species	Average Stress (N/mm ²)
1	Hallea ciliate	138
2	Uacapa guineensis	134.7
3	Albizia zygia	140
4	Sacoglottis gabonensis	123.7
5	Symphonia globulifera	143.7

CONCLUSION

The strength characteristics of timber section remain stable for values of moisture content between 20 - 25%, but as timber dries, its strength increases for high moisture content to a lower value.

This assertion was verified in the result from Table 7 above, a low moisture content of 20.4% was observed for *Uacapa guineensis*, though with the highest value of specific gravity of 3.03 corresponding to the highest value of MOE of 21,635.1N/mm².

No proper seasoning was reported for timber logs processed into sectional sizes, and non-standard sizes have the day at sawmills, due to the economic situation and ignorance of the users of timber for structural purposes. The rate of accident (up to 4 per month) was also alarming despite the fact that no enforcement is in place for first aids provisions and non existence of emergency units.

Factors found to influence strength are moisture content and specific gravity from the data of standard tests of clear specimen of timber. Generally strength decreases from bottom to top, but however, the results from the test for all species were found to be in order with their respective strength classes with respect to their mechanical properties when compared with the British standards BS 5268: part 2 (2002). The average strength properties becomes more relevant when a timber section is used as a joist beam, rafter, strut or ties in a roof section acting as a whole structural member, either from the butt, middle or top of a tree log converted for use.

Since significant reduction in moisture content would lead to an increment in strength characteristics, the use of kiln seasoning is included in the process, it would create another series of jobs to further alleviate poverty in the community, increase gross domestic product (GDP) by increase in exportation of seasoned timber and finished furniture works and decrease in its importation and would satisfy the agitations for government and/or private intervention in the provision of seasoning plants and educating the merchants. Information's on the age of timbers available in the market are not reliable, except regulations are enforced to control the felling age of timbers by forestry government agency.

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THE IMPACT OF THE GROWTH RATE OF THE GROSS DOMESTIC PRODUCT (GDP) ON POVERTY REDUCTION IN NIGERIA

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ABSTRACT

This study is on the impact of GDP growth rate on poverty reduction in Nigeria. The study made use of secondary data sourced from the Central Bank of Nigeria statistical bulletin and the National Bureau of Statistics between 1986 and 2012. The model for the study has as its dependent variable the Unemployment rate whose reduction should imply poverty reduction and its explanatory variable is the GDP growth rate. Using the Ordinary Least Square (OLS) regression techniques; our study revealed that there is a weak relationship between the unemployment rate and the Nigerian Gross Domestic Product (GDP) growth rate and that instead of an inverse relationship, it was positive. That is, as GDP was growing the unemployment rate was also growing. The study holds that when citizens cannot work to earn they will remain poor. This implies that the GDP growth has not impacted positively on the poor through job creation sufficient enough to reduce the percentage of the unemployed and the incidence of poverty over the period of study. We therefore recommend that there is the need to reassess the growth direction so as to give priority to key sectors like the agricultural and the industrial sectors that have the capacity to generate and absorb more labours thereby solving employment problem and at the same reducing the poverty incidence on the citizens.

KEYWORDS: Impact, Gross Domestic Product, Growth rate, Poverty, Reduction, Key Sectors

INTRODUCTION

Poverty reduction has become a central goal for development. It can be achieved by economic growth and / or by the distribution of income. Issues related to the benefits of growth accrued to the poor have become a priority of development policy in the 1990s (Son & Kakwani, 2004). There is little doubt that economic growth contributes significantly to poverty alleviation. The evidence is mounting and coming from various sources: cross-country analyses (Besley and Burgess, 2003; Dollar and Kraay, 2005; Kraay, 2006; and López, 2004), cross-regional and time-series comparisons (Ravallion and Chen, 2007; Ravallion and Datt, 2002), and the evaluation of poverty evolution using household data (Bibi, 2005; Contreras, 2001; Menezes-Filho and Vasconcellos, 2004). At the same time, it is clear that the effect of economic growth on poverty reduction is not always the same.

In fact, most studies point to considerable heterogeneity in the poverty-growth relationship, and understanding the sources of this divergence is a growing area of investigation (Bourguignon, 2003; Kakwani, Khandker, and Son, 2004; Lucas and Timmer, 2005; and Ravallion, 2004). The Nigerian national capacity as reflected in the recently rebased GDP cannot be played down; because the nation's economy currently ranked as the largest in Africa, the challenge however, has been

how this economic strength can be used to engender sustainable growth and poverty reduction. This study therefore, intends to look at the relevance of the growth in the GDP to poverty reduction in Nigeria between 1991 and 2012.

STATEMENT OF THE PROBLEM

The persistent problem of poverty in the developing world has led many to question the efficacy of economic growth and development as a means of poverty alleviation (Roemer and Gugerty, 1997). Indeed, the lack of convergence in standards of living across countries is one of the great unresolved issues in development and growth economics. In Nigeria for example, the incidence of poverty and the rate of unemployment in Nigeria have increased significantly between 2004 and 2011 (NES, 2012). Within that time, incidence of poverty rose from 54.4% in 2004 to 69% in 2010. In other words, the number of Nigerians living in poverty rose from 68.7 million in 2004 to 112.5 million in 2010. In the same period, the unemployment rate rose from 13.4% to 21.4%. It then rose further to 23.9% in 2011. Whereas, the GDP within the same period also has been growing at an average of 6% per annum between 2004 and 2011 (NES, 2012). This growth in GDP no doubt has placed the nation's economy on the frontline in Africa in terms of capacity. It is the aim of this paper to find out whether the GDP growth is impacting positively on poverty incidence in Nigeria.

RESEARCH QUESTIONS

The research questions that shall guide this study are;

1. Is GDP growth rate compatible with poverty reduction in Nigeria?
2. If not, why is the GDP growth rate not bringing about poverty reduction in Nigeria?

OBJECTIVES OF THE STUDY

The objectives of this study are:

- i. To examine the impact of the GDP growth rate on poverty reduction strategy in Nigeria.
- ii. To find out why the GDP growth has not been bringing about commensurate poverty reduction through job creation.

RESEARCH HYPOTHESIS

The hypotheses that shall guide this study are as stated thus:

Hypothesis one

H₀: GDP growth rate has not impacted on poverty reduction in Nigeria.

H_a: GDP growth rate has impacted on poverty reduction in Nigeria.

Hypothesis two

H₀: There are no factors responsible for the lack of impact of GDP growth rate on poverty reduction in Nigeria?

H_a: There are factors responsible for the lack of impact of GDP growth rate on poverty reduction in Nigeria?

SIGNIFICANCE OF THE STUDY

The significance of a study aimed at examining the impact of GDP growth rate on poverty reduction in Nigeria cannot be over-emphasized, given the fact the Nigerian GDP has been growing at an average of 6% per annum between 2004 and 2011. As such, doing a study that would help to find out the extent to which this GDP growth rate has impacted upon poverty reduction should be considered apt and necessary. This is because; the study findings could serve as veritable tool for government policy planners and executors. In addition, it will add to existing literatures and a reference for scholars and future researchers in this area.

LITERATURE REVIEW

Conceptual Framework

The concept of poverty has a multi-disciplinary dimension for the economist; however, poverty can be properly situated within the realm of development economics. Central to the quest for policies and programmes that will reduce poverty is the issue of the conceptualization of poverty. Conceptually, three dominant views are identified as the meaning of poverty in the literature (Oyeranti and Olayiwola, 2005).

According to Oyeranti and Olayiwola (2005), the first view sees poverty as a severe deprivation of some basic human needs at the individual or household level. Put differently, poverty is a material deprivation, and this can be assessed in monetary terms. While this conceptualization of poverty makes the quantitative analysis of poverty straightforward and permits comparisons over time and between countries, it fails to recognize non-material forms of deprivation such as illiteracy and social discrimination among others. The second view has a direct link with the work of Sen (1999), and it defines poverty as the failure to achieve basic capabilities such as being adequately nourished, living a healthy life, possession of skills to participate in economic and social life, permission to take part in community activities to mention a few. This conceptualization forms the basis for the belief that poverty is multi-dimensional. Although, the capabilities framework offers many advantages over the income-consumption conceptualization, yet it is argued by Karlsson (2001) that it requires a greater variety of data and that no consensus exists on how capability deprivation at the household level is to be computed.

The third conceptualization of poverty came into limelight in the 1990s and has a fundamentally different approach to the understanding of poverty: subjective poverty assessments. Karlsson (2001) presented five conclusions from the voices of the poor series, these are:

- a) Poverty needs to be viewed in a multi-dimensional way. Hunger is part of everyone's understanding of poverty. Equally strong is the sense of powerlessness, voicelessness, and humiliation that comes with being poor.
- b) The state has been ineffective. People everywhere fear police, they hate corruption, and they trust only their own institutions.
- c) Non-governmental organizations play a limited role. People rely on informal networks.
- d) Households are under deep stress. Gender relations are crucial to understanding poverty, particularly the positions of men.
- e) The social fabric is often poor people's saving grace, and it is under threat.

Measuring Poverty: In a study by Roemer and Gugerty (1997), they put forward that there are many indicators available for measuring poverty; in a cross country analysis the choice of indicator will be limited by the need for a consistent cross-country measure. While this study relies on income distribution data such as that described above, it is useful to review briefly the major tools used in the definition of poverty and in the conversion of national data to internationally comparable standards. The welfare approach to poverty alleviation typically used by economists assumes both

that individuals know what is best for themselves and that monetary measures of consumption or income can serve as an indicator of well-being (Roemer and Gugerty, 1997). Using this approach, the analyst defines a poverty line as a level of income, and all those under that line are considered poor. Under an alternative non-welfarist approach, standards of nutritional or other basic human needs are defined by the observer, who then estimates the income level needed to satisfy those needs. That required level of income becomes the poverty line. The welfare approach associates the standard of living with individual *consumption*, generally measured using *expenditure* data, and wherever possible including consumption from own production. Where expenditure data are not available, *income* can be taken as a proxy for consumption. Most of the data on poverty measures now available are based on comprehensive *household surveys*. This is the ideal form of survey, particularly if it is national in scope. One issue that arises in using household surveys to measure poverty is that the survey unit is the household, whereas we want to measure the welfare of *individuals*. If household income were the unit of analysis, then when comparing two households with equal per capita income, the larger household would wrongly appear to have higher welfare than the smaller one. Where only household information is possible, some kind of conversion to an individual (per capita) basis is necessary (Deaton and Muellbauer, (1980).

A poverty line can be defined in absolute or relative terms. An **absolute poverty line** is set in terms of a particular living standard, defined in a common currency and held constant for all the countries, regions, or areas under consideration. One example might be setting an absolute poverty line at 20% of the U.S. median income and using this income level as the cut-off to define poverty in all countries. An alternative approach is to define poverty at a certain dollar income per day; one dollar a day is a common poverty line for developing countries. Absolute poverty levels imply a certain command over goods and services necessary to rise above poverty. To make poverty lines comparable across countries, economists generally prefer to calculate income or expenditure on a purchasing power parity, or PPP basis. PPP takes into account the differences in relative prices, and therefore purchasing power, among different countries. One dollar typically buys more basic goods and services in India than in the United States, and that should be taken into account when estimating living standards. A **relative poverty line** is set at a constant proportion of the mean or median income in a country, for example, 25% or 50% or even 100% of mean or median income. Each country thus has a different relative poverty line, expressed in dollars, and each country's relative poverty line changes

as incomes rise. If we use 50% of median income as a relative poverty line and compare the U.S. and a developing country, clearly those with incomes equal to 50% of the median in the U.S. will have income levels higher than those at 50% of the median in a developing country like India, even after converting expenditures or income to common (PPP) dollar prices. Once a method for defining a poverty line has been chosen, the analyst must then decide how exactly to measure those individuals below the poverty line. Three measures of poverty are commonly used (Foster, Greer and Thorbecke (1984), Atkinson (1987) and Foster and Shorrocks (1988) and Ravallion (1992)): n the headcount index (*HCI*), which measures the prevalence of poverty; n the poverty gap index (*PGI*), which measures the depth of poverty; and n the Foster-Greer-Thorbecke (*FGT*) index that measures the severity of poverty. A great deal of theoretical work has gone into defining consistent and equitable poverty measures during the last 25 years. Unfortunately, when analyzing developing countries the data are often poor enough that these measures are difficult to calculate reliably. Nevertheless, we present a brief description of the major indicators. The **headcount index (HCI)**, the proportion of the total population considered to be poor, is defined as the fraction of the population whose standard of living (income or expenditure) is below the poverty line.

The headcount index is relatively easy to estimate and easy to communicate. It is quite useful in addressing overall changes in poverty. The key weakness in this measure is that it only measures changes of income that cross the poverty line and ignores shifts below the poverty line. If a poor person becomes poorer, this is not reflected in the headcount index. The **poverty gap index (PGI)** alleviates some of this problem by measuring the aggregate amount of poverty relative to the poverty line. The poverty gap represents the transfer of income to the poor that would be necessary to eliminate poverty, assuming an absolute poverty line. The poverty gap index is simply the average poverty gap across the entire population. The main weakness with the poverty gap index is that it does not indicate the severity of poverty. For example, suppose there are two countries. In Country A all of the poor all have incomes just below the poverty line. In Country B there are two groups of poor: one subgroup has incomes just below the mean and the other has much lower incomes. The poverty gap index is averaged across all the poor and could therefore mask the desperate poverty of the very poor group in the second country. The **Foster-Greer-Thorbecke** measure is sensitive to this problem of extreme poverty. It is most commonly defined as the square of the poverty gap, divided by the population. By using the square of the poverty gap, the *FGT* gives heavier weight than the *PGI* to the poverty of the very poor, because all income

gaps are squared. In the example above of two countries with the same headcount and poverty gap indices, the Foster-Greer-Thorbecke index will be higher for the second country with the group of desperately poor. The drawback to this method is that it is less straightforward to interpret. It is essentially composed of two parts: an amount due to the poverty gap and an amount due to inequality among the poor. The choice of poverty indicator does not matter if the distribution of income has not changed within the society. When all members of society have gained income in equal proportion, then all of the measures discussed above will lead to the same poverty ranking. If instead poor individuals clustered around the poverty line gain in income, while the poorest households lose, the headcount index will register a decrease in poverty while the *FGT* index might rise. If, however, income from individuals grouped around the mean is redistributed to the poorest, the *HCI* could stay the same while the *FGT* could decline.

The Debate Over Poverty Reduction Strategies

Roemer and Gugerty (1997) hold that most economists believe that economic growth benefits nearly all citizens of a country, even if not equally, and therefore reduces poverty. The extent to which these benefits are realized by various groups is reflected as change (or lack of change) in the distribution of income. If economic growth raises the incomes of everyone in a society in equal proportion, then the distribution of income will not change. Two arguments are often made against the proposition that economic growth reduces poverty. First, the Kuznets curve hypothesis proposed by economist Simon Kuznets in 1955 holds that as incomes grow in the early stages of development, income distribution would at first worsen and then improve as a wider segment of the population participated in the rising national income. If income distribution became dramatically less equal with growth, poverty might not be declining. Our study finds that income distribution does not change dramatically in most countries, even over relatively long periods of time. In addition, the data in this paper indicate that the Kuznets hypothesis does not seem to hold for most individual countries that are currently developing. Second, the obvious depth and persistence of poverty has created doubts about the ability of economic growth to reduce poverty; these doubts are especially prevalent among development professionals working directly with the poor in developing countries. In addition, stabilization and structural adjustment measures that are prescribed to promote growth are widely perceived to deepen poverty, particularly in the short run, casting further doubt on the wisdom of attacking poverty through faster growth. While there is little empirical evidence on the relationship between structural adjustment and poverty

alleviation, this paper demonstrates that the policies promoted by structural adjustment, namely openness to the world economy and sound fiscal and macroeconomic management, do tend to reduce poverty through their effects on growth. Unfortunately, other than through the effect of raising incomes, few data are available to address the relationship between economic growth and the welfare of the very poorest members of society.

Economic Structure and Income Distribution

As noted above, for growth to occur without a reduction in poverty, income distribution must become more unequal (Roemer and Gugerty, 1997). Could rapid growth take place without any reduction in poverty? It is possible but unlikely, as many studies now show. Moreover, it is possible for income distribution to worsen somewhat while the incomes of the poor nonetheless increase. The extent to which a given rate of growth affects poverty depends upon many factors, but particularly on economic structure and economic policies. Growth is more likely to lead directly to a reduction in poverty when the economic assets of a country are distributed relatively equally or when economic growth is based on the intensive employment of abundant factors of production, which for most countries is labor (Roemer and Gugerty, 1997).

In largely rural economies based on small-scale farming, as in many African and Asian countries, most of the poor are engaged in agriculture. When such a country grows through agricultural exports, or when growth in manufacturing increases the demand for food and materials supplied by the rural sector, growth benefits both poor farmers and the even poorer laborers they employ. In land-poor but labor-abundant economies, such as those of East Asia, rapid growth of manufactured or service exports creates a large pool of new jobs, absorbs the supply of low-productivity workers, and eventually causes a rise in real wages that further reduces poverty (Roemer and Gugerty, 1997). In contrast, mineral-rich economies typically have very concentrated income distributions; the country's wealth is in very few hands. Thus, when growth comes from mineral exports, the market mechanisms that would involve the lower income groups in that growth are weak (Roemer and Gugerty, 1997). The 3 best means for poverty alleviation in such countries may involve government programs to channel mineral revenues to the poor through education, health, rural works and other activities that will attract private employers. Development strategy and economic policies may also have differential impacts on the reduction of poverty via their impact on growth. Economic strategies and policies also affect distribution by altering the way an economy generates and absorbs economic growth.

Outwardlooking policies, for example, encourage a country to intensify its production in industries that employ abundant, and therefore low-cost, resources. If these economies are either labor-abundant or both land- and labor-abundant, these policies will enhance the impact of growth on poverty alleviation (Roemer and Gugerty, 1997). But if the economy is mineral-rich, or if it has concentrated agriculture in the hands of a few wealthy landowners, the impact on poverty will be weak. The market reforms espoused in structural adjustment should enhance the impact of growth on poverty. The reduction in controls reduces rent-seeking, which tends to concentrate income and wealth. More importantly, it opens market access to a wider group of participants, including the powerless and the poor. This effect can be especially strong when the controls that are targeted for elimination have affected the rural economy, such as export marketing boards, price and marketing restrictions on food grains, or when they have restricted entry to the informal sector, especially rural trading and curb side retailing in cities. The analytic arguments presented here suggest that growth tends to reduce poverty and that openness and outward trade orientation decrease poverty through their effects on growth. The data presented in this paper support these assertions.

Empirical Evidence on Growth and Poverty Reduction

The early hypothesis of the Kuznets curve led to a large development literature on the potential for economic growth to widen inequality and worsen the plight of the poor, a phenomenon called *immiserizing growth* (Robinson (1976), Adelman and Robinson (1989), Papanek and Kyn (1981)). The initial studies on the Kuznets curve hypothesis used cross-sectional data and compared poor countries to rich countries in order to test hypotheses about income distribution and growth. As data covering longer time periods for individual countries have become available, the evidence points in the opposite direction: growth appears to lessen poverty.

Even early studies like Ahluwalia, Carter and Chenery (1979) and Fields (1980) found that increases in poverty and economic growth were a very exceptional combination. A 1979 study of 12 growth periods in various countries found no increase in poverty and the real per capita income of the poorest 20% rose in every period of growth. A more recent study by Fields (1989) indicates that of 18 countries with data on poverty over time, in only one case was economic growth not accompanied by a fall in poverty. Moreover, Fields found that more rapid economic growth tends to bring greater declines in poverty. While this preliminary evidence was encouraging, more conclusive results were precluded by the lack of data. In 1996, however, a

new database was compiled by Klaus Deininger and Lyn Squire at the World Bank. This database contains the most comprehensive data that exist on income distribution across countries. The data cover 58 countries, beginning in 1960, and for each country give the distribution of income by quintile. In compiling the database, every effort was made to ensure that only reasonably high quality data based on comprehensive household surveys were included. Of the 58 countries included in the database, 26 are developing countries. The database makes it possible for the first time to test propositions about the Kuznets curve and the relationship between growth and poverty over time. We used the Deininger-Squire data set to identify 61 intervals, covering 26 developing countries, for which growth in national average and quintile incomes could be identified. We used relatively restrictive criteria in defining our sample: intervals should be at least 5 years in length, but as long as a decade if possible, and based on consistently defined household surveys.

Using the same data set but including all 58 countries, Deininger and Squire (1996b) identify 91 intervals or episodes for which income growth and changes in income distribution are available. They find that changes in income distribution are generally small, so that growth is clearly associated with increasing incomes in each quintile of the population. In more than 81% of their 91 growth episodes, the incomes of the poorest quintile rose. Another study by Ravallion and Chen (1996) analyzes a more selective set of household survey results, covering the period since 1980. Their results are striking and give strong support to the hypothesis that growth reduces poverty in developing countries. Ravallion and Chen use 64 intervals that cover periods from one to seven years. Twenty-one of these intervals are from Eastern Europe and Central Asia (former Soviet or transitional countries), and forty-three are from developing countries. For each episode, Ravallion and Chen calculate the change in the headcount index of poverty (H) and the growth in the mean income for the sample as a whole.

A great deal of evidence has been generated in the last five years that supports the proposition that more open economies have higher rates of growth. This section reviews the main findings of these studies. An important study by Dollar (1992) looks at the relationship between exchange rates and growth by constructing a measure of openness indicating the extent to which the trade regime distorts the real exchange rate from its free-trade level for the period 1976-1985 and uses this indicator in a regression of 95 countries. Dollar estimates that reducing the level of exchange rate distortion to that of Asia would raise GDP growth by 1.8% in Africa and 0.7% in Latin America. Reducing exchange rate

variability to the Asian level would add an additional 0.8% to annual growth in Latin America and 0.3% to growth rates Africa. Sachs and Warner test the effects of openness on growth using their openness variable described above. In regressions of the annual growth of per capita GDP from 1970 to 1989, incorporating data for 114 countries, Sachs and Warner find large, negative and highly significant coefficients for the openness variable. Open economies have annual growth rates as much as 2.8 percentage points higher than closed economies, on average. Sachs (1996) has used these results to show how much faster African countries could grow if they adopt the kind of open policies that have characterized East and Southeast Asian countries. He attributes a difference of 1.8% a year in income growth to the closed-economy policies of African countries, including exchange rate overvaluation, import restrictions and export restrictions (marketing boards). Two other factors--lower savings rates¹² and less efficient internal markets--reduce growth rates by another 2.8% a year below Asian levels, so that on the whole different policies can explain 4.6% of the difference between African and Asian growth rates. Using a different regression framework, Easterly and Levine (1996) find that three variables associated with soundly managed, open economies--the exchange rate premium, the fiscal surplus as a share of GDP, and ratio of liquid financial assets to GDP--can account for a growth differential of 1.5 percentage points between African economies and East and Southeast Asian economies.

