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Editorial Staff

Journal of Arts, Management, Science and Technology

A Call for Paper

Guide to Authors

1. **Originality**

Authors are expected to report results of original research not published elsewhere. A review with useful innovation may be considered for publication if the summaries of the articles contain information obtained from scattered literature that could stimulate research on the topic. The language of communication must be in English and spellings must be consistent with Oxford Dictionary.

2. **Requirement**

The original and two copies of the manuscripts should be submitted. Articles should be typewritten double-lined spacing on A4 paper with a 30mm margins on all sides in not more than fifteen (15) pages.

3. **Title of Paper**

It is mandatory that the title should unambiguously reflect the contents of the paper.

4. **Names and address of the authors**

The name(s) of the author(s) should follow the title. The address of the place where the research was conducted should be given. Avoid the use of titles for authors. Also e-mail address should be specified for easy reach, e.g impactanah@yahoo.com.

5. **Abstract**

The manuscript must include an abstract of a single paragraph not exceeding 150 words. The abstract should be clear and concise. The abstract should give the scope, purpose, procedures, significant results and conclusions of the research work.

6. **Introduction**

The introduction should contain the purpose or reason for the study being reported. Also, highlight of previous and related work is required. The literature cited must be discussed to show the relationship between the published work and the research study.

7. **Experimental**

Only highlights of procedures which are common knowledge should be included. Details should be referred to literature cited. New approaches or methodology should receive detailed attention.

8. **Results and Discussion**

The results and discussion should be combined. Direct repetition of methodology should be avoided under this section. Work should be related to published articles.

9. S. I. Units

The standard International Units should be used throughout. Unusual symbols should be defined when first mentioned.

10. Tables, Graphs and Structural Formulae

Tables and figures should be placed in the appropriate places within the text. Avoid grid lines. These must be prepared in such a way as to permit photo reproduction. Minimum character size must be 2.5. Where diagrams and graphs are provided, they should be incorporated into the manuscript and good transparencies provided. Structural formulae should carry Arabic numbers in the text and below the formula which should be drawn neatly within the typed manuscript. Lattra set symbols must be used.

11. Nomenclature and abbreviations

Authors are required to follow the nomenclature and abbreviations that are to be found in other reputable journals. Specialization terms, unusual abbreviations trade names and semi-ambiguous terms should be defined at first point of use.

12. Reference

References should be listed in a separate sheet, using the current APA format. Direct and indent quotations must carry the page number of the work cited. Every in text must appear in the references.

13. Computers/CD

On acceptance of a Manuscript (MS), the journal of Arts, Management, Science and Technology demands a CD of an error-free Manuscript Publication. The CD prepared on IBM compatible system using Word Perfect 6.0, page maker 6.0, MS Publisher, Window 2007 and above. Also, we can accept MS Prepared from systems running Microsoft Word and Microsoft Excel. You are required to state the programme system and file name as used on the CD. A virus-free CD is expected with a copy of the revised MS (Your CD will be returned provided a self-addressed stamped envelope accompanies the CD).

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15. All subscriptions should be sent to:

Engr. E. O. Edet Editor-in-Chief, Journal of Arts, Management, Science and Technology (JAMST), Centre for Research, Innovation and Development (CRID), Auchi Polytechnic, P.M.B. 13, Auchi Edo State.

MINUTES OF MEETING OF PUBLICATION OF JOURNAL COMMITTEE HELD ON THE 26TH MARCH, 2019 AT THE CONFERENCE HALL OF CENTRE FOR RESEARCH, INNOVATION AND DEVELOPMENT (CRID)
ATTENDANCE:-

1. Engr. E. O. Edet
2. R. I. Egwa
3. Professor A. A. Segymola
4. Professor M. I. Rilwan
5. Dr. N. A. Musa
6. A. C. Aizebioje Anthony
7. Dr. E.U. Tonukari
8. Dr. TPL. M. S. Jimah
9. Rev. G. E. Okpeodua
10. Idalu E. A. (Mrs.) Secretary

Opening Prayer:- The opening prayer was said by Dr. N. A Musa at about 10.17am

Presentation of the Proposed Agenda:-

1. Opening prayers
2. Welcome address/brief on Journal Publication
3. Any other business (A.O.B)
4. Closing prayer

Welcome Address: - The Assistant Director (CRID) welcomed everybody to the meeting and appreciated members of the Committee for their commitment. He briefed the house on what is required for the publication of the Journal. He mentioned that the papers, henceforth, should be vetted by a staff of the department, before sending them for external assessment. The Assistant Director thanked the members for attending the meeting despite the short notice and equally that they should disseminate the information to the Polytechnic to vigorously engage in publication of papers.