These studies focus on the relationship between growth and economic structure. A study by Fischer (1993) investigates the effects of shorter-term, macroeconomic variables with longterm growth. Fischer finds that low budget deficits (or higher surpluses), low inflation and market-based official exchange rates¹³ are associated strongly and significantly with more rapid economic growth. By extension, then, sound macroeconomic management, because it establishes conditions for sustainable growth, is associated with reduced poverty. Finally, in their study of six African countries cited above, Demery and Squire (1996) construct an index that measures the combined effects of three macroeconomic policies: a reduction in the fiscal deficit, a reduction in seignorage, and a devaluation of the real effective exchange rate. They find that in all six countries, a favourable change in the macroeconomic policy index was associated with a favourable change in the incidence of poverty. In Cote d'Ivoire, the only country with increased poverty, the macroeconomic index worsened. These studies all demonstrate the important connection between outward oriented policies and economic growth. Because economic growth is such a key factor in poverty reduction, openness

becomes an important policy variable that can be used to reduce poverty. But economic structure and government spending decisions also matter, as discussed below.

Poverty and Economic Structure

Countries that are relatively rich in natural resources tend to have slower economic growth (Roemer and Gugerty, 1997). Furthermore, for reasons already discussed, in resource-rich societies the distribution of income is expected to be more concentrated and market forces alone will be less effective in translating GDP growth into substantial reductions in poverty. Thus, on both counts, we would expect the growth of income of the poorest groups to be slower in resource-rich economies. To test this proposition, we utilized three indices compiled by Sachs and Warner to represent resource endowment: · the ratio of natural resource exports to GDP · the ratio of natural resource exports to total exports · the ratio of arable, pasture, and forest land to population. All indices are based in 1971, a year predating all but a few of our observations and thus indicative of an initial resource endowment.

The results are qualitatively similar to those on openness. Resource exports as a share of total exports and land per person have a negative effect on growth. The coefficients are negative and significant at the 1% level or better.¹⁴ Growth of incomes for the poor is lower in well-endowed economies. But resource endowment does not explain much of the variance in income growth of the poor: adjusted R-squareds are below 25%. And, as with openness, when the growth of GDP is inserted into these regressions, the resource endowment coefficients lose significance, though they retain the expected negative sign. Resource endowments appear to work against poverty reduction through their depressing effect on economic growth, as Sachs and Warner (1995b) have demonstrated. Regressions were run showing the effects of openness and resource endowment on income growth of the poor. Regressions 1 and 2 use the share of resource exports in total exports as the indicator of natural resource wealth. All coefficients are negative and all but one is significant at the 5% level or better. This indicates that high levels of resource exports are associated with lower growth rates. The openness variables are positive; the positive impact of an open economy can offset the negative impact of resource dependence. In regressions 3 and 4, land is used as the indicator of resource wealth, and the story is broadly similar, though only one of the coefficients on openness is significant at the 5% level. Resource wealth in terms of land appears to have a negative effect on growth. None of these regressions, however, explains more than a third of the variance in income growth of the poorest. When the growth of GDP per capita is

included, the openness and resource endowment variables lose their significance, although the signs remain the same. Openness retains its positive sign, suggesting again an open economy may help to offset the negative impact of resource dependence. As in the regressions above, the openness and resource variables appear to have little or no impact on poverty that is separable from their impact on economic growth.

Theoretical framework: The resource curse

In considering the curse of resource wealth on poverty reduction, it is important to keep in mind a few outliers: resource-rich countries that have enjoyed both rapid GDP growth and dramatic reductions in poverty. Indonesia and Malaysia, both rich in natural resources including petroleum, have had rapid growth in GDP per capita since 1970 and substantially reduced poverty. In Indonesia, for example, average incomes grew by 4% a year from 1970 to 1993 and the headcount index of poverty fell from 60% to under 15%. In Malaysia, per capita income grew by over 3% a year and the headcount index of poverty fell from 18% to 2% over the same period. These countries avoided the curse of wealth through shrewd government policies. First, both governments maintained sound macroeconomic policies that avoided exchange rate overvaluation and other symptoms of Dutch disease during the resource booms of the 1970s. Second, they invested in the education and health of their people, especially of the rural poor. Third, Indonesia (and to a lesser extent Malaysia) invested in rural infrastructure and agricultural development that benefited agricultural smallholders, especially on densely populated Java. And fourth, Malaysia undertook a determined policy of redistribution of assets and jobs towards the majority Malay population, which included most of the poor. Resource wealth does not condemn a country to entrenched poverty. Instead, resource wealth can be turned to an advantage in the war on poverty, but it takes a determined and skilful government to do so. It is the political economy of resources that drives the growth and poverty results.

In Nigeria, there is abundance of resource wealth of both human and natural endowments. Yet this resource wealth cohabit with abject poverty, reasons been that these human and natural resources have not been properly harnessed to bring about commensurate impact on the poverty of her citizen. This is the resource curse syndrome. However, recent happenings with the rising GDP could be suggesting that the economy is been revamped. This position is what this study aimed to test what has been the impact of this rising GDP on poverty situation in the country.

RESEARCH METHODOLOGY

Specification of the Model

In specifying the model, it takes queue from the Kuznets hypothesis proposed by economist Simon Kuznets in 1955; which holds that as incomes grow in the early stages of development, income distribution would at first worsen and then improve as a wider segment of the population participated in the rising national income. What this intuitively transformed to mean is that income spreads when citizens can work and earn income. As such, if the GDP growth rate represents economic growth, then the unemployment rate can represent the poverty reduction index. It is expected that as the economy grows income distribution should lessen the hold of poverty through employment generation as an aftermath of the growth. Therefore, a model in which the dependent variable is the annual time series data of Nigerian unemployment rate (UNEMrt) while the independent variable is the gross domestic product (GDP) from 1991-2011, can be specified in the form:

$$Y=f(X_1)$$

$$Y=b_0+b_1X_1+U$$

Where;

Y = Unemployment rate (FPI)

X₁ = Gross Domestic Product growth rate (GDPgr)

U = the stochastic variable or the error term and b₁, is the coefficients of the parameter estimate of the variable X₁, and b₀ the intercept of the Model.

As such, we used the ordinary least square multiple regression technique to estimate the values of the parameters b₀ and b₁. Besides, we will also conduct the student's t-test and the standard error test to know and to test the statistical significance of the parameter estimates respectively, and the test of goodness of fit for the model using the R² and adjusted R² techniques. This will enable us to know the percentage of variations between the dependent variable and the explanatory variables which very central to helping to understanding the impact of economic growth on poverty reduction.

And finally, we conduct the F-statistic test to determine the overall significance of the regression model and the Durbin –Watson test for the presence or absence of autocorrelation.

EXPECTED RESULT

On apriori ground, it is expected that fall in unemployment rate should be spurred by rising GDP growth rate; as such unemployment rate should have a negative relationship with the gross domestic products growth rate. Since, it is expected that as the GDP grows there should be poverty reduction through employment generation resulting from the growth.

Estimation Techniques and Data Sources

In the estimation of the specified model, the ordinary least square (OLS) multiple regression technique was employed. The estimation will be carried out with the use of an econometric package known as 'E-Views'. In order to facilitate time series analysis, data on, FPI, GDP, interest rate, exchange rate and market capitalization were collected from the following sources: Central Bank Nigeria (CBN) – Statistical Bulletin and National Bureau of Statistics (NBS).

PRESENTATION AND ANALYSIS OF RESULTS

Presentation of results

Using the annual time series data of the entire variables so chosen, we have our estimated model result to be:

Dep. Var. =	Coefficient	Standard Error	t-statistics
UNEMrt			
Intercept {c}	3.98	2.27	1.75
GDPgr	1.14	0.39	2.91

	R ² = 0.25	F-stat=8.46 (Prob. 0.0)	d.w. = 0.43
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Source: Author's computations

INTERPRETATION OF RESULTS

On apriori grounds or economic relationships- The explanatory variable's parameter estimate possesses a positive sign. This implies that the GDP growth rate and the unemployment rate have a positive relationship. This does not conform to apriori since it has positive sign instead of negative sign. It was expected that as the GDP grows it should generate employment opportunities thereby reducing the incidence of poverty through income distribution.

On Statistical Criterion

- ❖ Based on the coefficient values, a unit rise (instead of a fall) in the unemployment rate is caused by 1.14 rise in the GDP growth rate. That is, as the GDP growth rate was rising the unemployment rate was also rising alongside. This is not in line with expected theoretical propositions. Using the rule of thumb of 2, it is evident that the t-value for the parameter estimate of the variable was statistically significant. This was also not expected to be since the relationship was wrongly signed.
- ❖ The R² value of 0.25 shows that there is very weak relationship between the dependent variable unemployment rate and the independent or explanatory variables the GDP growth rate. The model has been able to explain only about 25% of the relationship or variations; this is highly insignificant. This validates the fact that the GDP growth rate has not in any spur poverty reduction by its inability to reduce the unemployment rate.
- ❖ The F-stat; of 32.77 with probability value 0.00 assumes a very huge value when compared with the

table value of 5.95. This implies that in the overall, our model is statistically significant in explaining the relationship between FPI and the explanatory variables.

Econometric Criterion

Using the Durbin-Watson value of 0.14, this value is much closer to zero (0) and it falls outside the critical region or the region of indecision, this suggests the presence of positive autocorrelation.

Policy Implications of Results

The statistical significance of the GDP growth rate estimate given that the relationship with the explanatory variable was wrongly signed implies that the GDP growth has not been creating sufficient jobs to reduce the unemployment rate in the economy over the period of study. The reason for this is not far-fetched since the international flow of foreign investment into Nigeria has been encouraged by various economic policies within the period, following the internationalization of the capital market in 1995 and the abrogation of laws that constrained foreign participation in the Nigerian capital market. The non-statistical significance of other parameter estimates of GDP, interest rate and the exchange rate implies that a country's GDP size, interest rate and exchange rate do not necessarily determine the flow of international currency into the Nigerian economy.

CONCLUSION AND RECOMMENDATION

The result of the estimate showed that in spite of the Nigerian GDP growth rate employment opportunities have not grown sufficiently to mitigate the poverty incidence on the army of the unemployed in the economy. This finding is in line with the content of the communiqué of the Nigerian Economic Society (2012) when they put forward that the optimism about GDP growth which averaged over 6% annually in 2004-2011 is counterbalanced by the sustained growth in the rate of unemployment and rising incidence of poverty and inequality. They stated further that this paradox of **jobless growth** poses a significant threat to economic, social and political stability. This study has revealed that the Nigerian economy over time has been growing but not sufficient to reduce the poverty incidence on the populace through job creation. Hence, we made our recommendations based on the results that, it is important that we become interested in the direction of the growth of the growth of GDP so as to ascertain whether the economy while growing also have absorptive capacity to create room more jobs or employments for the army of the unemployed in the economy. As a result priority should be given to those sectors like the agricultural and the industrial sectors that will be able to generate and absorb more labours

thereby solving employment problem and at the same reducing the poverty incidence on the citizens.

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CAPACITY BUILDING PRACTICES IN SECONDARY SCHOOLS: IMPLICATION FOR TEACHERS' PROFESSIONAL DEVELOPMENT IN CROSS RIVER STATE, NIGERIA

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ABSTRACT

This study investigated capacity building practices and its implication for teachers' professional development in secondary schools in Cross River State, Nigeria. It focuses on the level of provision of capacity building practices in respect to seminar, workshop, conferences, in-service training, ICT training, coaching/monitoring. Survey research design was adopted for the study. One research question and one hypothesis were isolated to guide direction to the study. Simple random sampling technique was used to draw two hundred schools for sample out of the population of two hundred and thirty four (234) schools in Cross River State. Data collection was done with the researchers constructed instrument called "Capacity Building Practices Questionnaire (CBPQ)". Data collected were subjected to statistical analysis with the use of descriptive statistics and population t-test. Results of the findings revealed that the most provided capacity building practices in secondary schools is coaching, monitoring following by workshop, ICT training, conferences, seminars and in-service training the last. The level of provision of capacity building practices in terms of seminar, workshop, conferences, in-service training, ICT training, coaching/mentoring is significantly low. It was recommended that school managers should provide more capacity building practices in secondary schools for teachers. When they are organized the management should motivate the teachers to attend by providing the finance for it.

KEYWORDS: Capacity Building, Practices, Teachers' Professional Development, Secondary Schools

INTRODUCTION

Teachers in Nigeria have been observed in the past ten years as not discharging their teaching and non-teaching responsibilities effectively. This is evidenced on the poor quality of students produced at secondary level of education. Federal Republic of Nigeria (2008), stipulated in the National Policy of Education that one of the goals of this level of education is preparation for higher education. This goal cannot be said to have been effectively realized because the caliber of students who sit for matriculation exams and up failing mostly. This is an indication that they are not adequately prepared for this purpose which shows that the teachers have not been able to discharge their responsibility creditably. Perhaps the teachers' failure to achieve these goals might be attributed to poor nature of capacity building the are exposed to capacity building practices are essential ingredients in the process of changing individuals and organizations from where they are to where they should be and operate.

WHO (2014) sees capacity building as the "development and strengthening of human and institutional resources. It is acknowledged that the process needs to go beyond the public sector, as it is also influenced by entities in the private sector including

commercial enterprises and non-governmental organizations". In the same vein

Philbin in Akwegwu et al (2013 p.280) defines capacity building as a process of developing and strengthening the skills, instincts, abilities, processes and resources that individuals, organizations and communities need to survive, adopt and thrive in the fast changing world. It focuses on understanding the obstacles that inhibit people, institutions, governments, international organizations and non-governmental organizations from realizing their developmental goals while enhancing the abilities that will allow them to achieve measurable and sustainable results.

United Nations Committee of Experts on Public Administration (2006) sees capacity building as "the ability to perform functions, solve problems and achieve objectives at three levels-individual, institutional and societal".

This study is investigating the provision of capacity building practices in secondary schools in respect to seminar, workshop, conferences, in-service training, and information and communication technology, ICT

training and coaching/mentoring. It also checks the level of such provision in terms of high or low. Scannel in Uchendu (2010p.9) defines professional development as the systematic maintenance, improvement and brooding of knowledge and skills and the development of personal qualities necessary for the execution of professional, managerial and technical duties throughout one's working life.

Therefore, effectively designed and organized capacity building practices such as seminars, workshops, conferences, in-service training, ICT training, coaching/mentoring have the tendency to result to teachers' professional development whereby teachers are exposed to new knowledge, techniques, experiences that are likely to add value to their teaching and non-teaching responsibility.

However, it can be rightly argued that the quality of professional development teachers' are exposed to, is a function of how rich capacity building practices they are exposed to. Teachers' profession development does not exist in a vacuum. In essence therefore, capacity building practices ought to enrich and undertaken in such a way that they bring out the best out of a teacher and also contribute to the attainment of the goals of secondary education. In essence therefore any blame apportioned on the teacher not leading up to expectation should be first channel to the nature of capacity building practices they are exposed to. Teachers are the major instrument in educating the future generation (children) who will in turn the national leaders of tomorrow. Teachers at any level are significant instrument for the national development. It is against the background that the study intends to find out the level of capacity building practices provision for teachers in secondary school and the most provided.

LITERATURE REVIEW

Capacity building in this context is a process of developing and strengthening teachers' skills, knowledge, attitude and abilities. Capacity building has three different dimensions namely; building awareness, building analytical capacity and building decision-making capacity building awareness involves offering activities, presenting new topics or demonstrating new methods through workshops, Seminars and conferences. The practice will create awareness about a particular activity, topic or method so as to enable beneficiaries apply them in performing assigned tasks. Darling-Hammond et al in Centre for Public Education (2014) conducted a research on types of professional development provided to teachers discovered the following percentages: workshop-91.5%, school visit-22%, coaching/mentors-45%, research 39.8% and peer observation 63%. The result showed that workshop was

the highest provided while school visit was the lowest. Akuegwu, Nwi-ue and Etukudor-Eyo (2013) investigated on lecturers' participation in capacity building programmes in South-South Nigeria: implications for sustainable development. The survey designed study focused on the extent of lecturers' participation in workshops, seminars, conferences, ICT training and mentoring aspect of capacity building programmes.

These findings revealed that university lecturers participate mostly in conferences than any other capacity building programmes. Also the lecturers' participation in capacity building programs is significantly low which means that university lecturers have low participation in capacity building programmes. They also discovered that there is no significant difference between male and female lecturers' participation in capacity building programmes. It was recommended that enabling environment should be provided whereby university teachers are encouraged to participate fully in capacity building programmes.

To meet developmental challenges, capacity building practices must be provided for teachers in different ways and capacities. Uchendu, (2011) conducted a research on capacity building programmes and secondary school teachers' work performance in Cross River State. It was a descriptive survey design. The result revealed that there is a significant relationship between capacity building programmes in respect to (in-service training, in-house training) and teachers' work performance. This means that the more teachers are exposed to capacity building performance the better their job performance. Centre for Public Education (2013) on teaching the teachers stated that professional development in an era of accountability requires a fundamental change in a teachers' practice that leads to increase in students' learning in the classroom.

United Nation Environment Programme (2006) opined that a wide range of approaches is available to build capacities including training, formal education, capacity building projects, networking and others. A training workshop usually can go as far as building human capacities at an awareness raising level. If specifically designed, training may also succeed in building analytical capacity.

Many work had been done on capacity building in and outside Nigeria but non had investigated exactly the level of provision of capacity building practices for secondary school teachers in terms of seminar, workshop, conferences, in-service training, ICT training, coaching/mentoring in Cross River State.

STATEMENT OF THE PROBLEM

The problem of students' continuous poor performance in public standardized examination such as West African Examination Council (WAEC), National Examination Council (NECO) and Joint Admission and Matriculation Board (JAMB) calls for concern, especially with the recent introduction of Computer Based Test (CBT) in JAMB examination in particular. Most students and parents complain that teachers hardly prepare students for examinations right from on set of their admissions using modern instructional techniques. Most teachers have remains with the old knowledge which they acquired several years before current improved changes in institutional methods and facilities.

For instance, in many countries of the world today, classroom teaching, laboratory and other practices lessons are facilitated through the use of Information and Communication Technology (ICT). It is sad to note that Cross River State in particular, most teachers in the secondary schools are not computer compliant. It is in recognition of the import of teachers' professional development that Cross River State government compulsorily provided teachers with computer loans, organized retraining programmes for teachers by National Teachers Institute (NTI). Thereafter computer skill acquisition training was organized for them to enhance modern teaching capacity. In spite of all these efforts, so many teachers still remain traditional in their teaching approach. Since most of them can hardly operate computers. This situation unfortunately, continues to impact negatively on students' academic achievement especially for those whose parents cannot afford extra lessons for their children.

Teachers' professional development is organized when lapses are observed among workers like insufficient skills to do the work, changing nature of job, introduction of new technologies and other great challenges on the job. It is incumbent upon these issues that the researcher wonders what are the capacity building practices that have been provided for teachers' in secondary schools and the most provided.

RESEARCH QUESTION

1. Which of the capacity building practices with regards to coaching/mentoring, seminar, workshop, conferences, in-service training, ICT training is most provided in secondary schools for teachers.

STATEMENT OF HYPOTHESIS

The level at which capacity building practices in terms of seminar, workshop, conferences, in-service training, ICT training, coaching/mentoring are provided in secondary schools is not significantly low.

METHODOLOGY

The area of this study is Cross River State of Nigeria. It comprises the 18 Local Government Areas. Calabar is the capital of Cross River State and it has two hundred and thirty four (234) secondary schools and two universities. The state is located at South-South geo-political zone of Nigeria. The study adopted survey research design. A sample of two hundred (200) schools were selected from the population of two hundred and thirty four (234) schools using simple random sampling technique. The researchers constructed instrument titled Capacity Building Practices and Teachers' Professional Development Questionnaire (CBPTPDQ) was used to collect data. It contained sections A and Section B.

Section A was made up of 4 demographic variables, while section B arranged on a four point rating scale had 36 items, 6 of which measured each of the 6 variables isolated for the study. In all, the instrument contained 40 items. The instrument was face validated by experts in measurement and evaluation department, while the trial test was conducted by administering 30 copies of the instrument to 30 schools in secondary schools not used for the study. The scores obtained were analyzed using Cronbach Alpha Method. The results gave rise to a reliability coefficient which ranged from 0.72 to 0.84. With these figures, it was confirmed that the instrument was reliable enough in achieving the objectives set for the study. The administration of the instrument was handled personally by the researcher and with the help of research assistants, a measure which ensured that the sampled subjects completed the questionnaire correctly. By this a hundred percent return rate was achieved for the instruments. The data collected were analyzed statistically using mean rating and population t-test (test of one sample mean) summary of the results were presented in the tables.

RESULTS

Research Question

Which of the capacity building practices is the most provided in secondary schools for teachers? Mean rating statistical technique was used to analyze the data collected. Summaries of the result were presented in table 1.

TABLE 1: Mean rating of Capacity Building Practicing for Teachers (N=200)

Variable	Mean	Standard Deviation	Rank
Seminar	15.28	3.31	5 th
Workshop	15.81	3.24	2 nd
Conferences	15.72	3.29	4 th
In-service training	15.21	3.24	6 th
ICT training	15.76	3.18	3 rd
Coaching/mentoring	15.96	3.32	1 st

The result presented in table 1 indicated that coaching/mentoring had the highest mean practices ($x=15.96$) followed by workshop ($x=15.81$), ICT training ($x=15.76$), conferences ($x=15.72$), seminar ($x=15.28$) and lastly in-service training ($x=15.21$). This means that the most available capacity building practices in secondary school for teachers is coaching/mentoring and the least is in-service training.

Hypothesis

The level at which capacity building practices in terms of seminar, workshop, conferences, in-service training, ICT training, coaching/mentoring are provided in secondary schools is not significantly low. The only variable in this hypothesis is the provision of capacity building practices. Population t-test (test of one sample mean) was used in analyzing data collected. Summaries of the results are presented in table 2.

TABLE 2: Level of Provision of Capacity Building Practices in Secondary schools (N=200)

Variable	Expected Mean	Observed Mean	Standard Deviation	T
Seminar	15	15.28	3.31	83.42
Workshop	15	15.81	3.24	84.36
Conferences	15	15.72	3.29	85.34
In-service training	15	15.21	3.24	84.21
ICT training	15	15.76	3.18	85.22
Coaching/mentoring	15	15.96	3.32	86.46

Significant at 0.05, $df=199$, critical t -value=1.972

The results presented in table 2 revealed that the provision of capacity building practices in secondary schools is significantly low with respect to seminar ($t=83.42, P<.05$) workshop ($t=84.36, p<.05$), conferences ($85.34, p<0.5$), in-service training ($85.22, p<0.5$), ICT training ($85.22, p<0.5$) and coaching/mentoring ($86.56, p<.05$). The null hypothesis is by these results rejected because the obtained t -values are found to be higher than the critical t -value of 1.972 at 0.05 level of significance and 199 degree of freedom. The results in table 2 also indicated that the observed mean level of provision of capacity building practices is higher than the expected mean level of provision of capacity building practices of 15.00.

Statistical comparison of these observed mean values and the expected mean value of 15.00 using population t -test (test of one sample mean), positive t -values were obtained. This means that the provision of capacity building practices in secondary school for teachers is significantly low.

DISCUSSION OF FINDINGS

Results of the research question indicated that coaching/mentoring has the highest level of provision of capacity building practices followed by workshop, ICT

training, conferences, seminar and lastly in-service training. This means that schools made provision for coaching/mentoring more than others. This means that school provides seminar, workshop, conferences, In-service training, ICT training, coaching/mentoring because they expose teachers to new techniques in teaching and learning thereby updating their knowledge and ability for better performance in the school system which improves students' academic performance. This finding corroborated by the outcome of Uchendu (2010) that workshops, conferences help workers (teachers) to learn new skills, techniques, ideas, knowledge and experiences that will improve their professional development. This finding suggest that the provision of more capacity building practices can help to transit teachers from traditional approach of teaching to modern approach will help to achieve the organizational goals.

Johnson (2014) in his findings said that providing high quality professional development for teachers may be the most important thing schools can do to improve students' learning. Results of hypothesis in table 2 disclosed that the level of capacity building practices in respect to seminar, workshop, conferences, in-service training, ICT training, coaching/mentoring provision in secondary schools is significantly low. This paves way for the rejection of the null hypothesis and the retention of the alternate hypothesis. A plausible explanation for this finding is that the provision of capacity building practice in secondary schools is not adequate for teachers to acquire new skills, ideas, knowledge, abilities, Experiences for the job in this fact changing world of technology. The result of this study agrees with Centre for Public Education (2014) that teachers' that teach others should be trained in this era of accountability.

CONCLUSION

Based on the strength of the findings, it was concluded that coaching/mentoring is the most provided capacity building practices in secondary schools for teachers followed by seminar, workshop, conferences, in-service training, ICT training respectively. The level of capacity building practices in terms of coaching/monitoring, seminar, workshop, conferences, in-service training, ICT training provided is significantly low. In other words the provision is not adequate. The implication to teachers' professional development is that when the provision is not sufficient to update teachers' knowledge they will still be operating in the old traditional method of teaching and learning and it will hamper the achievement of educational goals and objectives. Teachers are the major instrument in implementing the national policy of education but when the are not equipped with the knowledge, ideas, skills,

abilities, experiences to move with this fast changing environment their job performance will be affected negatively. The provision of capacity building in secondary school is as important as the national development because they teachers are the instrument that prepares the feature generation. Teachers should be exposed to different capacity building practices so that they can stand the test of time and their counterparts internationally.

RECOMMENDATIONS

1. School managers should give special attention to adequate provision of capacity building practices in respect to coaching/mentoring, seminar, workshop, conferences, in-service training, ICT training in secondary schools.
2. When they are organized the management should motivate the teachers to attended by providing the finance for it.

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DEFICIENCY OF BUS NETWORK SYSTEM IN DHAKA CITY

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ABSTRACT

Transportation system of Dhaka city is under huge challenge of managing growing number of private cars and non-motorized vehicles. Traffic congestion is an everyday scenario of this city. Buses are the only available organized public transport system in Dhaka. This research assesses the quality of service provided by the bus network system and its deficiencies. Under the study, demand-supply conditions and performance of the public buses had been identified by processing field survey data according to a suitable mathematical procedure. For this purpose, 7 different bus routes were chosen and a total of 100 passengers of buses were interviewed with a predetermined structured questionnaire to know their experience, level of satisfaction and opinion about the existing service as well as their expectations. It was observed that the existing bus service quality is very poor. There is no specified time schedule for the buses operating; hence passengers waiting time at station is longer. Except a few bus of seating service, all the buses carry extra passengers than the seat capacity and always remain over-crowded. Thus buses are often not accessible for disabled or elderly persons as well as for women.

KEYWORDS: Traffic Congestion, Bus Network System, Deficiencies, Demand-Supply Conditions, Over-Crowded

INTRODUCTION

Dhaka, the capital of Bangladesh is one of the least motorized mega city in the world but most densely populated city with a current population of almost 16 million at annual growth rate of 8% per annum (STP,2004). Anyone living in this city will certainly speak of overcrowded city streets. The roads of the city are clogged with vehicles all day long making travel unbearable. It has become a dream for city dwellers to travel on traffic jam free road. Unfortunately, Dhaka's struggles will prevail as it is growing at the second fastest rate of the twenty most populated metropolises in the world(World Urbanization Prospects:, 2006).The impact of such rapid growth has major consequences on the ability of the transport sector to provide mobility for all people, as they seek to take advantage of employment, education, health and social opportunities. As Dhaka is also the economic, cultural and administrative hub of Bangladesh, huge amount of people travel daily by pedal rickshaws, auto-rickshaws, tempos, taxis, private cars, and a wide array of buses. Among these travel modes, buses are the only available conveyance medium for dedicated mass transport system in Dhaka city. The bus system mostly financed by private owners. These buses typically ply overcrowded with very low frequency, very poor maintenance and service quality but the extent to which they do so, differs a lot by the type of bus service.

BACKGROUND

Dhaka is a city with a transportation system predominantly road based having absence of any mass

transit system like metro rail or bus rapid transit (BRT). As a third world country, the majority of trips in Dhaka are served on public transport and non-motorized transport modes (NMT) or Para-transits because a significant numbers of people are poor who cannot afford personal vehicle. As the fare of NMT (such as rickshaws) or other Para-transits are more expensive than the bus fares (Rahman, M. S. U., 2009); most of the people are heavily dependent on public transport for their travel (Hossain, M, 2006) .Among households, 7% either have or have access to a car, 4% owns motorcycle, 3% cycle rickshaw, 5% bicycle, and 2% auto-rickshaw. Auto-rickshaw and cycle rickshaw are for commercial uses. The results revealed that 84% of household do not have any sort of transport vehicles and depend on public transport and only 16% have some sort of vehicles. This explains the importance of and dependency on the public transport system (STP,2004). Although only mechanized transport buses run the highest passenger-km per day(Rahman, M.S.U and Nahrin, K., 2012) , according to 2005 Strategic Transportation Plan (STP) it's only 44%, which is very low. However, the demand of public transport system is increasing with the increase of passengers for the last 20 years (Karim, M. M., and Mannan, M. S.,2008).

As Dhaka is a city with poor economy and low private car ownership, it needs a very sustainable and economy friendly bus transport system. Dedicated bus transport system for mass transit should be the backbone of transportation system in this city. However, at present,

passenger transport scenario of Dhaka shows that the existing bus transport facilities is not sufficient to keep pace the growing demand. In addition, this service is inefficient, unproductive and unsafe. Passengers are frequently facing long waiting time, delay on plying, over-crowding, lack of comfort, long walking distance between origin and nearest bus stops as well as between bus stops and destination. Again, a well-planned city should have 25% of total area for its road network whereas in Dhaka; only 9% of total area is occupied by road. This paper is an attempt to explore existing service quality and deficiencies of the bus network system of Dhaka city.

USE OF BUS AS PUBLIC TRANSPORT

All shapes and sizes of vehicles are part of the traffic. The multiplicity of modes of transport, private cars, motor cycles, buses, taxis, cycle rickshaws, rickshaw vans, trucks, pushcarts and recently revived animal driven transports offers a rich range of choices to travelers and transporters of goods. But lack of relevant measures and firm decisions to cope with the complexity of traffic has created chaotic conditions. Different types of modes using the same road space characterize traffic environment. Current very diverse traffic mix is increasing the traffic delays constantly. **Figure-1** is an illustration of the complex traffic composition in Dhaka (see appendix).

Table-1 Parametric comparison of different transport modes in Dhaka

Mode types	Passenger boarding at peak hour	Load factor	One way Avg. Trip length (km)	No. of trips/day/ vehicle	Passenger Km/Day/ vehicle	Journey speed (km/hr)	Fare demand (Tk/km)	No. of conductor or helpers
Rickshaw	2	1	4.8	35	252	9.3	2.7	Nil
Baby taxi	3	1	8	22	396	10.8	5.4	Nil
Mishuk	3	1	6	22	297	15.2	5.1	Nil
Auto tempo	12	1.2	6	18	927	21.9	0.47	1
Double Decker bus	102	1.4	14.5	12	8874	15.5	0.25	2 to 3
Single Decker bus	77	1.5	14.5	12	6700	15.5	0.25	2 to 3
Private bus	77	1.5	14.5	12	6700	15.5	0.25	2 to 3
Mini bus	42	1.2	16	14	4704	18.3	0.37	2

PREVAILING BUS SERVICES AND BUS ROUTES IN DHAKA

In Dhaka, according to services, buses are classified into two types: (1) Counter bus service; and (2) Local bus service. Counter buses have specified stoppages for loading and unloading passengers. Passengers have to purchase ticket before boarding on counter buses. Few of the counter buses are air-conditioned. Whereas, local buses have no defined stoppages. They stop anywhere on the road for loading and unloading passengers. Passengers pay to conductor after boarding on the bus. Both counter and local buses remain over-crowded due to gap between demand and supply. However, there are a few seating service buses operating in certain limited routes which allow boarding passengers only if there is an empty seat available for the person (e.g. Bikalpa having start and end termini at Motijheel and Mirpur 12, respectively as in Table 3).

Again according to size, Dhaka buses can be grouped in to 3 types: (1) Large bus; (2) Mini bus; and (3) Double decker. Large buses are those with at least 32 seats. However, more generally buses with length more than 10m are considered as large bus. The most significant recent change in the bus fleet composition is the increases in the number of large buses. This trend began with Sino Dipon in early 2003. They are now operating on four different routes with 105 buses. Minibuses have capacity of 15 to 30 seats excluding driver's seat and normally are around 8m long. There are around 9311 numbers of registered large buses and 8459 numbers of registered mini buses in Dhaka city (<http://www.brta.gov.bd/>). STP conducted a survey on average trip length, travel time, speed and carrying capacity of existing mass transit system and got the following scenario as shown in **Table-2**

Table-2 Average trip length, travel time, speed and carrying capacity of existing mass transit system in Dhaka city

Mode	Average Route length (km)	Average Journey time (min)	Average travel speed (km/hr)	Average running speed (km/hr)	Average boarding passenger	Pass-load At max. point	Average stops
Mini Bus	20.12	65.00	17.14	23.19	79.27	39.1	16.56
Large Bus	14.7	71.09	13.7	17.8	89.6	44.9	12.3
Double Decker	17.81	56.83	17.22	23.45	100.76	83.71	13.67
School/ Staff bus	13.5	37.25	20.9	23.0	44.4	43.4	7.8

METHODOLOGY

Dhaka inter-city bus transport companies have a wide variety of buses. The reactionary behavior of bus staffs (bus driver, bus conductor, bus helper and counter staffs) created a difficult situation to explore the condition of service provided by bus transport system of this city. Although maximum bus staffs were friendly and helpful to share their experience and answer the question asked for survey, a few were afraid of sharing as their buses do not follow the rules imposed by Bangladesh Road Transport Authority (BRTA).

The structure of the study was aimed at certain variations in bus types and examined the way they performed, their physical condition, average journey speed and passengers comfort level while travelling. The ultimate goal was to explore the level of service provided by bus transport system of Dhaka city by collecting individual experience at certain stops. It was decided that a variety of buses to be captured so that the results represent the bus network system. Counter buses have wider variety of door arrangements. Bangladesh road transport corporation (BRTC) operates some double decker and articulated buses. Local buses have less variation in size and all of them fall in to mini bus category.

The data was collected by discussion with the bus employees (i.e. bus conductors, bus drivers, employees at counter). Data given by bus staffs were cross-checked

by riding on that particular company bus three times at different periods. To know the riders opinion on riding bus, a total of 100 persons were interviewed with selected structured questions. The survey form was ten questions long and was conducted through face-to-face interviews. Few questions (e.g. your comfort level, your movement inside the bus) were phrased for satisfactory, moderate and un-satisfactory responses and other questions (e.g. are you a regular passenger on this route) were phrased for yes or no responses. The survey was written in English and translated into Bengali before delivered to subjects. Interview places were selected considering two facts: (1) Starting or ending point of bus route; and (2) Places where counter bus passengers and local bus passengers assemble and remain for a sufficient period to board or alight. By this, counter bus passengers and local bus passengers were easily separated. The interview was conducted during the month of October to December 2013 at sunny days.

The data of speed was collected by riding on that particular bus and by using GPS device (route length and travel time). After taking three readings on the same bus company on same route, an average travel time was obtained. Average journey speed data was obtained by dividing the total route length by average travel time. During weekdays, data was collected at peak hour, from 8.00 am to 10.00 am in the morning and 4.30 pm to 7.00 pm in the evening. And during holidays data was collected from 3.30 pm to 7.00 pm in the evening.

Table-3 Survey on selected bus routes

Bus routes	Bus stops (Places where passengers were interviewed)	Selected bus services	Average journey speed During working days (km/hr)	Average journey speed (km/hr)	Type of Service
		Bikalpa Auto Service (M.B.)	11.48	28.7	Sitting
Motijheel to Mirpur	Mirpur12, Mirpur1, Farmgate, Gulistan, Motijheel	Bahan paribahan (L.B.)	8.32	15.33	Local
		Shakalpa paribahan (L.B.)	8.92	14.49	Counter
Motijheel to Gulshan	Motijheel, Malibag, Doimik Banglar Moor, Gulshan I	Bus no 6 (L.B.)	6.52	10.56	Local
		Moitri (L.B.)	7.23	13.17	Counter
Motijheel to Mohammadpur	Motijheel, Pressclub, City college	Rajacity (L.B.)	8.05	14.23	Counter
		Dipon Transport(L.B)	6.87	14.98	Counter
Azimpur to Kuril (Bishwa road)	Azimpur, Kalabagan, Bashundhara city, Nabisco	Winner (L.B)	7.67	18.18	Counter plus boarding
		Safety bus service(M.B)	7.5	19.54	Boarding
Azimpur to Mirpur.	Azimpur, Kalabagan, Mirpur12,Mirpur1.	Bihanga (M.B)	7.45	16.93	Boarding
		Bus no. 27(M.B)	6.56	14.87	Local
Azimpur to Uttara	Azimpur, Kalabagan, Farmgate, Mohakhali.	Duldul(L.B)	8.37	16.29	Counter
Jatrabari to Mirpur	Jatrabari, Gulistan, Farmgate, Mirpur 10, Mirpur 12	Bus No.14	7.27	17.28	Counter

(Note: L.B. = Large Bus and M.B. = Mini Bus.)

All buses would be ridden only within the city limit. For this, routes were chosen from all parts of the city, and when possible, a route which started and ended within city limits. For this study, the study riding limits were set at Uttara in the northeast, Jatrabari in the southeast, and Mirpur 12 in the northwest of Dhaka. To collect data during journey each route was observed from origin to destination but data which valid within city limits were taken. To assess the condition inside the overcrowded buses, the surveyors ride on the bus and collected necessary data. The number of people standing before the first row of seats and immediately in front of the middle or back doors was recorded as a measure of a bus's crowding levels. The number of people who remained at the bus stop who could not board, the number of passengers with some part of their body outside the doorframe and passengers riding on the roof of bus were also recorded.

It was quite impossible to cover the whole city or all the bus routes and operators of the city due to time and resource constraints. Hence, only the seven major bus routes: (1) Motijheel to Mirpur; (2) Motijheel to Gulshan; (3) Motijheel to Mohammadpur; (4) Azimpur to Kuril (Bishwa road); (5) Azimpur to Mirpur; (6) Azimpur to Uttara; and (7) Jatrabari to Mirpurhad were chosen for this study. While selecting the bus routes, it was considered that they cover the whole city (i.e. the

central area and the periphery, the planned and unplanned area, and the higher-income and lower-income residential areas). Ultimately, 90 ticket bus trips and 45 local bus trips were collected. **Table-3** shows the collected survey data.

RESULTS

Overcrowded bus, long waiting line for buses is a common sight in Dhaka city. This is due to low frequency of bus headway and high demand. Waiting time at a bus stoppage was reported less than 10 minutes by 22% of passengers, waiting time greater than 10 minutes but less than 25 minutes was reported by 65% of passengers. However, 13% reported that they frequently have to wait more than 40 minutes to board in a bus. This waiting time is the average of all buses (local and counter buses). Waiting time only for local buses was reported more than 20 minutes by 72% of passenger. This long waiting time is also due to overcrowded buses. It is common sight in Dhaka that a few passengers is unable to board in the bus as there is no room and they have to wait for the next one. **Figure-3** (See apendix) shows the queue of the passengers waiting for bus and **Table-4** shows the number of passengers at bus stops waiting per hour along with the prevailing demand and supply of buses at that particular stop.

Table-4: Demand and Supply in Different Stops

Stops	Total number of awaiting passenger per hour	Total demand of bus per hour	Current supply of bus per hour
Mirpur 12	52	0.35	0.35
Mirpur 10	78	0.65	0.33
Mirpur 1	105	0.88	0.38
Kalabagan	48	0.3	0.35
Azimpur	201	1.68	1.1
Gulistan	426	3.84	3.05
Jatrabari	480	4	3.7
Motijheel	224	2.25	2.25
Press club	55	0.32	0.68
Nabisco	35	0.23	0.36
Khamar Bari	386	3.56	3.18

Besides waiting at the bus stops, this survey shows that about 83% riders are not satisfied with the delay time incurred at each and every stoppage. And the rest are moderate. Whereas, no one is satisfied with the delay time of the local bus only. A local bus will commonly remain at a stop for several minutes until the conductor feels the bus is sufficiently loaded, which typically means every possible space is filled. Some local buses will leave a stop when a second bus of the same route arrives, but schedules are roughly kept so that the first bus will already be sufficiently crowded by the time of the second bus's arrival. In case of counter buses, counter staff makes the bus wait to sell some more

tickets. Passengers on-board often shout at bus staffs to stop this delay. This often creates chaotic situation. Even, they often board and off-load passengers at unspecified stops. These unexpected halt cause unnecessary delay for on-board passengers. Besides, higher alighting and boarding time might be another cause of delay. Passengers reported that average delay time at each station for counter buses ranges from 2 minutes to 5 minutes while for local buses it varies from 3 minutes to sometimes more than 8 minutes. This delay time affects average journey speed. Difference in average journey speed is showed on **Figure-4** (See Appendix). For weekdays this difference is less

significant because of traffic jam, all buses are bound to move at same speed. But during holidays, this difference is significant. Delay time while travelling is the main reason of this difference. Compared to local buses, counter buses have fewer stops and less delay at each stop.

Considering the bus frequency, only 10% are satisfied where 55% and 35% are respectively moderate and unsatisfactory. However, considering only local buses, unsatisfactory passengers rises up to 70%. Often due to low frequency and high demand, it becomes impossible for older people or women or children to get room inside the bus. Consequently, these groups of vulnerable people do not have access to bus service during rush hours. Most buses especially local buses carry passenger exceeding their capacity.

Only few buses carry passenger as much as their seat capacity ('no standing passengers') e.g Bikalpa Auto Service (Motijheel to Mirpur12). Due to high demand,

passenger boarding in the bus risking their lives (see, Figure 3). Due to overcrowded situation, comfortable movement inside the bus is restricted often impossible. Survey shows that more than 73% of bus passengers do not feel comfortable during travel. This discomfort increases at office starting and ending hours. This situation is worse in local buses where conductor moves inside the bus to collect fare of travel often make the condition of passengers standing miserable. Also, he shouts for passengers to compress more so that he can board in more passengers beyond the bus capacity. **Figure-5** shows overcrowded bus during the typical peak hours (see Appendix) About 27% of the respondents mentioned satisfactory about the behavior of bus staffs (bus conductors, bus drivers, bus helpers, counter staffs), 40% mentioned moderate and the remaining 33% mentioned unsatisfactory. However, if considered only the local buses, about 83% are not satisfied. This indicates the behavior of a staff in the counter bus is much better than the local bus. This might be because often there is dispute between the conductor and passengers to set a fare for a particular trip on the local bus. This dispute sometimes ends with blows creates severe situation.

For female passengers the travelling environment of buses especially local buses is very much unsatisfactory. Not all local buses have special female seats. Compared to local buses, counter buses are much better, have 6 seats in front especially for female passengers. But this number is very few compared to the female passengers travel. This survey found that there is no especial care for pregnant female passengers. So riding buses in

Dhaka city for pregnant woman is a matter of great risk. Also sexual harassment to women in crowded buses is a common problem in Dhaka. Many women reported that they experienced physical harassment while boarding or alighting bus by bus staffs, even by male passengers.

Figure-6 (See Appendix) shows the satisfaction level of riders riding on buses.

The main reason of discomfort during bus journey is unavailability of seat and overcrowding of passengers while the minor factors are leakage of rain water, uncomfortable seats, interior of bus, and behavior of bus staff. For example, almost 35% of passengers mentioned that counter bus facilities are comfortable because of good seating facilities. About 37% of the passengers mentioned that seats of buses are not comfortable. They reported that for a large bus with more than 50 seats have almost one fifth of seats are out of order. However, if only local buses are considered, almost all the passengers reported uncomfortable seats: (1) having holes in the seats; (2) back side of the seats broken; (3) no foam in the seats; and (4) bad odor. For local buses, the size of the seat is unsatisfactory. For two healthy individuals more than 5 feet 8 inch tall, it tends to be impossible to sit on the two seat arrangement of local buses.

The physical condition of the buses plying in Dhaka city is not satisfactory. This is because the majority of bus fleet is very old and the maintenance is almost absent or very poor. Despite the poor bus condition riders not feeling it or mentioning about it because their main

concern might be getting a seat or room inside the bus irrespective to its overall condition. For instance, one of the passengers told 'interior of the counter buses are moderate, however, the local bus is very poor'. Not only interior but also bus engine condition is very poor. Due to poor maintenance of the bus fleets, often these become out of order on the way and causing problems for its passengers. About 40% of the respondents reported that they had experience of unexpected breakdown of the bus while travelling, mostly due to fitness problem of bus or staff related problem. Researcher had such experience of sudden breakdown in Dhaka for two times during the survey in 2013. On that occurrence, the passengers had to wait until another bus, which was passing the spot, to pick up them or some passengers either walked to their destination or took alternative modes. This causes serious harassment for passengers by compelling them to find new bus or to find the nearest bus stop to board.

The survey shows that about 47% respondents reported that their closest bus stop is within 0.5 km while 36% mentioned within 0.5 km to 1 km and more than 1km was reported by 17%. So, it is clear that position of bus stops is satisfactory. Even bus stops within half km cause reduction in bus frequency. Although there are sufficient bus stops, the condition of bus stops are not good. Very few bus stops offer protection from the sun, rain, dust, and other elements that have significant implications for health or safety. Passengers shade is almost absent in Dhaka city. There are a few, however, occupied with vendors or shops and no use for the bus passengers. Counter bus stops have big umbrellas for their counter staffs but does not provide any shade to passengers from sun and rain. There is no seating facility for passengers, often they sit on sidewalks blocking pedestrian movement or stand in a queue while waiting for buses causing temporary bottleneck by blocking a lane of road. Also there is very few designated place for bus stoppage in road side of Dhaka city. Most of the bus stop in road side haphazardly with competition attitude and alighting and boarding passenger dangerously. This makes always crowded on road side and influence pedestrian to move on road as well as decreases the effective width of the carriage way.

Buses, which are main mass transit system in Dhaka, are operated by government authority and private financing entities. The BRTC, which operates under immunity from regulation by licensing authorities, owns a total of 306 buses operating on 15 routes in Dhaka (1). BRTC does not operate the buses directly, rather sub-contracts bus operations to private operators at different routes. The main problem of privately operated bus services is that buses are owned by a large number of operators. There are many operators who have only 2 to 3 buses. Drivers and crew in this category either own the vehicle individually or rent the bus on a daily or monthly basis. They then operate the vehicle at their own revenue risk, requiring enough passengers per day to repay the bus rental fee, cover fuel and basic maintenance costs, and make a profit. So, to keep their business upright they forget about giving minimum level of service to riders.