Brief on Journal Publications:- The Assistant Director briefed members of the Publication Committee on the way forward for the proposed publication of the Journal. That he wants the house to bring up ideas on how the vetting should be done before the external assessment will be carried out. The Committee unanimously agreed on the following:

1. Vetting of the papers should be done by three persons either within the institution or outside, and TETfund should pay for the vetting.

2. That the papers should be checked meticulously before being sent out for assessment. It was resolved that the vetting should be done by experienced professionals before sending the papers for external assessment.

3. That a staff from each School should be given the assignment of allocating the papers to capable hands for vetting. The Committee members representing each school are as follows:

1.	Dr. Wilfred	ICT
2.	Akhalume P. B	School of Business
3.	Engr. Akele	Engineering
4.	Mr. Balogun P.O	General Studies
5.	Dr. Festus Otoba	Art Design
6.	Al-Hassan	Environmental

4. That two members of the Publication Committee should finally go through the papers to ensure that they are error-free before collation.

A.O.B:- Mr. Balogun P.O. said it's very good to co-author a paper. That it has more advantages than one person authoring it. He also said that it's not good to put more than two papers from the same source in one journal. And that it is desirable to have papers published in the University Journals or International Journals as such publications would be easily accepted and considered valued.

A. C. Aizebioje Anthony moved a motion for adjournment at 11.17 am and supported by Dr. E.U. Tonukari who equally led the closing prayers at about 11:18am.

..... **.....**

Mr. R. I. Egwa **Idalu E. A. (Mrs.) `**
Secretary

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SOIL EROSION: THREAT TO FOOD SECURITY IN NIGERIA

By

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Abstract

Erosion is globally widespread and affects the productivity of soils as vital plant nutrients are washed away. Cropland is more proned to erosion to frequency of cultivation and land use intensification. The dorminant form of soil degradation, dislodge surface soil particles and transport them steep slope cultivation, depletion of organic matters, reduced fallow periods, at great distance. Less of soil vegetative cover, and land topography exposes soil to erosional hazard. Soil structure is shattered when soil is subjected to high rate of water erosion. Water storage and infiltration capacity of the soil is reduced. Eroding soils contain more nutrient than are left in the remaining soil. Soil depth reduction, reduces the productivity of soil (lowers yield). Subsistent agriculture is yet prevalent in Nigeria. The unhindered degradation will lead to ruins the soil productivity capacity for human uses. Achieving future food security depend on serious research to develop effective soil and water conservation measures conserving fertile soil, water and energy. The resilience of most soils in Nigeria is inherently low hence high level of degradation upon cultivation. Integrated soil quality management approach should be adopted in agriculture soil s to ensure sustainability agricultural production, food security and environmental conservation.

Introduction

The wearing a way of topsoil by runoff or wind defines erosion which is the most serious environmental area public health problems facing human society. The loss of soil from land surfaces by erosion is widespread globally and adversely affects the productivity of all natural ecosystems as well as agricultural, forest and rangeland ecosystems (Lal and Sterwart 1990; Pimentel 1993; Pinentel, 1995; Pimentel and Konang, 1998). According to Shaxson*et al.,* (1991) erosion is the unresolved problems by rural agriculture which has been perceived as the major cause of land degradation. Erosion is the most common form of land degradation affecting soil productivity in Nigeria (Phillip *et al.,* 2008). The extent of erosion in Nigeria is alarming and its devastating tendencies exclude no part of the country. Moreover, soil loss opinion, soil loss is one of the pressing and difficult problems facing the future of mankind (Biswa, 1979).