Dhaka is perhaps the only city of its size without a well-organized, properly scheduled bus system. Dhaka Metropolitan Regional Transport Committee (DMRTC) gives route permits without using statistics, without judging travel demand. There are some routes in the city where more than 5 counter bus companies along with more than three local operators exist. Whereas, there are some routes with only one counter bus operator. So it is obvious that due to too many bus operators and lack of statistical data, no route is operated on the basis of

travel demand and supply. In Dhaka, there is no coordinated bus network information center. It is not easy to travel to desired route for unfamiliar riders. Especially for local bus service as there is no counter; passengers have to rely on fellow passengers of same route to collect information. For a vast city like Dhaka with its huge population where bus is the only mean of public transport this is certainly unacceptable.

DISCUSSION

Bus is the only mode of public transport system, the choice for the majority and the only means of mobility that can be afforded by the urban middle and lower economy people. Public transport system by definition is a system which provides scheduled service carrying mass people on a fixed route. However, public transport system of Dhaka city is not maintaining any time schedule. Due to heavy congestion on road and absence of any time schedule, waiting time for the buses is unpredictable for riders. Due to low frequency and supply-demand deficiency the buses remain always overcrowded making the journey experience a miserable one for passengers. Due to the extreme levels of congestion in the streets of the city, buses cannot keep consistent schedules. This means that passengers will prefer to board a crowded bus, even at the risk of their personal safety, rather than wait an unknown length of time for the next bus to start (Katz, Donald and Rahman, Md. Mizanur,2010). However, there are some sitting services but their numbers and routes of operation are very limited. The average journey speed is about 7.5 to 8 km/hr which is few kilometers greater than normal walking speed of a matured human being. Also, there is no organized authority to operate day to day operation of bus system.

The only organized bus transport authority BRTC started with the motto of “*Service is our motto: Comfort is our commitment*”, it cannot fulfill any of their objectives(BRTC. 2011). With few exceptions, the bus owners or operators, including government owned BRTC buses in Dhaka City do not pay adequate attention to passengers’ comfort(Andaleeb, Syed Saad, Haq, Mahmudul, and Ahmed, Rubina I, 2007). Not only operational deficiencies but also Dhaka bus system lacks of quality bus service. Facilities inside the bus, such as fans and lights are frequently out of order; many of these do not have lights and fans at all. Other requirements, such as airflow and ventilation, lighting during night must be monitored to ensure a desirable environment for riding. Basic passenger’s requirements, like comfortable seats and windows for airflow also do not meet up the standard (Rahman, M.S.U and Nahrin, K, 2012). The results derived from the interview of bus passengers suggest that if comfort level could be improved it could also increase significantly the

passengers' satisfaction, leading perhaps to greater proclivity to use public buses (Rahman, M. S. U. , 2011)

To reduce demand-supply deficiency authority prefer increasing the number of buses without any sort of research. These unplanned decisions increase congestion thus reduce the flow of buses more. These add up to the waiting time. In Dhaka, the number of bus stops is satisfactory but boarding-alighting system is unacceptable. Most of buses have only one door even if they have two doors, they use two doors both for alighting and boarding. Also the behavior of bus staffs is an important issue for service level. Often they halt the bus in the center of road for boarding or alighting passengers, causing temporary bottleneck and safety hazard for passengers.

There is no guarantee that anyone can reach to their destination within certain time because of the ever increasing traffic jam, congestion and shortage of public transport service. Public bus is the most affordable mode of transport in developing countries like Bangladesh. According to the study, performance of bus service will not be developed only by increasing bus number. Service regularity, on-time performance and service quality are also mandatory factors to be considered. Traffic congestion and excessive demand are behind all the problems. Reducing the traffic congestion is not in the hands of the respective bus authority but maintenance of the service quality of the bus is still manageable. This study gives a picture about the service condition of the bus that can help the bus authority to take remedial measures to upgrade the present situation of the bus. From the research, it is very clear that, the demand-supply deficiency is prevailed, but not so acute. But still the people are fully deprived from a quality bus service. The results of the research point out that the excessive travel time, waiting time and dreadful services in terms of comfort, regularity and on-time performance mainly hinder the prospect of the public bus transportation in Dhaka. Hence, transport facilities of the city should be provided keeping in mind the population growth, economic development, and future travel demand of the city.

Dhaka is currently trying out new bus transportation options to help maximize the use of the road. BRTC has recently added air-conditioned buses to its fleet at different routes. Articulated buses have recently been purchased to be used by private companies, meaning one bus can carry higher loads if current crowding conditions remain the same. Also plans to institute a digitalized ticket system on the busy Uttara to Azimpur route. All existing companies on that route will run under one name and ticket system instead of competing with each other. Dhaka is also planning for elevated

expressway, BRT and Metro Rail inside the city. These new operational implementations should be studied to see their effect on Bus network system of Dhaka.

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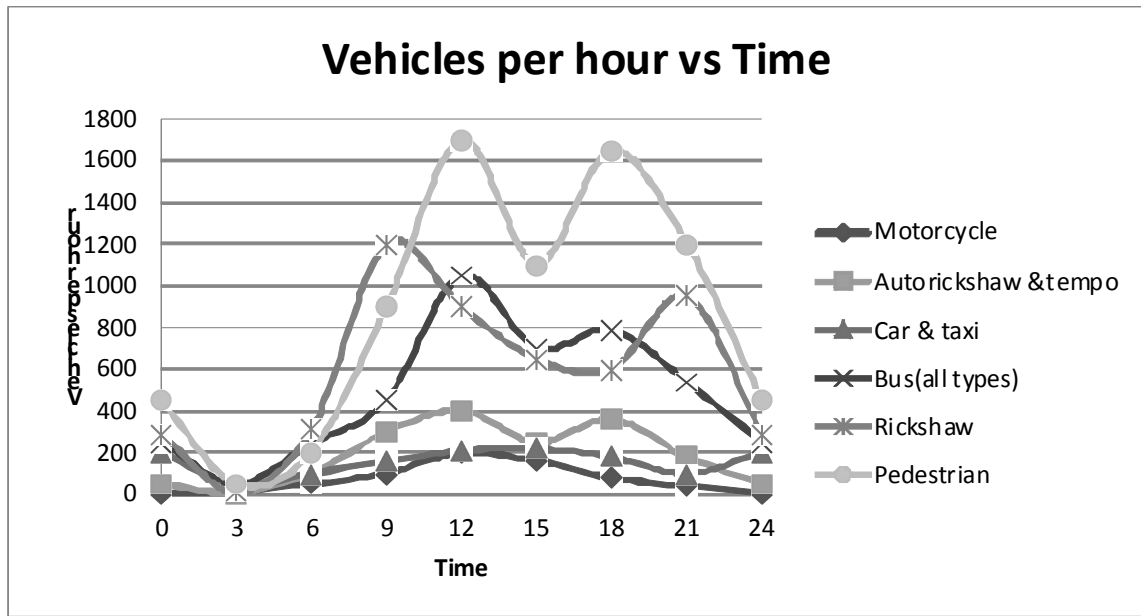
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APPENDIX

Figure-1 Illustration of the complex traffic composition in Dhaka. (Source: STP, 2004)

Figure-2: Prevailing bus routes and number of buses operating on those routes.

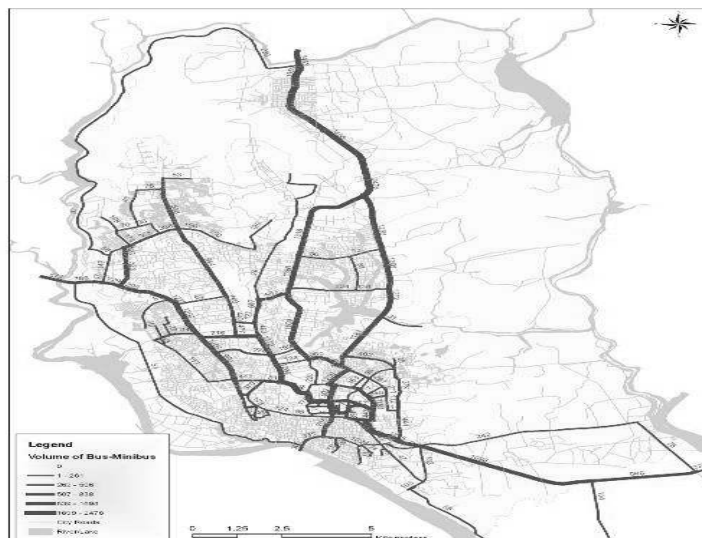




Figure-3: Passengers waiting for bus

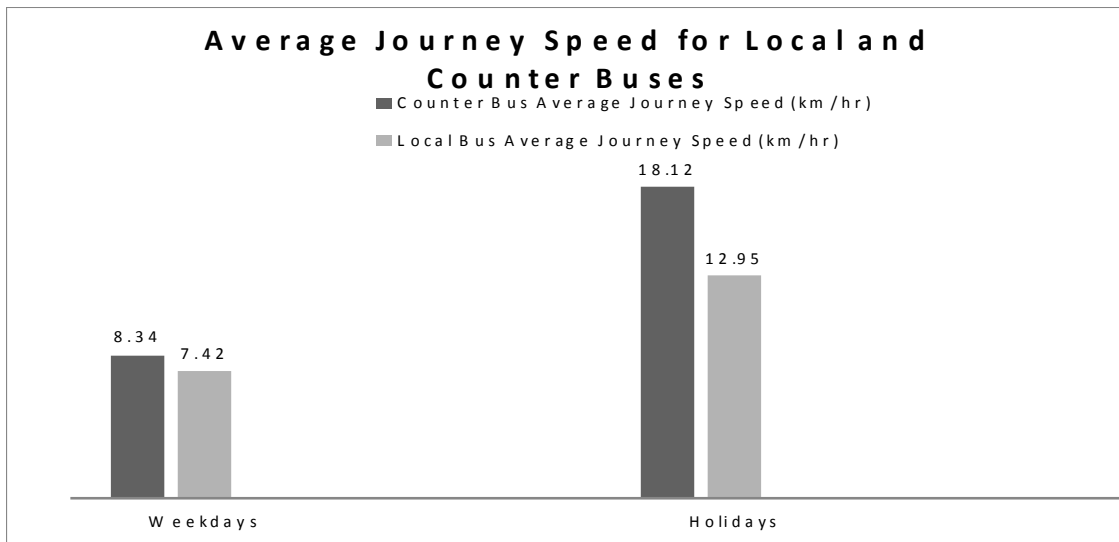


Figure-4: Average Journey Speed for Local and Counter Buses



Figure-5: Overcrowded buses of Dhaka

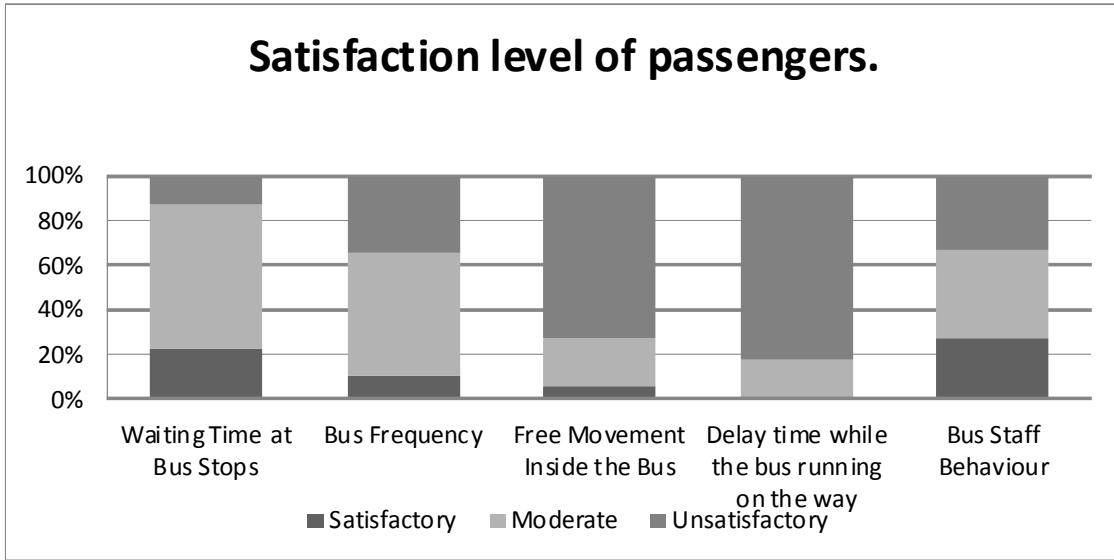


Figure-6: Satisfaction level of passengers boarding on buses

ENVIRONMENTAL SUSTAINABILITY DIMENSION OF URBAN PROSPERITY IN SELECTED SETTLEMENTS OF OGUN STATE, NIGERIA

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ABSTRACT

This study investigated the extent of residents' perception of urban prosperity in selected settlements (Ota and Agbado) in Ogun State, Nigeria using the UN-Habitat (2012 / 2013) prosperity of cities dimensions (Environmental Sustainability). The sample frame consisted of 4,375 households in Ota (Otun) and 3,312 households in Oke-Aro (Agbado Core), which translates to 7,687 households' heads. The sample size was 722 households' heads. The method of data analysis used include frequency table, cross tabulation, Likert scale outputs through the Statistical Package for Social Science (SPSS). The study revealed that the extent of urban prosperity in terms of environmental sustainability were encased in pollution and emission (3.66 R.P.I.); rate of noise pollution (3.59 R.P.I.); water quality satisfaction (2.48 R.P. I); air quality (2.33 R.P.I.) and sustainable environment (1.62 R.P.I.) respectively. The environmental sustainability in terms of green/recreational facilities revealed that green space availability found 1.86 as the Residents' Perception Index. In conclusion, urban settlements (Otun and Oke-Aro) have tendency of becoming a prosperous urban centres, most especially, if the suggested pragmatic strategies will be implemented.

KEYWORDS: Environment, Sustainability, Urban, Prosperity, Settlements

INTRODUCTION

Rapid increase in population of urban centres in most countries of the world is an indication of the pace of social and economic change (Donk, 2006). In many cities of the developing world, urban expansion has taken the form of "peripherization" that is characterized by large peri-urban areas with informal or illegal patterns of land use, combined with a lack of infrastructure, public facilities and basic services, and often accompanied by a lack of both public transport and adequate access roads. Urban expansion is the consequence of poverty, not affluence, as informal unplanned settlements on the periphery spring up in response to a lack of affordable housing options within the city itself (UN-Habitat, 2013).

While urbanization can mean economic dynamism, inclusion and democracy, it also creates enormous challenges, and the difficulties of urban life are magnified when the public sector is weak (Glaeser and Joshi-Ghani, 2013). At the same time, growing cities also pose a number of challenges such as pollution, excessive resource usage and energy consumption, climate change mitigation, congestion, spatial competition, safety and health issues, inequality, poverty, and segregation (Burton, 2000; McCormick, Anderberg, Coenen, and Neij, (2013). The right response to the challenges of urban life is having urban visioning and proper planning implementation. Close

proximity increases human connections and enhances urban growth.

Both in academic literature and in policy documents, creativity is considered essentially an urban phenomenon because human, economic and institutional resources are generally located in the big cities (Florida, 2002). Cities are traditionally considered as places of development, centre of growth or growth poles, areas of concentrated prosperity. Similarly at the individual level, cities have been viewed as places of dynamism and concentrated opportunities. All these indicated the continuous influx of people to urban centre has both positive and negative effects. One of these is appreciable for urban prosperity in world cities today.

To date, more than half of the world's population lives in urban areas (United Nations, 2011). Cities are driving forces and centre of economic, technological, and human development (Polese, 2005; UN-Habitat, 2013; Bettencourt, Lobo, Helbing, Kuhnert., and West, (2007) and Porter, 2000). Searching to improve their quality of life, people move to cities (Taylor, 2012). There is a near perfect correlation between urbanization and prosperity across nations (Glaeser, 2011). The city is a powerful and wonderful construct of history that developed in response to geographical forces that are now well understood, as are the main keys to urban prosperity (Jean-Claude Prager, 2008).

Urban prosperity takes different forms and characterizations. Each individual city, depending on its own stage of socioeconomic development, history and culture, can be seen as giving its own unique interpretation of prosperity, including in the way it is shared among the population. Still, it is possible to find a common set of conditions that enable urban residents to flourish, feel happy and healthy, and in which business can thrive, institutions develop, and physical spaces become more integrated and diverse (UN-Habitat, 2013).

Every year millions of people, in a population movement that is unprecedented in the history of humankind, continue to migrate from the countryside to the city, because prosperity is to be found in urban settings: the best predictor of income in the world today is not what or whom you know, but where you work (World Bank, 2009). Glaeser (2008) points revealed that "cities are full of poor people because cities attract poor people, not because cities make people poor. However, most studies have concentrated on the urban poor and relatively little is known about the prosperity of urban settlement (residential core areas). This becomes a gap that this study intends to fill. Therefore, the focus of this paper is to investigate the extent of environmental sustainability of urban prosperity in the selected settlements of Ogun State (Agbado and Ota), Nigeria using UN- Habitat urban prosperity index.

LITERATURE REVIEW

Environmental Sustainability

Cities with higher levels of environmental sustainability tend to be more economically productive and provide residents with a higher quality of life. Environmental sustainability is central to the qualitative changes necessary to transform cities and urban lives, particularly the lives of the urban poor. (UN- Habitat, 2013) This implies that there is no trade-off between any city's environmental sustainability and their economic growth and prosperity. For cities, the amelioration of the air quality, the reduction of traffic congestion, and the health of their inhabitants are much more direct benefits of greener practices.

Environmental sustainability requires capacity-building and resource availability at the at all levels; global, region, nation and even at local. A place cannot be single –out for environmental sustainability due to interdependent of human race and settlements. The sustainability of environment is majorly on quality, CO2 emissions, Energy and indoor pollution.

Prosperity

For a prosperous life, the provision of basic material and immaterial needs is crucial (UN-Habitat, 2013).

However, that there is more to it: prosperity is not only about fulfilling basic needs or combating urban problems. Instead, the essential aspects of prosperity are summarized in the following quote: Prosperity consists in our ability to flourish as human beings within the ecological limits of a finite planet. The challenge for our society is to create the conditions under which this is possible. It is the most urgent task of our times. (Jackson, 2009,) To achieve this, a shift away from materialistic, 'status-drive consumerism' is necessary, argues Jackson (2009). Druckman and Jackson (2010, p. 1803) adds to this point by emphasizing the importance of providing capabilities for a less materialistic flourishing; nutritional health, life expectancy, and participation in society (Jackson, 2009). Jackson (2009) emphasizes the importance of meaningful participation in society through meaningful employment because employment provides opportunities for individuals to connect and interact with others.

The five components encompass productivity, infrastructure, environmental sustainability, and equity (UN-Habitat, 2013). For example, quality of life includes key aspects: knowledge and intellectual development (education), meaningful work (employment), recreation, good health, safety/ security, and participation in decisions that affects people's lives (political rights). These aspects are derived from (UN-Habitat, 2013) and (Jackson, 2009).

STUDY AREA

Ota is situated near the boundary with Lagos State and has steadily grown to be the largest industrial town in Ogun State, largely as a result of its proximity to Lagos and it is located within the tropical zone lying between 6° 47' of the equator and 2° 33' E and 3° 18' of the Greenwich Meridian covering a land area of 1,263 square kilometre, it has terrain of 1, 1010 square kilometre. (Ado-Odo / Ota Local Government Economic summit, 2010). Oral tradition has it that Ota was founded in about 1835 by the Aworis who originated from Ile-Ife, the cradle of Yoruba's. The population figure of Ota in 1963 was put at 14,248, in 1991 was 103, 32 and when the 2006 national Population Census was conducted it was put at 142,793. CPMS, (2008). Ota growth also could trace to industrial estates, religious worship centres, government housing estate, universities, access to border towns and most importantly a nodal town on Lagos-Abeokuta Expressway.

Agbado has grown strongly in its physical extent along the railway station, north to Iju_Ishaga of Lagos State and extends to a distance of about 6.5km terminating at Akute. The physical extent of the town along Ijoko Road which runs in an south direction extends west

ward from Ijaye-Ojokoro of Lagos State. Population figure of 35,470 was recorded 1991 and 49,016 in 2003 (NPC, 1998). Agbado station is a town consist with areas like Oke-Aaro, Ibaragun, and Matogbun, Aboru etc and shared boundaries with Ado-Odo /Ota local Government in Ogun State and Ifako-Ijaiye Local Government in Lagos State.

METHODOLOGY

Data for this study were obtained from the primary and secondary data sources. The secondary data were obtained from reports, textbooks, journals, file of government agencies and UN-Habitat, prosperity of cities 2012/2013, National Population Commission among others. The study area entailed the traditional core area of Ota (Otun) and Agbado (Oke-Aro). The sample frame was 4,375 households in Ota (Otun) and 3,312 households in Oke-Aro (Agbado Core), which translates to 7,687 households. The sample size was calculated using Yard's formula and it was estimated as 367 from 4,375 households for Otun (Ota) and 355 from 3,312 households for Oke-Aro (Agbado). Based on the sample size, sets of questionnaire were administered. The study adopted systematic random sampling technique. The sampling procedure entailed the identification of the study area, selection of buildings and households and the conduct of interview with households' heads through the structured questionnaire. Data were analysed using the frequency tables and outputs of the likert scale.

RESULTS AND DISCUSSION

Environmental Sustainability which is the basis of healthy living, revealed information on sustainable environments, that captures the quality of air, pollution and emission, noise pollution and quality of water in the area.

Results on environmental sustainability in **Oke-Aro** revealed that 8.2 % of the respondents were Strongly Dissatisfied, 20.6 % were Dissatisfied, 7.0 % were Moderate, 61.4% Satisfied and 2.8 % did not respond, while in **Otun**, its shows 27.8 % were Moderate, 63.8% Satisfied and 8.4% Strongly Satisfied. Majority of respondents satisfied the environment in terms of sustainability.

Perception on Air Quality

Results on the quality of air in **Oke-Aro** found that; 30.4 % of respondents opined that they were Strongly Dissatisfied, 18.6 % were Dissatisfied, 26.2 % were Moderate, 9.9% were Satisfied, 14.9 % were Strongly

Satisfied, while in **Otun**, it was revealed that 27. % of the respondents perceived the quality of air as Moderate, 63.8% as Satisfied and 8.4% as strongly Satisfied. Majority of the respondents were satisfied with the quality of air.

Perception on Pollution and Emission

This result indicated the perception of residents on pollution and emission in **Oke-Aro**; 7.0 % opined that they were Strongly Dissatisfied, 13.6 % opined that they were Dissatisfied, 44.2 % opined that they were Moderately satisfied, 25.4% Satisfied, 9.3 % were Strongly Satisfied and 0.8% did not respond, while in **Otun**, it was found that 0.8 % were Moderate, 65.9% were Satisfied, 30.0% were Strongly Satisfied and 3.3% did not respond. Majority of respondents were Satisfied with the settlements level of pollution and emission, and this could be because there were no Diesel Engines or Industrial Machine within the traditional core areas (see Table 1).

Perception on Noise Pollution Level

Analysis on residents' perception on noise pollution revealed the level of noise pollution in **Oke-Aro**; as 8.4 % were Strongly Dissatisfied, 11.0% were Dissatisfied, 32.4 % were Moderate, 37.7% were Satisfied, and 10.4 % were Strongly Satisfied, while in **Otun**, results showed that 8.4 % were Dissatisfied, 3.3% were Moderate, 81.5% were Satisfied, 6.8 % were Strongly Satisfied. Majority of the respondents were satisfied with lower level of noise pollution in the environment and this could be to the fact that there were no industrial machines and many Entertainment/Music Shops within the tradition cores (see Table 1).

Perception on Water Quality

The water quality of **Oke-Aro** showed that; 30.7 % were Strongly Dissatisfied, 17.7% were Dissatisfied, 18.0% were Moderately satisfied, 27.3% were Satisfied, and 6.2 % of the respondents were Strongly Satisfied, while in **Otun**, results showed that 7.6 % were Strongly Dissatisfied, 66.2% were Dissatisfied, 17.7 % were Moderately satisfied, 0.3% were Satisfied and 8.2% were Strongly Satisfied. Majority of the respondents were dissatisfied with the settlement in terms of shortage of quality water in spite the presence of Lagos Water Corporation (Works) and Ogun State Water Corporation (Facilities). The settlement lives on individual facilities, Pure Water Companies and Bore-Holes.

Table 1: Analysis of Environmental Sustainability Dimension

Variables		Frequency						Total
		Strongly Dissatisfied	Dissatisfied	Moderate	Agree	Strongly Satisfied	No Response	
Sustainable Environment	Agbado (Oke Aro)	29 (8.2%)	73 (20.6%)	25 (7.0%)	218 (61.4%)		10 (2.8%)	355
	Ota (Otun)			102 (27.8%)	234 (63.8%)	31 (8.4%)		367
Total		29	73	127	452	31	10	722
Injurious Air	Agbado (Oke Aro)	108 (30.4%)	66 (18.6%)	93 (26.2%)	35 (9.9%)	53 (14.9%)		355
	Ota (Otun)	100 (27.2%)	218 (59.4%)	1 (0.3%)	24 (6.5%)	24 (6.5%)		367
Total		208	284	94	59	77		722
Pollution and Emission	Agbado (Oke Aro)	25 (7.0%)	47 (13.2%)	157 (44.2%)	90 (25.4%)	33 (9.4%)	3 (0.8%)	355
	Ota (Otun)			3 (0.8%)	242 (65.9%)	110 (30.0%)	12 (3.3%)	367
Total		25	47	160	332	143	15	722
Noise Pollution	Agbado (Oke Aro)	30 (8.4%)	39 (11.0%)	115 (32.4%)	134 (37.7%)	37 (10.4%)		355
	Ota (Otun)		31 (8.4%)	12 (3.3%)	299 (81.5%)	25 (6.8%)		367
Total		30	70	127	433	62		722
Water Quality	Agbado (Oke Aro)	109 (30.7%)	63 (17.7%)	64 (18.0%)	97 (27.3%)	22 (6.2%)		355
	Ota (Otun)	28 (7.6%)	243 (66.2%)	65 (17.7%)	1 (0.3%)	30 (8.2%)		367
Total		137	306	129	98	52		722

Source: Field work, 2014

Table 2: Perception Index of Residents' Environmental Sustainability Dimension

Factors	Rating and Weight Value					Deviation			
	SS(5)	S(4)	MS(3)	DS(2)	SDs(1)	SWV	RPI	RPI-PPI	(RPI-PPI) ²
Pollution and Emission	143	332	160	47	25	2642	3.659	0.929	0.863
Rate of Noise Pollution	62	433	127	70	30	2593	3.591	0.861	0.741
Water Quality Satisfaction	52	98	129	306	137	1788	2.476	-0.254	0.0645
Air Quality not injurious	77	59	94	284	208	1679	2.325	-0.405	0.164
Sustainable Environment	31	452	127	73	29	1167	1.616	-1.114	1.240
Total							13.667		3.0725

Source: Field work, 2014

$$\sum RPI = 13.667, PPI = \frac{\sum RPI}{N} = \frac{13.667}{5} = 2.73$$

Column 7: Addition of the variables of environmental sustainability dimension with their levels of satisfaction and their respective weight values. For instance, sustainable environment 31 (5) + 452 (4) + 127 (3) + 73 (2) + 29 (1) = 1167

Column 8: Perception index of the variables of infrastructure development dimension with their levels of satisfaction and their respective weight values, equals summation of weight value (SWV) divided by the

addition of individual satisfaction on the variable of productivity. For instance PI for waste collection point is 1167 / 722 = 1.616

Column 9: The deviation equals to means of perception index for all the 5 variables for environmental sustainability subtracted from perception index value for each identified variables 1.616 - 2.73 = -1.114 for environmental sustainability.

Column 10: the Square of the Deviation) $\sqrt{RPI - PPI}$

Using the formula below, the variance, standard deviation and co-efficient of variation of residents' perception responses is as calculated below

$$\text{Variance} = \frac{\sum (RPI - PPI)^2}{N} = 3.0725 / 2 = 0.6145$$

$$\text{Standard deviation (SD)} = \sqrt{\text{variance}} = \sqrt{0.6145} = 0.783$$

$$\text{Co-efficient of variation} = \left\{ \frac{SD}{PPI} \right\} \times 100\% = \frac{0.783}{2.73} \times 100 = 28.7\%$$

The highest of the residents' perception components from the Likert scale output of environmental sustainability are; pollution and emission (3.65), low rate of noise pollution (3.59) and water of water satisfaction (2.47). This explained environmental sustainability of urban prosperity of Respondents' perception index.

Environmental Sustainability Dimension in Study Area (Green/Recreational Facilities)

Table 3: Response on Environmental sustainability dimension in study area (Green/Recreational facilities)

Variables		Frequency						Total
		Strongly Dissatisfied	Dissatisfied	Moderate	Satisfied	Strongly Satisfied	No Response	
Green Space	Agbado (Oke Aro)	119 (33.5%)	198 (55.8%)	38 (10.7%)				355
	Ota (Otun)	44 (12.0%)	297 (80.9%)	26 (7.1%)				367
	Total	163	495	64				722
knowledge about renewable energy and recycling	Agbado (Oke Aro)	162 (45.6%)	67 (18.9%)	35 (9.9%)	(20.0%)		20 (5.6%)	355
	Ota (Otun)	140 (38.1%)	226 (61.6%)	1 (0.3%)				367
	Total	302	293	36	71		20	722

Source: Field work, 2014

Table 4: Perception Index of Respondents' Response on Environmental Sustainability Dimension in Study Area (Green/Recreational Facilities)

Factors	Rating and Weight Value				Deviation				
	SS(5)	S(4)	MS(3)	DS(2)	SDs(1)	SWV	RPI	RPI-PPI	(RPI-PPI) ²
Green Space Availability			64	495	163	1345	1.86	0.195	0.0380
Knowledge of Energy renewal and recycling		71	36	293	302	1064	1.47	-0.194	0.0376
Total							3.33		0.0756

Source: Field work, 2014

$$\sum RPI = 3.33, PPI = \frac{\sum RPI}{N} = \frac{3.33}{2} = 1.665$$

Column 7: Addition of the variables of green / recreation facilities with their levels of satisfaction and their respective weight values. For instance, sustainable environment 64 (3) + 495 (2) + 163 (1) = 1345

Column 8: Perception index of the variables of green space availability dimension with their levels of satisfaction and their respective weight values, equals summation of weight value (SWV) divided by the addition of individual satisfaction of the variables. For instance PI for green space availability is 1345 / 722 = 1.862

Column 9: The deviation equals to means of perception index for all the 2 variables for green space availability subtracted from perception index value for each identified variables 1.616 - 2.73 = -1.114 for environmental sustainability.

Column 10: the Square of the Deviation) $\sqrt{RPI - PPI}$
Using the formula below, the variance, standard deviation and co-efficient of variation of residents' perception responses is as calculated below.

$$\text{Variance} = \frac{\sum (RPI - PPI)^2}{N} = 0.0756 / 2 = 0.0378$$

$$\text{Standard deviation (SD)} = \sqrt{\text{variance}} = \sqrt{0.0378} = 0.194$$

$$\text{Co-efficient of variation} = \left\{ \frac{SD}{[PPI]} \right\} \times 100\% = \frac{0.194}{1.665} \times 100 = 11.65\%$$

The highest of the residents' perception components from the likert scale output of environmental sustainability are; green space availability (1.86). This explained environmental sustainability of urban prosperity of Respondents' perception index.

RECOMMENDATIONS AND CONCLUSION

The study which was conceptualized on prosperity wheel as dimension parts of urban prosperity has examined the residents' perception of environmental sustainability dimension of urban prosperity in traditional core areas in Oke-Aro and Otun. The traditional core areas were dominated by the indigenes of 78.7% of the total population of 722 respondents. As at present environment could be sustainable due to less noise and pollution from heavy trucks and industries that could be injurious to the ecosystem. The absence of green space for neighbour children and recreation centre for adult relaxation was traced to land speculators. There is a need for sustainable city plan by the state government for the core areas. The "hubs" (urban and regional planning, national building code, laws, regulations, institutions and agencies) that can bring about the change in building prosperous area should also be revisited and implemented. Urban upgrading programme or policy is recommended to the core areas for a facelift and sustainability. Most ancient structures could be conserved. The provision of infrastructures in core areas could be carried out by quasi-governmental agencies which could solve problems related to water, sanitation and health related issues with a view to providing a functional, liveable and aesthetically pleasing environment and promoting urban prosperity for all, particularly for the self-employed, less educated and health challenged persons in selected core areas. All the afore-mentioned will surely drive the wheel of urban prosperity towards prosperous urban core, in areas that promote and enhance environmental sustainability.

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MULTIVARIATE REGRESSION ON THE MEASURES OF HEALTH AND ANTHROPOMETRIC DIMENSIONS OF PRIMARY SCHOOL PUPILS
(A Case Study of Community Primary School Lagwa Okwuato, Aboh Mbaise L.G.A, Imo State, Nigeria)

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ABSTRACT

This paper is on the measures of health and the anthropometric dimensions of primary school pupils using multivariate multiple regression. The data for this research were collected from Community Primary School Lagwa Okwuato in Aboh Mbaise L.G.A, Imo State Nigeria on 159 pupils who made themselves available from 30th June to 4th July 2014 with the assistance of two medical nurses who participated in the study. The aim of this research is to know whether some of the selected anthropometric measures (Age and Height) have any significant effect on the measures of health of pupils (Temperature, Pulse and Weight). A statistical software package known as "R Development version 3.0.1" was employed for the data analysis, and the result of the analysis revealed that the two anthropometric dimensions jointly contribute to the three measures of health. Further analysis also revealed that only age determines the measures of health, while height does not contribute in the measures of health.

KEYWORDS: Multivariate Regression, Measures of Health, Anthropometric Dimensions, Regression Parameters

INTRODUCTION

In 1948, WHO defined health as "a state of complete physical, mental and social well-being, and not merely the absence of disease". Health can be considered in terms of a person's body structure and function and the presence or absence of disease or signs (**health status**); their symptoms and what they can and cannot do i.e. the extent to which the condition affects the person's normal life (**quality of life**).

"Health" is a multi-dimensional concept that is usually and measured in terms of: (1) absence of physical pain, physical disability, or a condition that is likely to cause death, (2) emotional well-being, and (3) satisfactory social functioning. Some have advocated including the quality of an individual's physical environment in the definition of health, but this dimension is not at present included in the most widely used measures of health.

There is no single "standard" measurement of health status for individuals or population groups. **Individual health status** may be measured by an observer (e.g., a physician), who performs an examination and rates the individual along any of several dimensions, including presence or absence of life-threatening illness, risk factors for premature death, severity of disease, and overall health. Individual health status may also be assessed by asking the person to report his/her health perceptions in the domains of interest, such as physical functioning, emotional well-being, pain or discomfort, and overall perception of health. Although it is

theoretically attractive to argue that the measurement of health should consist of the combination of both an objective component plus the individual's subjective impressions, no such measure has been developed (Pastor et al; 2009).

The **health of an entire population** is determined by aggregating data collected on individuals. The health of an individual is easier to define than the health of a population. Once the definition of optimum health for the individual is agreed upon, health status can be placed along a continuum from perfect health to death. In the absence of comprehensive or absolute measures of the health of a population, the average lifespan, the prevalence of preventable diseases or deaths, and availability of health services serve as indicators of health status. Judgments regarding the level of health of a particular population are usually made by comparing one population to another, or by studying the trends in a health indicator within a population over time.

The significance of this research shall guild future researchers, medical professionals, and the Government as well for National Capacity Building Strategy for Sustainable Development especially in the aspect of Health Sectors.

STATEMENT OF THE PROBLEM

It is evident that subjective health assessment is a valid indicator of health status in middle-aged populations, and that it can be used in cohort studies and monitoring

of a population's health. The use of anthropometric dimensions have been recommended for screening of majority groups, but not for minority ones. In spite of the fact that self-rated health is such an important factor, little is known about the anthropometric background to poor perceived health and also less is known about the impact of life satisfaction on health in a primary care practice population. Many researches have not been carried out on health and anthropometric dimensions to examine the effects of the anthropometric dimensions on health. Hence, this research will unveil if some selected anthropometric dimensions of pupils affect measures of health.

LIMITATION OF THE STUDY

This study covers a total of one hundred and fifty nine (159) pupils in Community Primary School Lagwa Okwuato, Aboh Mbaise L.G.A Imo State Nigeria who made themselves available for the free medical check-up organized by the researchers in collaboration with the nurses who assisted in the exercise. The study was also limited to only three measures of health (Temperature, Pulse, Weight) and two anthropometric dimensions (Age, Height). The methodology of this paper is limited to multivariate multiple linear regression model.

REVIEW OF RELATED LITERATURE

Works have been investigated, which in one way or the other relates to this research investigation. Hence, there is need to review some past researches.

Cohn (2000) investigated the relationship between measures of health and eating habits. He collected data on cholesterol, blood pressure and weight. He also collected data on the eating habits of the subjects (that is, how many ounces of red meat, fish-dairy products and chocolate consumed per week). The result of the analysis revealed that only fish-dairy products and chocolate consumed per week related to the cholesterol, blood pressure and weight of the patients.

Ekezie et al (2013) carried out a research on Multivariate Multiple Linear Regression Model on the relationship between vital signs and social characteristics of patients using Federal Medical Center (F.M.C.), Owerri Imo State, Nigeria as a case study. Three response variables: Systolic Blood Pressure, Temperature, Height and two predictor variables: Age, Sex of patients were used for the study. The statistical software used in the data analysis was the "SAS Version 9.2" package. The result of the analysis revealed that the Multivariate Multiple Linear Regression Model was adequate for the relationship between the variables: Systolic Blood Pressure, Temperature and Height of patients on one hand, and the two social characteristics:

Age and Sex on the other. A test of significance revealed that Age and Sex have influence on the Vital Signs. Following their results, they recommended that researchers should carry out a similar work, making the predictor variables up to four to compare result.

Oguebu (2011) carried out a research work on a multivariate linear regression study of confectionery products; a case study of cheese balls produced by Zubix International Company Ogidi between January 2010 and March 2011. The researcher used Average weight and Bulk Density of cheese balls as the dependent variables and oven temperature, moisture content before extrusion and moisture content after extrusion as the predictor variables. The result of the researcher's analysis revealed that only oven temperature is significant for the Multivariate Linear Regression Model. In line with the researcher's findings, he made the following recommendations to help improve the quality of cheese balls produced by the manufacturer: "oven temperature at 188.57⁰c should be selected to produce optimum levels of Average weight and bulk density", "the producer should adopt better methods of data collection such that more data would be accessible for future work", "Data should be collected in larger dimensions to accommodate more variables".

It is obvious that so many researches carried out on health have not been able to relate it to anthropometric dimensions to examine their effects. Hence, this paper therefore tends to investigate the influence of some anthropometric dimensions on the measures of health of primary school pupils in Imo State Nigeria, using Temperature, pulse and weight as the measures of health, and age and height as the anthropometric dimensions.

MULTIVARIATE MULTIPLE REGRESSION

In this section, we consider the problem of modeling the relationship between m responses, Y_1, Y_2, \dots, Y_m , and a single set of predictor variables, Z_1, Z_2, \dots, Z_r (Johnson and Wichern;1992). Each response is assumed to follow its own regression model so that

$$\left. \begin{aligned} Y_1 &= \beta_{01} + \beta_{11}Z_1 + \beta_{21}Z_2 + \dots + \beta_{r1}Z_r + \varepsilon_1 \\ Y_2 &= \beta_{02} + \beta_{12}Z_1 + \beta_{22}Z_2 + \dots + \beta_{r2}Z_r + \varepsilon_2 \\ Y_3 &= \beta_{03} + \beta_{13}Z_1 + \beta_{23}Z_2 + \dots + \beta_{r3}Z_r + \varepsilon_3 \\ &\vdots \\ Y_m &= \beta_{0m} + \beta_{1m}Z_1 + \beta_{2m}Z_2 + \dots + \beta_{rm}Z_r + \varepsilon_m \end{aligned} \right\} (1)$$

The error term $\varepsilon = [\varepsilon_1 \varepsilon_2 \varepsilon_3 \dots \varepsilon_m]'$ has $E(\varepsilon) = 0$ and $\text{Var}(\varepsilon) = \varepsilon$. Thus, the error terms associated with different responses may be correlated.

To establish notation conforming to the classical linear regression model, let $[Z_{j0}, Z_{j1}, \dots, Z_{jr}]$ denote the values

of the predictor variables for the j th trial, let $Y_j = [Y_{j1}, Y_{j2}, \dots, Y_{jm}]'$ be the responses, and let $\varepsilon_j = [\varepsilon_{j1} \ \varepsilon_{j2} \ \varepsilon_{j3} \ \dots \ \varepsilon_{jm}]'$ be the errors. In matrix notation, the design matrix

$$Z = \begin{bmatrix} Z_{10} & Z_{11} & Z_{12} & \dots & Z_{1r} \\ Z_{20} & Z_{21} & Z_{22} & \dots & Z_{2r} \\ Z_{30} & Z_{31} & Z_{32} & \dots & Z_{3r} \\ \vdots & \vdots & \vdots & \dots & \vdots \\ Z_{n0} & Z_{n1} & Z_{n2} & \dots & Z_{nr} \end{bmatrix}$$

is the same as that for the single response regression model. The other matrix quantities have multivariate counterparts. Set

$$Y = \begin{bmatrix} Y_{11} & Y_{12} & Y_{13} & \dots & Y_{1m} \\ Y_{21} & Y_{22} & Y_{23} & \dots & Y_{2m} \\ Y_{31} & Y_{32} & Y_{33} & \dots & Y_{3m} \\ \vdots & \vdots & \vdots & \dots & \vdots \\ Y_{n1} & Y_{n2} & Y_{n3} & \dots & Y_{nm} \end{bmatrix} = [Y_{(1)} \ : \ Y_{(2)} \ : \ Y_{(3)} \ : \ \dots \ : \ Y_{(m)}]$$

$$\beta = \begin{bmatrix} \beta_{01} & \beta_{02} & \beta_{03} & \dots & \beta_{0m} \\ \beta_{11} & \beta_{12} & \beta_{13} & \dots & \beta_{1m} \\ \beta_{21} & \beta_{22} & \beta_{23} & \dots & \beta_{2m} \\ \vdots & \vdots & \vdots & \dots & \vdots \\ \beta_{n1} & \beta_{n2} & \beta_{n3} & \dots & \beta_{nm} \end{bmatrix} = [\beta_{(1)} \ : \ \beta_{(2)} \ : \ \beta_{(3)} \ : \ \dots \ : \ \beta_{(m)}]$$

and

$$\varepsilon = \begin{bmatrix} \varepsilon_{11} & \varepsilon_{12} & \varepsilon_{13} & \dots & \varepsilon_{1m} \\ \varepsilon_{21} & \varepsilon_{22} & \varepsilon_{23} & \dots & \varepsilon_{2m} \\ \varepsilon_{31} & \varepsilon_{32} & \varepsilon_{33} & \dots & \varepsilon_{3m} \\ \vdots & \vdots & \vdots & \dots & \vdots \\ \varepsilon_{n1} & \varepsilon_{n2} & \varepsilon_{n3} & \dots & \varepsilon_{nm} \end{bmatrix} = [\varepsilon_{(1)} \ : \ \varepsilon_{(2)} \ : \ \varepsilon_{(3)} \ : \ \dots \ : \ \varepsilon_{(m)}] = \begin{bmatrix} \varepsilon'_1 \\ \vdots \\ \varepsilon'_2 \\ \vdots \\ \varepsilon'_3 \\ \vdots \\ \vdots \\ \vdots \\ \varepsilon'_n \end{bmatrix}$$

The multivariate linear regression model is

$$Y = Z\beta + \varepsilon \quad (2)$$

with $E(\varepsilon_i) = 0$; $Cov[\varepsilon_{(i)}, \varepsilon_{(k)}] = \sigma_{ik} I$ $i, k = 1, 2, 3, \dots, m$

The m observations on the j th trial have covariance matrix $\Sigma = \{\sigma_{ik}\}$, but observations from different trials are uncorrelated. Here β and σ_{ik} are unknown parameters; the design matrix Z has j th row $[Z_{j0}, Z_{j1}, Z_{j2}, \dots, Z_{jr}]$.

The i th response $Y_{(i)}$ follows the linear regression model

$$Y_{(i)} = Z\beta_{(i)} + \varepsilon_{(i)}, \quad i = 1, 2, 3, \dots, m \quad (3)$$

with $Cov(\varepsilon_{(i)}) = \sigma_{ii} I$. However, the errors for different responses on the same trial can be correlated.

Given the outcomes Y and the values of the predictor variables Z with full column rank, we determine the least squares estimates $\hat{\beta}_{(i)}$ exclusively from the observations, $Y_{(i)}$, on the i th response. Conforming to the single-response solution, we take

$$\hat{\beta}_{(i)} = (Z'Z)^{-1} Z'Y_{(i)} \quad (4)$$

Collecting these univariate least squares estimates produce

$$\hat{\beta} = \begin{bmatrix} \hat{\beta}_{(1)} & \vdots & \hat{\beta}_{(2)} & \vdots & \hat{\beta}_{(3)} & \vdots & \dots & \vdots & \hat{\beta}_{(m)} \end{bmatrix} = (Z'Z)^{-1} Z' \begin{bmatrix} Y_{(1)} \\ \vdots \\ Y_{(2)} \\ \vdots \\ Y_{(3)} \\ \vdots \\ \dots \\ \vdots \\ Y_{(m)} \end{bmatrix}$$

or

$$\hat{\beta} = (Z'Z)^{-1} Z'Y \quad (5)$$

For any choice of parameters say

$$B = \begin{bmatrix} b_{(1)} & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & b_{(2)} & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & b_{(3)} & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & b_{(m)} \end{bmatrix}$$

, the matrix of errors is

$Y - ZB$. The error sum of squares and cross-products matrix is

$$(Y - ZB)'(Y - ZB) = \begin{bmatrix} (Y_{(1)} - Zb_{(1)})'(Y_{(1)} - Zb_{(1)}) \cdot (Y_{(1)} - Zb_{(1)})'(Y_{(m)} - Zb_{(m)}) \\ \vdots \\ (Y_{(m)} - Zb_{(m)})'(Y_{(1)} - Zb_{(1)}) \cdot (Y_{(m)} - Zb_{(m)})'(Y_{(m)} - Zb_{(m)}) \end{bmatrix} \quad (6)$$

The selection $b_{(i)} = \hat{\beta}_{(i)}$ minimizes the i th diagonal sum of squares $(Y_{(i)} - Zb_{(i)})'(Y_{(i)} - Zb_{(i)})$. Consequently, $\text{tr}[(Y - ZB)'(Y - ZB)]$ is minimized by the choice $B = \hat{\beta}$. Also, the generalized variance $|(Y - ZB)'(Y - ZB)|$ is minimized by the least squares estimates $\hat{\beta}$.