In Nigeria, erosion is very serious because of rapidly increase in human activities which has resulted to cultivation of marginal land, reduced fallow periods and continuous cropping (FAO, 1991). Erosion undermines the performance of agricultural sector hence Udoh, (2006), ascerts that the performance potentials of the sector is yet under utilized because greater proportion of the farmers are practicing low external input agriculture (LEIA). FAO (1994) estimated 64% of agricultural land in Africa is low potentials land. One of the major factors leading to non sustainability of agriculture in the slopy upland is soil. According to USDA (United States Department of Agriculture) (2006), approximately 50% of the earth's surface is devoted to agriculture of this about one-third is planted to crops and two-third grazing land while about 20% of the land area is occupied by forest, of these two areas, cropland is more susceptible to erosion because of frequent cultivation of the soil and the vegetation is often removed before crops and planted. This practices exposes the soil to wind and rain energy. In addition, cropland is often left without vegetation between plantings. This practice intensifies erosion in agricultural land which is estimated times greater than erosion in natural forest areas (Myers, 1993).

In Sub-Saharan African, soil quality is classified as degraded on about 72% of arable land and 31% of pasture land (Scott *et al*., 2000). Babalola (2002) pointed out that our soil in Nigeria and indeed and other tropical soils are inherently infertile, highly weathered and leached. Soil is natural body upon the earth on which crop grow and its quality varies widely ranging from very old, weathered and leached rocks to soils inherently matter content (DFID, 20). These soil, contain low activity clay minerals. This makes them behave like "Sieve" retaining little water during rainfall and irrigation and little nutrient or plant food. The soils are fragile and their aggregate collapse readily under the impact of raindrop making them high susseeptible to erosion (Babalola, 2002).

According to UNU-INRA/World Bank Report (1999), nutrient levels have decline over the past 30years, resulting in low level minerals like Nitrogen (N), Phosphorus (P) and Potassium (K). Consequently, many soils in semi-arid parts of Nigeria have a strong liability to surface crushing or sealing which reduces water penetration into the soil, that encourages runoff and subsequently erosion.

This mean that the annual loss to crop production capacity is estimated to 25million tons in Zing Local Government of Nigeria. Soil loss due to erosion prompted by poor land use practices could be as much as 15 tons per hectare year on poor soil in Western Nigeria (Titilola and Jeje, 2008). Thus about 850,000 hectares of land are badly affected annually or rendered useless for agriculture. Olatunji (2003) says, erosion has led to low yield, reduce grazing land for livestock, famine, low standard of living and decrease availability of fuel wood, food security, poverty and migration of rural dwellers. Soil depth is reduced and vital plants nutrient are washed away by erosion. To replete nutrient losses, large qualities of fertilizer are often applied. Cropland is more susceptible to erosion because of frequency of cultivation and vegetation is often removed before crops are planted. Heavy grazing by livestock also exposes soil to erosion effects. Peasant farmers are more proned to erosion effects due to low financial status, information in relation to soil

properties, suitability and capability of soil and the lack of adequate assets base to cushion the consequences of erosion (Titilola and Jeje, 2008).

The effect of soil erosion on the productivity of both natural and managed ecosystem requires serious research to develop effective soil and water conservation measures. Farmers will need incentives to fully implement conservation methods. Worldwide land erosion continues unabated while human population and its requirements for food and fibre and other resources expand geometrically. Indeed, achieving future food security for all people depends on conserving fertile soil, water energy and biological resources. Carefull management of the vital resources deserve high priority to ensure effective protection of our agricultural land (Titilola and Jeje, 2008).

As the main foundation for agricultural production and sustainable rural livelihoods, land is at the core of the challenges of triggering off a Green Revolution to improve food and environmental security. Land is therefore, a very strategic socio economic asset, particularly in poor societies where wealth and survival are measured by control of and access to land in most developing countries (Titilayo and Jeje, 2008). Research results have shown that soil erosion negatively affects plants such as Cassava growth, yield and results in high contamination and concentration of heavy metals (lead, Cadmium, Chromium, Zinc and Nickel) in the Cassava leaves tubers and soils of oil spilled locations. As for rill and sheet erosion, they cause poor harvest due to a constant reduction of the topsoil while gully erosion has caused more havoc in Nigeria (Gbdebo and Bada, 2010).