Then, using the least squares estimates $\hat{\beta}$, we can form the matrices of

$$\left. \begin{array}{l} \text{Predicted values : } \hat{Y} = Z\hat{\beta} = Z(Z'Z)^{-1}Z'Y \\ \text{Residuals : } \hat{\epsilon} = Y - \hat{Y} = [I - Z(Z'Z)^{-1}Z']Y \end{array} \right\} (7)$$

$$E = (\hat{\epsilon}) = 0 \text{ and } E\left(\frac{\hat{\epsilon}'\hat{\epsilon}}{(n-r-1)}\right) = \Sigma$$

The orthogonally conditions among the residuals, predicted values, and columns of Z, which hold in classical linear regression, hold in multivariate multiple regression.

They follow form $Z[I - Z(Z'Z)^{-1}Z'] = Z' - Z' = 0$

Specifically, $Z'\hat{\epsilon} = Z'[I - Z(Z'Z)^{-1}Z']Y = 0$ (8)

so the residuals $\hat{\epsilon}_{(i)}$ are perpendicular to the columns of Z. Also

$$\hat{Y}'\hat{\epsilon} = \hat{\beta}'Z'[I - Z(Z'Z)^{-1}Z']Y = 0$$
 (9)

Confirming that the predicted values $\hat{Y}_{(i)}$ are perpendicular to all residuals vectors $\hat{\epsilon}_{(k)}$.

Because $Y = \hat{Y} + \hat{\epsilon}$,

$$\hat{Y}_1 = 35.41582 + 0.089521 Z_1 - 0.001288 Z_2$$

$$Y'Y = (\hat{Y} + \hat{\epsilon})'(\hat{Y} + \hat{\epsilon}) = \hat{Y}'\hat{Y} + \hat{\epsilon}'\hat{\epsilon} + 0 + 0'$$

or

$$Y'Y = \hat{Y}'\hat{Y} + \hat{\epsilon}'\hat{\epsilon}$$

(total sum of squares) = (predicted sum of squares and cross-products) + (residuals (error) sum of squares and cross-products) ... (10)

The residual sum of squares and cross-products can also be written as

$$\hat{\epsilon}'\hat{\epsilon} = Y'Y - \hat{Y}'\hat{Y} = Y'Y - \hat{\beta}'Z'Z\hat{\beta}$$
 (11)

For the least squares estimator

$$\hat{\beta} = \begin{bmatrix} \hat{\beta}_{(1)} & \vdots & \hat{\beta}_{(2)} & \vdots & \hat{\beta}_{(3)} & \vdots & \dots & \vdots & \hat{\beta}_{(m)} \end{bmatrix}$$

determined under the multivariate multiple regression model with full rank $(Z) = r + 1 < n$

$$E(\hat{\beta}_{(i)}) = \beta_{(i)} \text{ or } E(\hat{\beta}) = \beta$$

and

$$\text{Cov}(\hat{\beta}_{(i)}, \hat{\beta}_{(k)}) = \sigma_{ik} (Z'Z)^{-1}, i, k = 1, 2, \dots, r + 1$$

The residuals

$$\hat{\epsilon} = \begin{bmatrix} \hat{\epsilon}_{(1)} & \vdots & \hat{\epsilon}_{(2)} & \vdots & \hat{\epsilon}_{(3)} & \vdots & \dots & \vdots & \hat{\epsilon}_{(m)} \end{bmatrix} = Y - Z\hat{\beta}$$

Satisfy $E(\hat{\epsilon}_{(i)}) = 0$ and

$$E(\hat{\epsilon}'_{(i)}, \hat{\epsilon}_{(k)}) = (n - r - 1)\sigma_{ik} \text{ so}$$

DATA COLLECTION

The data for this research were collected from Community Primary School Lagwa, Okwuato Aboh Mbaise L.G.A, Imo State Nigeria with the help of the nurses who agreed to assist in a five days exercise. The exercise centered on the measurement of their heights with a meter rule, and collection of their respective ages via direct observation and interview. A total number of 159 respondents (Pupils) were used for this study. The weight was measured using the weighing machine, and their respective pulse and temperature were examined using the necessary apparatus provided by the nurses.

DATA ANALYSIS

In this section, we shall use the statistical techniques discussed in this paper to analyze the data collected for this research. For easier computation, the statistical software package known as "R version 3.0.1" shall be used to write an appropriate code for the analysis.

From the R software output in the Appendix, we have

$$\hat{Y}_2 = 100.58284 + 0.42090 Z_1 - 0.02510 Z_2$$

$$\hat{Y}_3 = 20.87378 + 0.58551 Z_1 - 0.05582 Z_2$$

This means that

$$\hat{\beta}_1 = \begin{bmatrix} 35.41582 \\ 0.089521 \\ -0.001288 \end{bmatrix}$$

$$\hat{\beta}_2 = \begin{bmatrix} 100.58284 \\ 0.42090 \\ -0.02510 \end{bmatrix} \quad \hat{\beta}_3 = \begin{bmatrix} 20.87378 \\ 0.58551 \\ -0.05582 \end{bmatrix}$$

TEST OF SIGNIFICANCE FOR THE REGRESSION PARAMETERS

From the ANOVA table in the Appendix, the p-value (0.004197) is less than 0.05. Hence, there is enough evidence to reject the null hypothesis and conclude that the anthropometric dimensions jointly contribute to the measures of health of primary school pupils.

TEST OF SIGNIFICANCE FOR THE INDIVIDUAL REGRESSION PARAMETERS

It is necessary to conduct a significance test on the individual parameters to know the predictor variable that caused the rejection of the null hypothesis in the Joint test. From the Appendix, it can be observed that the p-values for height for temperature, pulse and weight are greater than 0.05, which means that height is insignificant. On the other hand, the p-values for age for temperature, pulse and weight are less than 0.05 meaning that age is significant.

Table 1: Data on Measures of Health and Anthropometric Dimensions of Primary School Pupils

S/N	Measures of Health (Dependent Variables)			Anthropometric Dimensions (Independent variables)	
	Temp	Pulse	Weight	Age	Height
1	35.4	105	27	8	54.6
2	35.7	104	26	9	57.4
3	35.8	100	26	8	58.9
4	35.8	98	30	9	62.3
5	36.8	102	29	9	57.5
6	36	103	28	10	56.1
7	36.4	104	27	10	62.6
8	37.1	98	40	10	56
9	35.5	102	30	8	57.6
10	36.7	103	28	9	54.6
11	35.7	104	34	9	57.4
12	34.2	103	31	8	56.8
13	35.6	104	29	10	59.6
14	37.8	102	32	9	54.8
15	34.2	102	25	8	54.2
16	35.6	99	28	9	50.6
17	36.4	98	36	9	60.2
18	36.7	103	25	9	47.8
19	36.7	105	24	10	60.4
20	35.7	103	25	9	51.6
21	35.7	104	30	9	55
22	38.9	104	30	10	62.4
23	36.8	105	27	9	53.5
24	36.7	106	29	9	48.2
25	36.9	104	31	9	56.2
26	36.7	104	28	8	61.7
27	35.5	103	24	10	48.2
28	35.8	102	27	8	58.8
29	35.7	102	26	8	53.2
30	35.6	103	25	10	61.4
31	37.3	104	30	11	46.4
32	36.5	103	32	11	41.2
33	36.4	110	29	10	62.3
34	35.6	101	30	10	57.6
35	35.7	108	34	11	52.4
36	35.6	105	35	11	58.6
37	35.2	104	25	11	50.1
38	36.8	107	26	12	56.2
39	36.9	103	41	11	59.4
40	36.8	103	39	10	48.6
41	35.8	105	27	10	51.6
42	35.7	103	26	11	54
43	36.7	104	30	11	56.8
44	35.8	103	31	10	52.6
45	36.7	102	28	10	51.8
46	35.7	106	26	11	43.8
47	37.2	102	23	10	47.8
48	36.7	104	27	11	51.6
49	36.4	107	29	10	52.6
50	35.8	103	31	11	51.8
51	36.7	107	25	10	54.1
52	35.7	102	28	10	53.9
53	35.7	103	32	10	58.8
54	35.8	104	29	11	60.2
55	37.3	98	31	11	54.1
56	36.7	102	33	10	54.8
57	35.7	96	31	10	55
58	35.6	92	30	10	54.1
59	36.7	103	30	11	53.9
60	36.7	104	30	10	58.8
61	35.7	103	24	10	60.2
62	35.7	103	29	10	57.2
63	38.9	108	31	10	49.6
64	36.8	100	28	10	53.8
65	36.7	100	24	11	56.9
66	36.9	105	27	11	59.3
67	36.7	102	26	11	62.8
68	35.5	104	30	11	54.3
69	35.8	104	31	11	62.6
70	35.7	106	28	10	56
71	35.6	103	26	11	57.6
72	37.3	107	23	11	58
73	36.5	104	27	10	63.8
74	36.4	102	29	10	62.6
75	35.6	102	31	10	54.1
76	35.7	99	25	11	53.9
77	35.6	98	28	11	58.8
78	35.2	103	32	10	57.4
79	36.7	105	27	12	55.2
80	36.8	103	26	13	54.8
81	35.8	104	30	12	54.1
82	36.8	104	37	12	53.9
83	35.8	105	39	12	58.8
84	37.3	106	35	12	60.2
85	35.8	104	32	13	54.1
86	35.6	104	40	12	54.8
87	36.4	103	38	12	55
88	36.7	102	36	13	59.8
89	36.7	102	34	13	54.8
90	35.7	103	30	12	61.2
91	35.7	104	38	12	54.9
92	38.9	103	29	12	54.9
93	36.8	110	32	13	59.8
94	36.7	101	29	11	54.8
95	36.9	108	32	12	58.2
96	36.7	105	32	13	51.8
97	35.5	104	29	11	57.8
98	35.8	107	31	11	57
99	35.7	105	31	11	57.6
100	35.6	104	29	11	59.8
101	37.3	105	34	11	60.8
102	36.5	103	37	12	57.2
103	36.4	108	30	13	58
104	35.6	104	36	12	59.2
105	36.8	106	34	11	62.8
106	37.3	103	35	13	60.2
107	35.7	105	38	11	59.7
108	36.6	108	40	12	58.6
109	35.6	106	41	12	58.9
110	36.7	103	39	13	56.3
111	35.6	105	27	12	58.6
112	36.4	105	26	11	53.8
113	36.7	103	30	12	56.9
114	36.7	106	31	11	59.3
115	35.7	103	28	12	62.8
116	35.7	105	26	12	54.3
117	35.6	106	23	13	60.4
118	35.1	101	27	13	57.2
119	36.7	111	29	13	54.4
120	36.9	109	31	12	56.4
121	36.7	107	25	13	59.8
122	35.8	100	28	11	62.4
123	35.8	98	32	12	57.9
124	36.7	102	29	12	57.4
125	37.4	103	31	13	58.4
126	37.3	104	33	10	56.4
127	36.5	104	31	10	54.1
128	36.4	102	30	10	54.8
129	35.6	103	29	8	55
130	35.7	104	26	8	62.6
131	36.9	103	30	9	62.4
132	36.7	104	28	8	56.4
133	35.5	102	34	8	53.6
134	35.8	102	30	8	59.4
135	35.7	99	28	8	54
136	35.6	98	30	8	64.2
137	36.3	103	33	8	55
138	37.5	105	31	8	62.6
139	36.4	103	29	8	62.4
140	36.6	104	34	9	56.4
141	35.7	104	37	9	54.2
142	35.6	105	30	8	48.2
143	35.2	106	28	9	59
144	36.8	103	31	9	58.2
145	36.9	103	30	9	59.8
146	36.8	102	25	10	61.8
147	35.8	105	27	9	56.8
148	35.7	103	29	9	58.4
149	36.7	110	32	10	55.8
150	35.8	106	27	9	58.6
151	36.7	104	32	9	60.2
152	36.7	106	31	9	55.6
153	37.2	102	29	8	60.4
154	36.7	103	28	10	51.6
155	35.4	105	31	8	55
156	35.8	98	32	10	62.4
157	36.4	105	29	10	53.5
158	36.8	106	31	10	48.2
159	36.9	103	32	11	56.2

CONCLUSION

This paper has been able to set up a multivariate multiple regression model for the relationship between the three measures of health (Temperature, Pulse and Weight) of primary school pupils on one hand, and the two anthropometric dimensions (Age and Height) on the other hand. It has been concluded that the two anthropometric dimensions jointly contribute to the three measures of health. The analysis also revealed that only age determines the measures of health, while height does not contribute in the measures of health.

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APPENDIX

```
y=cbind(Temp,Pulse,Weight)
```

```
> z=cbind(Age,Height)
```

```
> Reg=lm(y~z)
```

```
> summary(reg)
```

```
> summary(Reg)
```

Response Temp :

Call:

```
lm(formula = Temp ~ z)
```

Residuals:

Min	1Q	Median	3Q	Maz
-1.8616	-0.5597	0.1531	0.4663	2.6700

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	35.415182	0.901328	39.29	<2e-16 ***
zAge	0.089521	0.039618	2.26	0.0252 *
zHeight	-0.001288	0.014262	-0.09	0.9282

$\hat{Y}_1 = 35.41582 + 0.089521 Z_1 - 0.001288 Z_2$ Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.7329 on 156 degrees of freedom

Multiple R-squared: 0.03172, Adjusted R-squared: 0.0193

F-statistic: 2.555 on 2 and 156 DF, p-value: 0.08095

Response Pulse :

Call:

```
lm(formula = Pulse ~ z)
```

Residuals:

Min	1Q	Median	3Q	Maz
-11.4337	-1.1881	0.0826	1.3877	6.7721

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	100.58284	3.22026	31.234	<2e-16 ***
zAge	0.42090	0.14155	2.974	0.00341 **

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```

zHeight      -0.02510      0.05096      -0.493  0.62294
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Residual standard error: 2.619 on 156 degrees of freedom
Multiple R-squared: 0.05483, Adjusted R-squared: 0.04271
F-statistic: 4.525 on 2 and 156 DF, p-value: 0.01229
Response Weight :
Call:
lm(formula = Weight ~ z)
Residuals:
  Min       1Q   Median       3Q      Max
-8.8567 -2.4680 -0.2118  1.7707 10.3701
Coefficients:
      Estimate      Std. Error      t value      Pr(>|t|)
(Intercept)  20.87378      4.71642      4.426 1.8e-05 ***
zAge         0.58551      0.20731      2.824 0.00536 **
zHeight      0.05582      0.07463      0.748 0.45564
---

```

```

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Residual standard error: 3.835 on 156 degrees of freedom
Multiple R-squared: 0.05219, Adjusted R-squared: 0.04004
F-statistic: 4.295 on 2 and 156 DF, p-value: 0.01528
> anova(Reg)
Analysis of Variance Table

```

	Df	Pillai	approx F	num Df	den Df	Pr(>F)
(Intercept)	1	0.99972	185562	3	154	< 2.2e-16
z	2	0.11805	3	6	310	0.004197
Residuals	156					

```

(Intercept) ***
z          **
Residuals
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
>

```

NUBIAN VERNACULAR ARCHITECTURE TECHNIQUE TO ENHANCE ECO-TOURISM IN EGYPT

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ABSTRACT

The purpose of the research is to investigate and analysis how Nubian building technology could be useful for redesign tourism resorts in Egypt. The paper discusses how to achieve sustainable development in tourism resorts in Egypt by strategies environmental sciences and natural resources, which presented by Nubian vernacular style where the culture of society has customs and traditions which withstood for the hundred years' test and was fundamentally suitable for the climate and local economy and social conditions such as the bases of ideological and religious depends on the self-limited resources. The research aims to extract the most important of those values and techniques in the construction to be the main principles and determinants in the design of tourist resorts in Egypt, especially the Red Sea and the arid areas , it can be configured architectural identity belong to the local environment in Egypt is characterized as sustainability of increasing the passive cooling system in residential buildings and in turn, thermal comfort, least energy consumption and achieve the sustainable development.

KEYWORDS: nubian houses, vernacular architecture, conservation, natural resources, sustainable development,

INTRODUCTION

Preserving the Egyptian architectural identity thoroughbreds of private old Nubian vernacular architecture and the content of the beauty, culture and traditions and linked closely to the natural environment building materials harsh climate is warm and struggling passive design. Tries this paper through the work of a comparative analysis between the two buildings in the same area in west *Seheil* in Aswan, one of them holds all the former qualities mentioned values, culture and belonging the identity of Nubian cultural architectural distinct (Clay Brick walls) by vaulted or domes covered, and the other building contemporary Nubian architecture, (built up by fire brick material and reinforced concrete roofing), trying to convergence of the inherent shape and some design elements and colors, but lack the hot dry climate resistance that region, which requires climatic processors and use energy-consuming cooling devices which affect a change in the architectural identity Nubian thoroughbreds .

OBJECTIVE OF THE STUDY

The aim of this paper is to revive to design solutions that were provided by old vernacular Nubian Architecture. So as to achieve energy efficiency in building and preserve natural resources through natural ventilation and thermal efficiency of materials and techniques.

HYPOTHESIS

The old vernacular Nubian Architecture built by raw brick, much better than new Nubian Architecture using fire brick, vaulting or reinforced concrete roofs.

The paper studies the effect of thermo-physical properties of the building materials on saving energy, regarding (walls/ roof) as the main construction element having an important role in the thermal performance of buildings and in saving energy.

STATEMENT OF THE PROBLEM

In Egypt the basic materials for construction in various regions is reinforced concrete and fire bricks which increase the heat gain of the building causing environmental problems. In addition to the loss of architectural identity of old vernacular Nubian Architecture.

The Tools

Through a field study of the site and conduct discussions and surveys of the views of residents and measuring the ability of mud buildings and concrete to adapt to the surrounding environment using devices (Hobo Data Loggers), HOBO U12Temp/RH/Light/Ext(Onset computer, 2015).

The use of mathematical models and simulation tools is often presented as the most credible approach to model the comportment of a building and predict the heating consumption, in a global vision of sustainability.

Different field measurements and theoretical studies were carried out to investigate the thermal performance of the traditional houses under the effect of local external climatic conditions of Aswan region, Egypt. Theoretical and experimental study was carried out to

investigate the thermal performance of some traditional building built there.

Another study shows that using Nubian sandstone in wall alone is not favorable and didn't valid thermal comfort due to the high storage, high thermal mass and thermal conductivity of it, also shows that domes or vault built from fire brick mortar cement and reinforced concrete beams. Without using material with special thermal characteristics is not the solution. (Khalil, Mervat, 2012).

The thermal performance of exposed composed roofs in very hot dry desert region in (Toshky) region, Egypt was carried out and investigate that; the construction roof systems (insulated concrete, double, planted and

un-insulated concrete roofs) valid an indoor air temperature thermal damping of about 96%, 90%, 89%, and 76% respectively, the green roof gives the lower indoor air temperature, due to the evaporation process. The thermal performance of building envelope in very hot dry desert region in Egypt (Toshka Region) was carried out and investigate that; the indoor air temperature of hollow clay brick and light sand block are nearest to the upper limit of thermal comfort. (Khalil, Mervat, 2012).

So the main factors affecting on studying the thermal performance of building are; the outdoor climatic condition (outdoor air temperature, relative humidity and solar intensity).

Table 1 shows the climate data for Aswan, Egypt.

The highest record temperature was 51 °C (124 °F) on May 22, 1973 and the lowest record temperature was -2 °C (28 °F) on January 5, 1989.²²

Climate data for Aswan, Egypt													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	33.3 (91.9)	39.0 (102.2)	44.0 (111.2)	45.3 (113.5)	48.4 (119.1)	49.5 (121.3)	48.8 (116.2)	48.3 (118.9)	46.7 (116.1)	44.8 (112.6)	39.3 (102.7)	35.4 (95.7)	49.5 (121.3)
Average high °C (°F)	32.9 (73.2)	35.2 (77.4)	39.5 (85.1)	34.8 (84.8)	38.9 (102)	41.4 (106.5)	41.1 (106)	40.9 (105.6)	39.2 (102.7)	36.9 (88.4)	30.1 (86.4)	24.3 (75.7)	31.6 (82.3)
Daily mean °C (°F)	15.3 (59.5)	17.5 (63.5)	21.8 (71.2)	27 (81)	31.4 (88.5)	33.5 (92.3)	33.8 (92.8)	33.2 (91.8)	32.8 (91)	27.7 (81.9)	21.5 (70.7)	16.9 (62.4)	25.9 (78.6)
Average low °C (°F)	8.7 (47.7)	10.2 (50.4)	12.8 (56.8)	19.9 (68)	22 (72)	25.2 (77.4)	26 (79)	25.8 (78.4)	24 (75)	20.6 (69.1)	15.0 (59)	10.5 (50.9)	18.5 (65.3)
Record low °C (°F)	1.6 (34.9)	1.0 (33.8)	4.8 (40.7)	7.5 (45.5)	13.6 (56.5)	16.4 (61.5)	20.2 (68.4)	19.8 (67.6)	15.8 (60.4)	11.8 (53.2)	6.5 (43.7)	3.2 (37.8)	1.0 (33.8)
Rainfall mm (inches)	0 (0)	0 (0)	0 (0)	0 (0)	0.1 (0.004)	0 (0)	0 (0)	0.7 (0.028)	0 (0)	0.6 (0.024)	0 (0)	0 (0)	1.4 (0.055)
Avg. rainy days (≥ 0.01 mm)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5	0.0	0.25	0.0	0.0	0.85
% humidity	40	32	24	19	17	16	18	21	22	27	36	42	28.2
Mean monthly sunshine hours	298.2	281.1	321.6	310.1	346.8	363.2	374.0	359.6	288.3	214.0	289.0	289.1	3,862.8

Table 1: The upper / lower limit temperature of the comfort zone during the summer season in Aswan region. Source: World Meteorological Organization, EGY_Aswan.624140_ETMY.ddy

Therefore, this paper to investigate of the thermal performance of buildings in old vernacular Nubian Architecture.

METHODOLOGY

In order to see how this concept of old Nubian Vernacular cooling system can influence Architectural practice, we have studied it through the different official texts, the three principles as proposed by:

1- The first principle how to integrating the economic, social, political and environmental dimension together

to Preserving of the culture, customs , traditions and the architectural identity for Nubian Architecture .

2- Reduce consumer energy consumption the concerns over global warming and the reduction of high emissions of greenhouse gases has become a thrust for exploitation of passive strategies for indoor thermal comfort.

3- Preservation of the environment and the identity of Nubian Vernacular Architecture.

HISTORY OF NUBIANS

In Egypt the representatives of the first group are the (Kunuz) occupying the northern region of Nubia, while the (Fadigga) group who dwell in the southern region of Egyptian Nubia.(El-Hakim, Omar, 2008).The general features and factors in Nubian layout of the village (*Nagu*) in North *Kanuz* district west *Seheil* Island, see

fig(1). The Dwellings extended along the Nile at irregular intervals in a staggered line more or less parallel to the river following the natural contours of the ground. The Orientation throughout Nubia, principal entrances to the houses faced the river, whether they

were on the west banks of the Nile. On approaching the front of a dwelling, towards the main entrance and threshold, a person had his back to the river (Riad& Abdel Rasoul, 2007).



Figure 1: Seheil Island in west Aswan (Source: Researcher, 2015)

Nubian vernacular architecture continued to be ignored by the rest of the world until 1963, when the region was to be flooded for the third time. (The first was after the British built the original dam, known as the *khazan* Aswan in 1898. The second time the dam was elevated in 1933, and the third time was the construction of the

High Dam itself in 1964). Then, they rebuilt all their villages on their own, with their own precarious means, giving them a chance to show the world potentialities of man when he is given the chance (Hssan Fathy). (El-Hakim, Omar,2008). In Fig(2) shown some Architectural drawing for Nubian houses built after 1964.

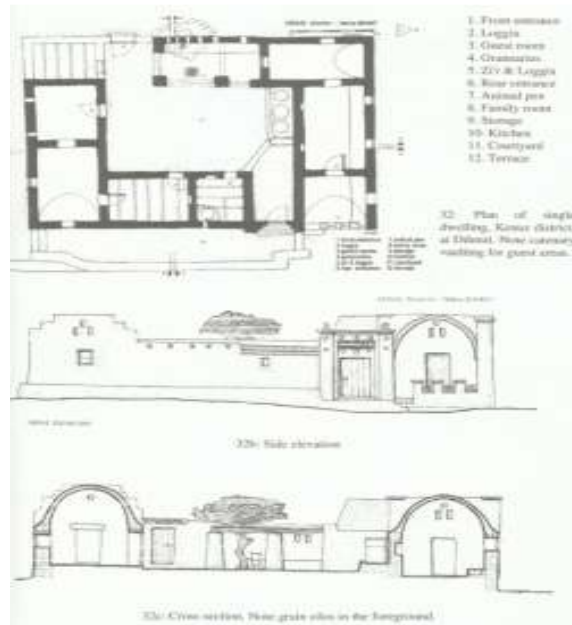
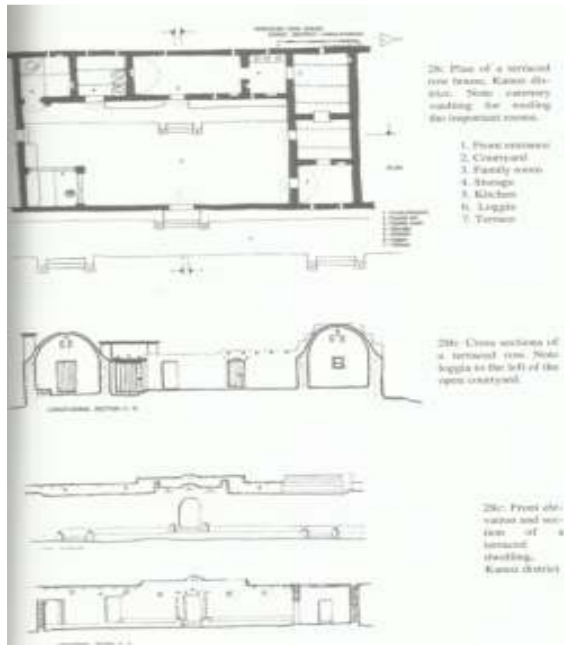


Figure2: Old Nubian Vernacular houses. Source: El-Hakim, Omar, 2008.

Traditional Nubian Housing Components Contemporary

Most of the houses were built in the form of a rectangle with an area roughly from 200 to 1000 m², it depends on the site and topography, most of houses in west *Seheil* attached and smaller than houses in west Aswan and the status of occupancy it's consists of the following:

1. The main entrance has formations that distinguish it from the rest of the house, in most cases leads to an open courtyard mediates the house, if the house area is relatively small becomes the majority of the yard shaded, and there are a small side entrance used especially for women and opens the inner courtyard directly (Elhabashi, Alaa, 2014)

2. Mandara is the guest room, located next to the main entrance and opens the inner courtyard right inside the house (Elhabashi,Alaa, 2014)
3. The Courtyard of the house opens on all rooms of the house and carpeted floor with sand for sitting.
4. Bed Rooms located in the sea side of the house and opens its doors to the main courtyard and opened her small ventilation window down the vault attract the air from inside the courtyard into the rooms.

5. Kitchen: There is next to the rooms and mostly consists of two rooms the roof covered by domes hanging up in the middle Tray (Meshlaa) serves as the refrigerator and on the reservation. , in outside the conventional oven Nubian who call (Duka), plus balconies which is about (Silos) built of mud, height about 40 cm builds upon (walls) to store the grain, dates and rest all food stuff. See fig (3).

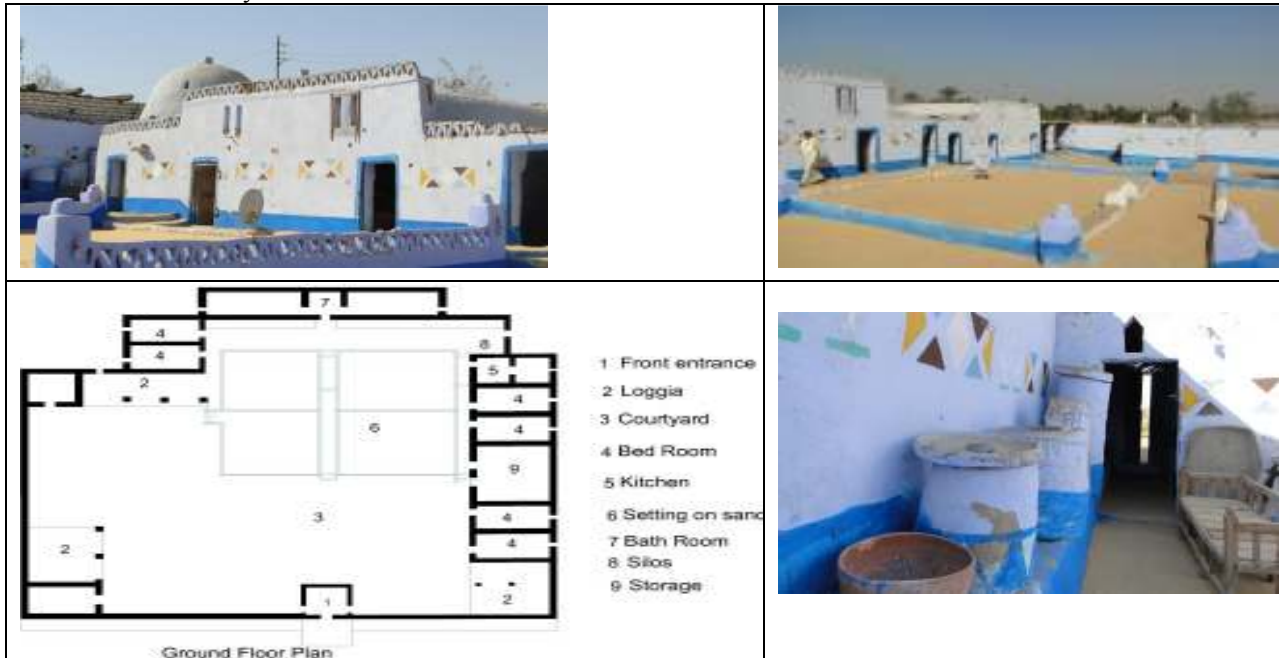


Figure3: Old Nubian house renewed used to host tourists in west Aswan
 Source: Researcher, 2015.

Topped (Aladrawi) full length of the interface with heights ranging and topped with cornices and triangle voids, and appeared on both sides of the entrance Photos mural is believed to be to protect the building from intruders, and most of the interfaces deaf only entrance door openings. All the walls of the house interior and exterior has been painted blanks Jerry white, but whites

yellow exterior color Ocean bottom walls of the facade of the building is nearly the color of the earth's natural color, as I use blue and green for some Parts of the interior walls and windows, and there are interesting wall drawings that express their habit and beliefs, which were represented in Feel inside and outside houses, such as palm trees, birds and crocodiles. See fig 4



Figure4: Front entrance Nubian house in *Seheil* Island & west Aswan, Source: Researcher, 2015.

CASE STUDY

Through a field study of the island of *Soheil* village (west *Soheil*) and village (west of Aswan). Has been selected one of the traditional homes of the study and

analysis, and the house is owned and inhabited by Haj / Ahmed Hassan and his family, and is located in one of the island *Soheil* ancient Nubian villages that is located south of the city of Aswan, and still retain the character

and identity. That was built on the old Nubian style and using traditional building materials, home was built before displacement suffered by Nubians, and the owner of the house management and activation of tourism trips, as the island has become a popular destination for tourists to get to know the rest of the social, cultural and artistic heritage. And neighbored by other dwelling for the same owner and the same direction and is divided into two parts, one on the old style and the other half newly built red brick and concrete ceiling.

The East Room overlooking the Nile for both two houses carry the same direction and size and different job, one with mud and other brick and concrete roof of the two houses, so as to make a comparison between them to measure temperature, humidity and carbon dioxide, and the severity of Luminosity. This paper explore the effects of indoor thermal conditions in a tradition Nubian house residence found in the hot

regions in Aswan (west Seheil) & (west Aswan) in Egypt. The design theme is centred towards an explanation of architectural concepts and principles of the traditional and Vernacular Nubian house as a source of deriving passive design strategies. Field investigation reveals a significant correlation between wall temperature and indoor air temperature. Airflow behaviours are sufficient to modify indoor thermal conditions to achieve comfortable environments. Furthermore the experiments will be on two types of houses.

The experiment Comparison between two different types of houses Nubian clay house with raw brick vaulting & Nubian fire brick and reinforced concrete roof slab semi attached each other see fig(5). All of them have the same characters and function configurations and Nubian features.

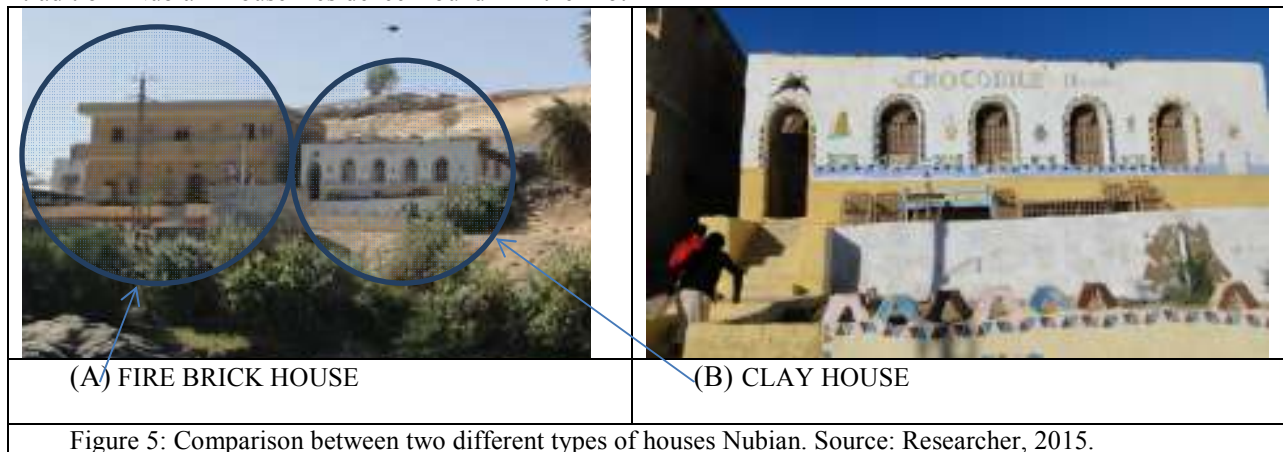
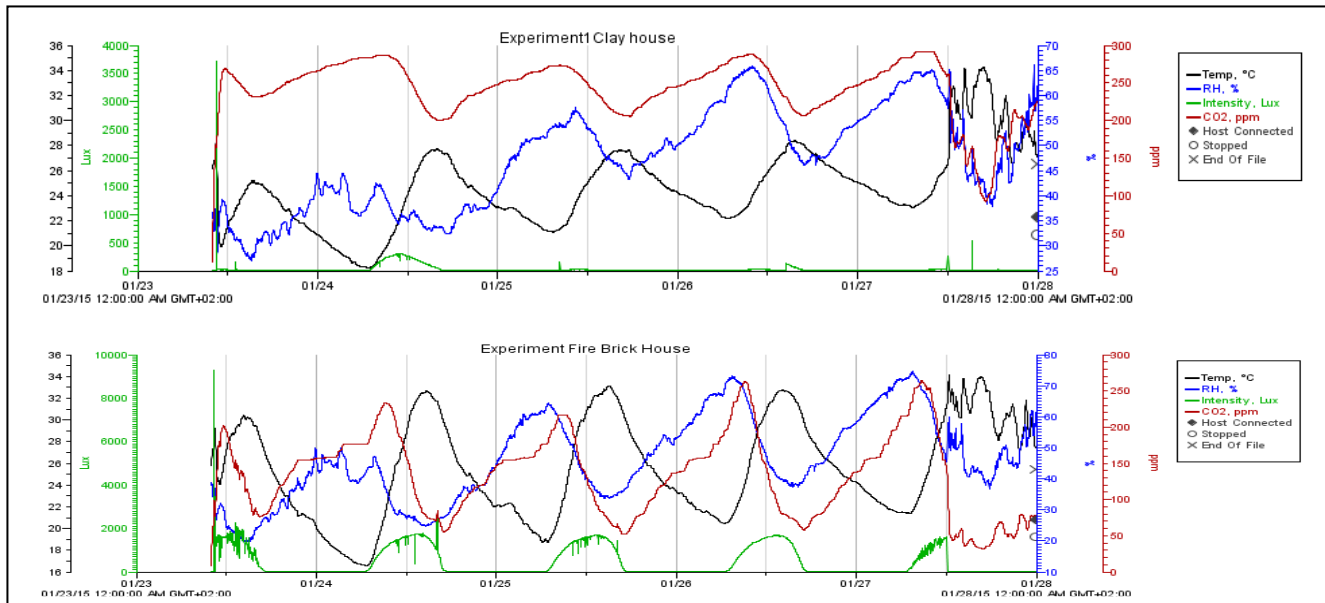


Figure 5: Comparison between two different types of houses Nubian. Source: Researcher, 2015.

This experiment to determine the ability of passive design for thermal comfort in both houses by using

devices (Hobo Data Loggers), U12Temp/RH/Light/Ext. (Onset computer, 2015)



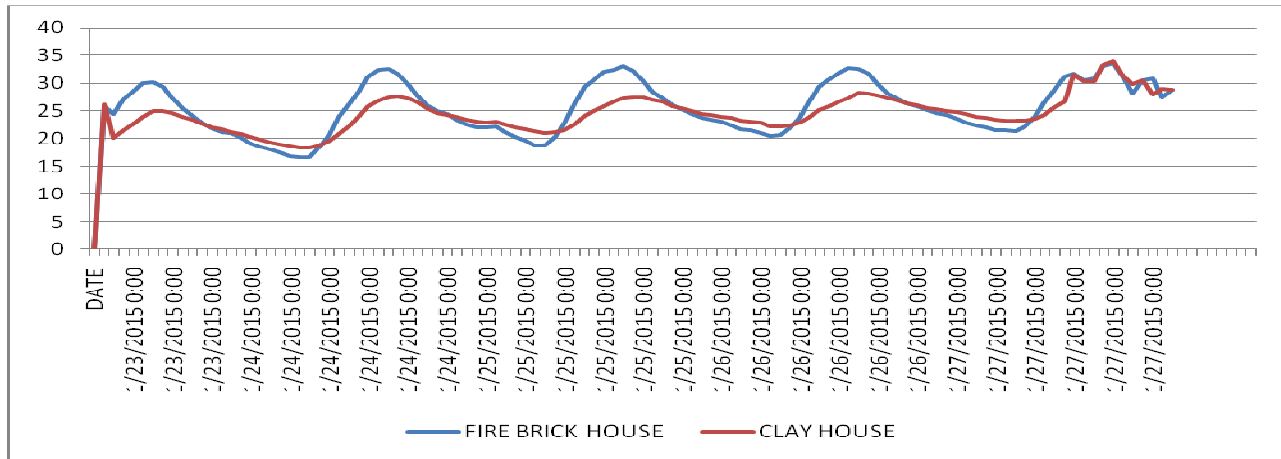


Figure 6: Comparison between measured and estimated indoor air temperature-humidity - Light Illuminate- Co²
Resource: (Hobo Data Loggers), U12Temp.

Table 4: Comparison of internal wall surface temperature for types A & B. Resource: (Hobo Data Loggers), U12Temp

	DATE	HOUR	(A) FIRE BRICK HOUSE				(B) CLAY HOUSE			
			TEMP	RH	ILLUM	CO2	TEMP	RH	ILLUM	CO2
1	1/23/2015	3:00 PM	30.142	20.26	894.8	101	24.992	27.621	11.8	233
2	1/24/2015	6:00 AM	16.677	40.035	11.8	177	18.295	36.681	11.8	283
3	1/24/2015	3:00 PM	32.587	25.251	1,525.50	74	27.579	33.492	98.5	208
4	1/25/2015	7:00 AM	18.818	64.159	98.5	182	21.127	53.303	11.8	273
5	1/26/2015	3:00 PM	33.105	33.787	1,446.70	71	27.284	47.197	11.8	216
6	1/26/2015	6:00 AM	20.555	67.225	11.8	186	22.321	58.8	11.8	274
7	1/27/2015	2:00 PM	32.691	39.773	1,651.60	81	27.358	54.721	19.7	234
8	1/27/2015	7:00 AM	21.39	72.786	122.2	219	23.208	62.941	11.8	284
TEMP= Temperature			RH= Relative Humidity				ILLUM= Light Illuminate			

ANALYSIS OF RESULTS

Thermal Mass

The hourly wall surface temperature of the entrances, courtyard and internal walls (all internal walls in each zone were monitored and averaged for a mean value) were compared with external walls. Thus, the best

thermal performance type house (A) and the worst thermal performance type house (B). The diurnal temperature range (DTR) is the difference between the daily maximum and minimum temperature. Through the table, through the table, we find an increase in temperatures (DTR), Specials in type (A) more than 50, and the time lag longest in time (B) which confirms the ability of the thermal insulation of clay house is much higher than buildings in fire brick.

RELATIVE INDEX EVALUATION

Modification of Indoor Air Temperature While almost uniform ambient conditions exist, the presence of different thermal conditions within the courtyard and interior zones would be the impact of different envelope configurations, which resulted diversity in airflow characteristics. Furthermore, is effective in modifying the thermal capacity of the high thermal mass building envelope, this is shown by Relative Humidity high in daily peak time of type (B) daily than (A), and vice versa for the night time lag peak time.

- Nubian clay house mud materials and raw brick vaulting which is based on the use of passive approaches in achieving maximum thermal comfort without the use of cooling or heating devices, which in turn consume energy Electric enormous.

CONCLUSIONS

- ❖ Fire brick construction and Reinforced concrete are displayed spread all over Egypt, especially along the coast beach Resorts, which is supposed protected areas or compatible with the environment due to environmental studies that offer EIA which materials cannot be recycled as well as consume energy due to the weakness of their thermal insulation. Knowing that some of the resorts used architectural elements and some features of Nubian Architecture but still not eco-friendly due to the use of concrete and fire brick, such as El Gouna resort in Hurghada.
- ❖ Construction of clay and silt has become a rare phenomenon of private construction in those areas due to the lack of availability of Nile silt, especially after the construction of the High Dam, the dam blocking the silt is not authorized to extract as well as protects the soles of the dam to prevent razing farmland. Note this type of the construction is environmentally compatible and the material can be recycled and has a high capacity for thermal insulation and achieve thermal comfort warm climate area.
- ❖ Preservation those architectural and environmental heritage, as well as crafts, social and cultural from extinction, which represents the value of the Egyptian environment value.
- ❖ There is no doubt that eco-tourism beach resorts must be eco- friendly buildings and building materials can be recycled, in addition to the tourists turn to our country to looking for the natural environment and the vernacular culture and architecture such as Gopher resort in Siwa in arid region in Egypt. See fig (7).



Figure 6: Photos for gopher resort in Siwa Egypt.
Resource: www.siwashaliresort.com.

RECOMMENDATION

Recommend using these unique and good techniques, which express the identity of the place and of great ability to reduce the energy lost to design of rural and arid areas, which is in the role of development and particularly in these paper to design of tourist resorts which represent a small sector comparing with a large public housing sector such as that sector have an environmental value for tourism development in Egypt. It is a natural environment areas must be protected and preserved according to the environmental considerations, and is considered a strong attractive point for eco-tourism in Egypt, that may be a reason to revive and spread of this types of buildings in all Egypt in the future.

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Design Innovation Challenges and Coping Strategies of Sustainable Apparel Product Development among Fashion Designers in Uyo, Nigeria

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ABSTRACT

The purpose of this study was to examine the design innovation challenges encountered in the process of sustainable apparel product development and the strategies adopted by the fashion designers to cope with the challenges. One research question and one hypothesis guided the study. Using a descriptive survey design, convenient sampling technique was used to select 49 out of 117 fashion designers in Uyo. Simple percentages, means and t-test were the statistical tools adopted to analyse the obtained data. The results of the study showed that challenges in the course of sustainable apparel product development are actually encountered by fashion designers in Uyo at the designing stage ($x = 3.37$). The statistical differences between the strategies adopted by male and female fashion designers to cope with sustainable apparel product development was not significant for design innovation challenges ($t_{\text{calc}} = 0.56$, $t_{\text{crit}} = 1.68$, $P < 0.05$). The findings of the study also revealed that application of the appropriate strategies to cope with apparel product development challenges enhances sustainable production turnover. It was recommended that challenges encountered in the process of apparel design innovation are necessary to harness the capacity of the Fashion designers to sustainably develop apparel products which will satisfy the consumers and as well gain widespread acceptance

KEYWORDS: design innovation, sustainable apparel, coping strategies, capacity building, fashion designers

INTRODCUTION

Today in this consumer-based society, clothing has become an indispensable part of human lifestyle and apparel product development has become a vital sector that contributes positively to the social and outward personality development of the people. The globalization of apparel manufacturing and shortening of development time has led to the evolution of the different roles within product development. Developing competitive products require a mix of strategy, teamwork and utilization of the right tools. The best practices to create this type of working environment are implemented and continually updated at many leading companies.

Fashion designers who are key players in apparel products are faced with diverse challenges due to rapidly changing fashion cycles, knowledgeable consumers, and rigorous competition and are being driven to more efficiently methods of apparel development (Wickett, Gaskill and Damhorst, 1999). As a result, apparel developers must remain agile to compete and be successful in today's market environment. One way to enhance apparel designers' agility is to assess the challenges encountered in the development process and the various coping strategies in order to suggest more appropriate strategies for improvement.

The designer must evaluate the needs of all stakeholders to determine how to proceed with a design concept and make choices according to the risks and benefits (Howarth and Hadfield, 2006). Klepp (2003) postulated that fashion designers should seek for quality management, which determines the sustainability of fashion business. They should not just design anything; they have to design something that they know will catch the consumer's eyes for sustainability.

According to Kogg (2003), the processes or activities of apparel product development requires that every apparel designer experiences some challenges in one stage or the other, some of which include; technological, timing, resources, perceived value, quality standard, supply capacity, material cost and pricing and design innovation. It is significant to note that encountered challenges are not surfaced to decline or stop the product development of apparel but to motivate the designer to look for alternative direction for improving production in the fashion industry. This demands that apparel designers should have a positive optimism and develop a positive attitude towards the challenges in order to develop confidence and determination for possible solutions suggestions towards sustainable product development, hence this study.

Mentzer *et al.*, (2001) deduced that the challenge of product development involves the effective selection of distribution agents or more entities that will directly and indirectly be involved in upstream and downstream flows of apparel products and services. Moreover, effective sustainable product development exists as a result of a firm's strategic commitment and orientation towards production. Mentzer *et al.*, (2001) asserted that effective and sound selection of distribution channel or supply chain depends on sustainable apparel products and service development. This however forms the major challenge of consumption which is the final stage of apparel product success (Mentzer *et al.*, 2001). Gam and Banning (2011) suggested that apparel product designers also face the challenge of product distribution. It was posited that heightened creativity and design innovation strategies can be employed by apparel designers to cope with design innovation challenges. They further affirmed that the production challenges can be coped with the application of system-based-thinking defining the problem.

In Uyo, preliminary investigations revealed that the clothing sector has been experiencing a tremendous slow-down in operation probably due to poor acceptance of innovative designs by the consumers, inadequate man power, scarcity and high cost of materials, poor technological support, poor production quality, lack of sufficient distribution channels and inability to satisfy consumers. This creates an illusion that the fashion designers in Uyo cannot compete with their counterparts outside the state in apparel products development. These problems caused many of the fashion designers to fold up probably due to their inability to cope with the challenges sustainably in the course of their apparel products development. Therefore, this study sought to investigate the challenges and coping strategies encountered by the fashion designers at the designing and production stages of sustainable apparel product development in Uyo.

PURPOSE OF THE STUDY

The main aim of the study was to investigate the challenges and coping strategies encountered by the fashion designers at the designing stage of sustainable apparel product development in Uyo. Specifically, the study sought to:

- i) Identify the design innovation challenges faced by fashion designers in sustainable apparel product development.
- ii) Examine the strategies adopted by fashion designers to cope with design innovation challenges.

RESEARCH QUESTIONS

- i) What are the design innovations and production challenges encountered by fashion designers in sustainable apparel product development.
- ii) What are the strategies adopted by fashion designers to cope with design innovation and production challenges faced by fashion designers in sustainable apparel product development.

HYPOTHESIS

H₀₁: There is no significant difference in the mean responses of male and female fashion designers on the strategies adopted to cope with design innovation challenges

REVIEW OF LITERATURE

Apparel Product Development

Apparel product development is the creation and realization of a garment and clothing from its initial concept to its scale of consumption (Kogg, 2003). It involves the entire process from concept to delivering from style creation through garment specification, production, transportation, to final on-floor selling to consumers.

Product development is done mainly by businesses in order to satisfy a new to be established customer want or a market niche. Brezet and Van (1997) describes that apparel product development can be tangible for example a physical product or it can be intangible which would mean for example a service that is being offered. There are many things to consider when developing a new product, for example how would the company turn the idea into a product, how to overcome technical challenges and how to market the idea and make everyone in the society aware of the product.

Effective sustainable product development exists as a result of a firm's strategic commitment and orientation toward sustainability. Systems-based thinking is required for implementing a sustainable design process and sustainability must underlie the ethos of the organization before designers can take action (Hong, Kwon, and Roh, 2009). A sustainable design effort that is analytical in defining the problem, innovative in its exploration of potential solutions, and practical in implementing them, is more likely to be successful when it is a result of an organization's strategic green orientation.

Design Innovation

The design stages of the product development process have a direct influence over the final product as this is where the most critical decisions are made, including cost, appearance, materials selection, innovation, performance and quality (Bhamra and Lofthouse, 2007).

At this stage, the designer must evaluate the needs of all stakeholders to determine how to proceed with a design concept and make choices according to the risks and benefits (Howarth and Hadfield, 2006). For instance, design choices about cost and aesthetics influence sales while choices about disassembly or re-usability are linked to recovery operations. A product development process integrating sustainability issues requires modifications from traditional practices. Systems-based thinking is required for implementing a sustainable design process and sustainability must underlie the ethos of the organization before designers can take action (Hong, Kwon, and Roh, 2009).

Research suggests that sustainable design requires an integrative approach using the expertise of wide variety of organizational actors who cooperate to develop a product with internal alignment between designers, merchandisers, business strategists, production teams, marketing staff, end of life managers, and corporate responsibility managers to align sustainable options with customer value (Hong *et al.*, 2009). A philosophy that originated in the engineering field, integrative product design underscores the importance of multidisciplinary teams and cross-functional organizations (White, 2008).

Apparel Design Innovation Challenges

One of the challenges is that even though the process is user orientated, the information from users will be intermediated through research to the designers. As a designer, there are several options to approach the problem of reducing environmental impacts of clothing, but the theme is complex and an improvement in one area has a potential for impairing another. Disposable clothing then seems to be a perfect solution as the need for laundering would be completely removed. This would however increase the impacts from production, processing, and distribution (Fletcher and Goggin, 2001). Material selection has consequences for how the products are to be washed, and therefore has a potential for saving energy. However, if this is not communicated to the user or if the user does not want to follow the recommendation, the potential saving is lost.

Coping Strategies in Sustainable Apparel Design Innovation

Fletcher and Goggin (2001) described some coping strategies for apparel design innovation to include quality management and control, competent designs, innovative design and use of current technology.

Quality Management and Control,

Klepp (2003) postulated that fashion designers should seek for quality management, which determines the sustainability of fashion business. They should not just

design anything; they have to design something that they know will catch the consumer's eyes for sustainability. Designers have to know what the new trends are and they have to know the change day to day in order to design what the customers' needs are. Clothing designers need to put so much work into their clothing design. Often times, people just buy a certain piece of clothing because it is what everybody else is wearing and it is the new fad without considering the quality of the product. They really do not respect the time and effort the designer has put into the design, even more so they buy them just for the label associated with the article of the clothing. All these things the fashion designers have to understand and try to master to become successful in the apparel industry.

The Use of Current Technology

Application of designed machine and equipment can facilitate garment design and fabrication. Most of the fashion designers in Nigerian communities are not using the latest technologies and machines to achieve best clothing design need of the consumers. Because most of the fashion designers are not technically inclined, it becomes difficult for the design companies to excel in their original perceived design apparel (Hethorn and Ulasewicz (2008).

May-Plumlee and Kenkare (2005) purport virtual design technologies such as product visualization, virtual fit, electronic communication, and networking can potentially reduce waste and maximize design. By working alternately in a 2D textile design environment and a 3D virtual product environment, the designer can create and evaluate textile and product designs without the cumbersome process of sampling and approving each step along the way. Such technology has the potential of reducing fabric usage while enhancing communication among stakeholders. There is some concern about achieving a seamless interface between technologies, the cost of implementing them, and the fact that users may miss the tactile interaction with the fabrics.

METHODS

This study employed descriptive survey research design. It was conducted in Uyo, Nigeria. The population of the study was made up of all the registered practicing fashion designers who are registered with both the National Directorate of employment, and Ministry of Commerce and Industry, Uyo. The total number of persons was 117 at the time of the study. Purposive sampling technique was adopted for the study to select 49 respondents which represents 41.9% of the entire study population. This technique was suitable because of accessibility, availability and experience of the study participants.

A structured questionnaire known as C-CSSAPROD was face-validated by 5 experts and used for data collection. This was a 20-item instrument that was used by the researcher to elicit responses from apparel designers on challenges and coping strategies of sustaining apparel development. It was a 4-point rating scale to indicate the level of agreement among respondents on the questionnaire items. Test retest reliability was used to determine the internal consistency of the instrument. It was 0.82 at the first instance and 0.85 when re-examined. The research question was answered using means and standard deviation while the hypothesis was tested using t-test at 0.05 level of significance.

Each of the respondents was given a questionnaire to tick the appropriate alternatives in the spaces provided.

Necessary explanations were made to guide the respondents. After this, the respondents were allowed ample time to respond to the items on the questionnaire. Questionnaires were collected back after completion.

In order to score the instrument a key was developed where all the information obtained from the questionnaire was scored. Section A did not require any scoring. The respondents' reactions to each of the items in sections B and C were scored as follows:

Strongly Agree (SA) -4, Agree (A) - 3, Disagree (D) - 2, Strongly Disagree (SD) -1

The research question was analysed using means and standard deviation. The hypothesis was tested at 0.05 level of significance using related t-test.

Table 1 Mean Scores of Respondents on Apparel Design Innovation challenges

S/N	Statements	Mean Score	Standard Dev.	Remarks
1	Fashion designers do not invest in new technology e.g Computer Aided Design	3.86	0.35	High
2	Fashion designers are faced with shortage of expertise, skill and vision to promote the apparel design sector.	2.84	0.91	High
3	There is lack of governmental support to invest in new fashion discovery.	3.92	0.27	High
4	Fashion designers lack design catalogues	1.35	0.71	Low
5	Fashion designers are faced with the problem of specialization in apparel product line.	3.93	0.26	High
6	Fashion designers do not design clothes for people considering their dreams and their situations.	3.78	0.42	High
7	Fashion designers do not design clothes to meet global standards.	2.60	1.19	High
8	Fashion designers are not positioned centrally in economic and business model.	3.88	0.32	High
9	Designs from fashion designers are not positioned centrally in economic and business model.	3.80	0.40	High
10	In designing management process clothes do not build in regenerative benefits for people and environment.	3.73	0.45	High
	Average	3.37	0.53	

From Table 1, the mean Scores of respondents on apparel design innovation challenges show that Lack of specialization of fashion designers in apparel product line, lack of governmental support to invest in new fashion discovery, inability of the fashion designers to be positioned centrally in economic and business model and inability of the fashion designers to invest in new technology were the most widely accepted apparel design innovation challenges with mean scores of 3.93, 3.92, 3.88 and 3.82 respectively. Lack of design catalogues ranked the least accepted challenge with a mean score of 1.35. The results imply that fashion designers in Uyo have design catalogues which remains an age-long design chart for apparel design. Their inability to augment to the current technological design such as the use of Computer Aided Design (CAD) is cost implicating thereby, placing the fashion designers in a disadvantaged position to adopting new technologies in design innovation.

From Table 2, the mean Scores of respondents on strategies adopted to cope with apparel design innovation challenges show that fashion designers undergo training on the application of new technology in the designing process (mean score = 3.92), they try hard to employ competent designers (mean score = 3.84) and they design clothes for corporate profit (mean score = 3.82). This implies that in attempt to overcome design innovation challenges, fashion designers in Uyo have to train and retrain themselves through formal and informal capacity building initiatives. This is however cost implicating leading to their increase in service charges to cater for the excess expenditure incurred in the training process.

Table 2 Mean Scores of Respondents on strategies adopted to cope with Apparel Innovation Challenges

S/N	Statements	Mean Score	Standard Dev.	Remarks
1	Fashion designers work hard to maintain good quality management and control.	3.75	0.54	High
2	Fashion designers try hard to employ competent designers	3.84	0.36	High
3	Fashion designers undergo training on the application of new technology in apparel design	3.92	0.37	High
4	Fashion designers put effort in hiring skilled personnel in order to improve the quality of the design.	1.35	0.71	Low
5	Fashion designers ensure the use of design catalogues	3.93	0.26	High
6	Fashion designers design clothes for people considering their dreams and their situations.	1.87	0.75	Low
7	Designs by fashion designers must be created locally and shared globally.	3.76	0.43	High
8	Fashion designers design clothes for corporate profit rather than society's good.	3.82	0.38	High
9	Design from fashion designers must be positioned centrally in economic and business model.	1.97	0.65	Low
10	In designing management process clothes must be built in regenerative benefits for people and the environment.	3.43	0.50	High
Average		3.17	0.50	

HYPOTHESIS

H₀: There is no significant difference in the mean responses of male and female fashion designers on the strategies adopted to cope with design innovation challenges

From the analysis of items 11 to 20 of the research instrument consisting of the strategies adopted by fashion designers to cope with design innovation challenges, Table 3 presents a summary of the t-test analysis of the mean scores of male and female respondents. As shown in Table 3, the calculated *t*-value (0.56) is **less** than the critical value (1.68); hence, the null hypothesis (H₀) of no significant difference between the mean scores of male and female fashion designers on strategies adopted to cope with innovation challenges is **accepted**. This implies that there is no significant difference between the strategies adopted by male and female fashion designers to cope with design innovation challenges.

Table 3: t-test Analysis of the mean scores of male and female fashion designers on strategies adopted to cope with innovation challenges

Variables	Mean	Var.	N	df	t _{calc}	t _{crit}	Remark
Male	3.48	0.03	21	47	0.56	1.68	Not Significant
Female	3.45	0.04	28				

P < 0.05

DISCUSSION OF FINDINGS

The results of the study has revealed that challenges in the course of apparel product development are faced by fashion designers in Uyo at designing, material sourcing, production and product distribution stages.

This agrees with the findings of Kogg (2003) that the processes or activities of apparel product development requires that every apparel designer experiences some challenges in one stage or the other, some of which include design innovation technological, timing, resources, perceived value, quality standard, supply capacity, material cost and pricing.

The results of the study have revealed that the fashion designers in Uyo adopted diverse strategies to cope with challenges encountered in the process of apparel products development. This was evidenced by the mean scores of their responses which were above a cut-off mark of 50% for strategies adopted to cope with design innovation, material sourcing, apparel production, distribution and consumption challenges. This agrees with the findings of Mentzer *et al* (2001) that effective and sound selection of distribution channel or supply chain depends on sustainable apparel products and service development. This however forms the major challenge of consumption which is the final stage of apparel product success (Mentzer *et al.*, 2001).

The results showed that female fashion designers scored less than the male counterparts in their responses to the adoption of coping strategies against design innovation challenges, material sourcing challenges, production challenges and product consumption challenges. This can be attributed to values of the feminine gender which seeks to be naturally reserved thereby not ready to take the risks (financial and stress-related) involved in search of materials and production utilities which guarantee product consumption. The complexity in respect to

apparel product acceptance is however low with the female gender such that adopting strategies to cope with design innovations was not a difficult task with female fashion designers since they (females) subscribe to multiple designs and apparel products when compared with the male folks.

Implications For Capacity Building Initiative And Wealth Creation In Apparel Product Development

It is noticeable that building the capacity for sustainability in the apparel design sector is key task of the apparel design programme and must be based on changing human activities (Thompson, 2014). Significantly, a visionary education system with sustainability and capacity building at its heart, producing designers who can use their creativity as a tool for communication together with a holistic interdisciplinary approach is vital to achieve all these tasks (UNESCO, 2002; Centre for Sustainable Fashion, 2009). It is totally agreed with Jones (Jones, 2008) that if design education is to fulfil its potential as an agent of change towards a more sustainable society, sufficient attention must be given to it as the subject of change. Curricula design for this purpose therefore should enable teachers to plan learning experiences that empower their students to develop and evaluate alternative visions of a sustainable future in apparel product design and to work creatively with other disciplines to help bring their visions into effect (UNESCO, 2002). According to Thompson (2014), as teaching of sustainability is comparatively new in Nigeria, the implementation of creative, innovative and sustainable training programmes will be an important part of building capacity for a sustainable future in textiles and apparel design.

CONCLUSION

Challenges in the course of apparel product development are faced by fashion designers in Uyo at designing, material sourcing, production and product distribution stages. Fashion designers in Uyo adopt strategies like the use of computer aided design and catalogues to cope with design innovation challenges.

The findings of the study has revealed that application of the appropriate strategies to cope with apparel product development challenges enhances sustainable production turnover, as such, challenges encountered in the process of apparel product development is necessary to harness the skills of the Fashion designers to sustainably develop apparel products which will satisfy the consumers and as well gain widespread acceptance. Thus, the following recommendations are made:

1. Designers should engage in sustainable designs to cater for the needs of consumers both now and in the future.

2. Fashion designers should be involved in sustainable designs so as to stay competitive in the global apparel market.
3. The government should encourage fashion fairs among indigenous designer's cooperative societies in Akwa Ibom State so as to encourage innovations in apparel initiatives.
4. The government and some private establishment should encourage capacity building initiatives among fashion designers and researchers.
5. Both government and private sector should sponsor proposals in entrepreneurship development in the apparel design sector.

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ⁱ Starting from the High Dam, moving on to the loss of agricultural lands, and most recently Cairo's black smog cloud in 1999.

ⁱⁱ From natural increase, R-U migration

ⁱⁱⁱ "Congestion costs appear in high urban density places; workers may face higher transportation and shelter costs, progressive overloading of housing and social services may require higher wages to cover these costs. That lead to outpace the growth of human and physical infrastructure needed for efficient economic life (Todaro, 2008)

^{iv} Congestion costs make it costly to build an officially legal house, hence responsible for the explosion in urban slums.

^v Environment, society, and economy

^{vi} Local Sustainability Strategy was introduced in 1997 by the Council of European Municipalities and Regions as a synonym for LA21 (GTZ, 2008).

^{vii} Many of the principles of A21 are to be found in the Rio Declaration on Environment and Development

^{viii} Chapter 28 is one of the shortest chapters in the A21 document and is, therefore, accessible .

^{ix} ICLEI – Local Governments for Sustainability is one of the main supporters of the LA21 process, it is an international association of local governments and national and regional local government organizations that have made a commitment to sustainable development. See their website at www.iclei.org.

^x THE GLOBAL DEVELOPMENT RESEARCH CENTER is an independent nonprofit think tank that carries out initiatives in the spheres of environment, urban, community, economy and information, and at scales that are effective. GDRC was inaugurated on 25 May 2000. Visit: <http://www.gdrc.org/>

^{xi} Considering that similar processes are being conducted under different names ("Sustainable Cities Program", "Healthy Cities Program", etc.), the number of cities in this process would be higher.

^{xii} With the UN Secretariat for the World Summit on SD and in collaboration with the UN Development Programme Capacity 21, while the first LA21 survey by ICLEI was in 1997.

^{xiii} For municipalities to be included in the survey results, it was necessary for the association to use the

following criteria to define LA21: include a participatory process with local citizens, include a consensus on a vision for a sustainable future, address economic, social, and ecological needs together, establish a roundtable, stakeholder group, forum, or equivalent multi-sectoral.

^{xiv} (ESI) was a composite index published from 1999 to 2005 that tracked 21 elements of [environmental sustainability](#) covering natural resource endowments, past and present [pollution](#) levels, environmental management efforts, contributions to protection of the [global commons](#), and a society's capacity to improve its environmental performance over time.^{[1][2]} It was superseded by the [Environmental Performance Index](#) in 2006.

^{xv} The 2010 (EPI) ranks 163 countries on 25 performance indicators tracked across ten policy categories covering both environmental public health and ecosystem vitality. These indicators provide a gauge at a national government scale of how close countries are to established environmental policy goals. The EPI's proximity-to-target methodology facilitates cross-country comparisons as well as analysis of how the global community is doing collectively on each particular policy issue.

^{xvi} These indicators are considered the best assessment for the society ability to preserve critical environmental conditions several generations into the future (Levy, 2002).

^{xvii} Eight Arab countries out of sixteen lies within the lowest Twenty-two rank, the ranks are: (143:Iraq)-(140:Sudan)-(138:Kuwait)-(137:Yemen)-(136:SaudiArabia)-(129:Lebanon)-(126:Libya)-(124:Mauritania) (Yale Center for Law and Policy, January 2010).

^{xviii} From a total of 6,416 LA21 worldwide (ICLEI 2001 survey)

^{xix} While heads of governments might be open to appoint new ministers or create new SD institutional frameworks, the ability of technocrats to quickly impose such changes renders government bureaucracies to be risk averse, and fearing openness and transparency of their operations.

^{xx} Med-cities is a network of Mediterranean coastal cities created in Barcelona in November 1991 at the initiative of the Mediterranean Technical Assistance Programme (METAP), URL: <http://www.medcites.com/>

^{xxi} Prepared by the Capacity-21 unit at EEAA, under the auspices of the UNDP.

^{xxii}EEAA; (2002); "The National Environmental Plan Of Eygpt 2002/2017"; Egyptian Environmental Affairs Agency; Ministry Of State For Environmental Affairs; Egypt.

^{xxiii} These programs are: Energy; Natural gas supply for households, providing alternatives to unsustainable

energy resources for urban and rural households, Supply energy to low-income households, Energy Efficiency Improvement and Greenhouse Gas reduction. Transport; Hybrid-Electric Transportation Bus Technology, Underground mass transit system and implementation of Ring Roads (ENCPC, 2008).

^{xxiv} Such as; the national program for upgrading and development of informal areas within urban context; and the supply these areas with potable water and sanitary drainage.

^{xxv} Such as; The Egyptian Pollution Abatement Project and The elimination and reduction of ozone depleting substances.

^{xxvi} According to the Information Provided by the Government of Egypt to the UNCSO Fifth Session 7-25 April 1997, and to Johannesburg summit 2002 New York, United Nations Department for Policy Coordination and Sustainable Development, Division for Sustainable Development, URL: <http://www.un.org/dpcsd/earthsummit>

^{xxvii} For more information about LGM analysis visit: <http://www.gdrc.org/ngo/lgm.html>

^{xxviii} Starting from the High Dam, moving on to the loss of agricultural lands, and most recently Cairo's black smog cloud in 1999.

^{xxix} Policies on energy efficiency issued by the Energy Supreme Council and the higher taxation on certain wastes would set the foundation for the movement towards sustainable Industrial development.

^{xxx} These results based on a survey conducted on 122 Egyptian consumers (Tantawi, O'Shaughnessy, Gad, & Ragheb, March 2009).

^{xxxi} The steering group is crucial to provide local knowledge and cross the distance between the local community members provide local knowledge.

^{xxxii} Balancing development with the protection of sensitive areas, establishing a management policy for the coastal zone, taking account of the interdependence of the marine and land environments

^{xxxiii} The facilitation of public transport, recycling, culture and healthy leisure activities, repair services, home insulation, local food production, alternative energy, car sharing schemes and the sustainable exploitation of natural resources.

^{xxxiv} By advertising, awareness, encouragement, promoting and supporting, eco labeling and open markets...etc. Some of the existing bio products in Egypt need this very much.

^{xxxv} The Grameen Bank is a [microfinance](#) organization and [community development bank](#) launched 1983 in [Bangladesh](#) by Professor [Muhammad Yunus](#), the bank makes [microcredit](#) to the impoverished without requiring [collateral](#) with overwhelming majority(98%) of its borrowers are women, it was awarded the [Nobel Peace Prize](#) in 2006.

^{xxxvi} Reducing, Reusing and Recycling.

^{xxxvii} Best Available Technology.

^{xxxviii} Local authorities are to develop or supplement these options according to the needs and circumstances in their localities.