Gully erosion has led to loss of lives, rendered many farm households homeless, destroyed numerous roads and footpath leading to farmlands; electricity and water supply taps and eventually loss of farmlands. In its international year of soil notes that increasing the degree and extent of soil erosion processes are threat encing, the survival of the human race (FAD, 2015).

Erosion on the land exposes plants and reduces protein content of tuber plant such as Yam and Cassava by 40% which could lead to malnutrition in children (Odinioha and Brisibe, 2003). World population will require ever-increasing food supplies, consider that more than 99.7% human food (calories) comes from land (FAO, 1988); while less than 0.3 comes from oceans and other aquatic ecosystems.

Maintaining and augmenting the world food supply basically depends on the productivity and quality of soils. The changes inflicted on soils by human induced erosion over many years are significant and have resulted in valuable land becoming unproductive and often eventually abandoned. (Pimentel, *et al.,* 1995; Young, 1988). Suffices it, soil erosion diminishes soil quality and thereby reduces the productivity of natural agricultural and forest ecosystems (Pimentel and Kannang, 2001). In addition, the valuable diversity of plants, animals and microbes in the soil is damaged (Pimentel *et al*., 1995).

In this study, the diverse factors that cause soil erosion are analysed. The extent of damages associated with soil erosion is evaluated with emphasis on the impact these have on future food security.

2.0 Causes of erosion

Erosion occurs when soil is left exposed to rain or wind energy. Raindrops hit exposed soil with great impact and easily dislodge the soil particles from the surface. Consequently, a thin film of soil is removed from the land surface by raindrops and create sheet erosion the dominant form of soil degradation (Troeli*et al,* 1991; Oldeman, 1997.). The surface soil is carried away as the water splashes downhill into valleys and water ways due to intensified impact of soil erosion on sloping land.Wind energy also has great power to dislodge surface soil particles and transport then at great distance. Wind can transport soil particles through a great distance.

2.1 Soil structure

Soil credibility is greatly influenced by its structure. Soil with medium to fine texture, low organic matter content and weak structural development are most easily eroded. (Bajracharya and Lal, 1992). Typically, these soils have low water infiltration rates and therefore are subjected to high rate of water erosion and the soil particles are easily displaced by wind.

2.2 Role of vegetative cover

Land areas covered by vegetation is more protected and experiences relatively little soil erosion because raindrop and wind energy are dissipated by the vegetative cover and the topsoil covered by dead biomass. According to Trimole and Mendel (1995) in Uta and Montana, as the amount of ground cover decreases from 100% to less than 1%, erosion rates increased approximately 200times. The extensive removal of vegetative cover during cultivation and pasturing is followed extensive soil erosion. In forested areas, a minimum of 60% forest cover is necessary to prevent serious soil erosion and landslides (Singh and kaur, 1989). Loss of soil vegetation cover is wide spread in developing countries where population are large and agricultural practices are often inadequate to protect top soils. In places where fuel wood and other biomass are scarce, even the root of grasses and shrubs are collected and burned. (Mc Laughlin, 1991). Land use intensification results to frequent cultivation of the soil and vegetation often removed before crops planted. This practice exposes soil to erosional hazards.

2.3 Land topography

The Topography of a given landscape, its rainfall and/or wind exposure all combine to influence its susceptibility to erosion. Erosion rates are high on marginal land which has been converted from forest of agriculture to replace the already eroded, unproductive cropland (Lal and Stewart, 1990).
In addition, under arid conditions with relatively strong wind as much as 5000t/ha year of much soil has been reported lost in an arid region of Indian (Gupta and Raina, 1996).

2.4 Loss of soil Productivity

Approximately 50% of the earth's surface is devoted to agriculture; of this about one-third is planted to crops and two-thirds to grazing lands (USDA, 2001). Forest occupy about 20% of the land area (WRI, 1997), of these two areas, cropland is more susceptible to erosion because of frequent cultivation of the soils and vegetation is often removed before crops are planted. This practices exposes the soil to wind and rain energy.
According to Myers (1993), cropland is often left without vegetation between plantings. This intensifies erosion on agricultural land which is estimated to be 75times greater than erosion on natural forest areas.

3.0 Effects of erosion on soil

The productivity of soil is reduced by erosion. In order importance, Soil erosion increases water runoff thereby decreasing the infiltration and water storage capacity of the soil (Troch *et al,* 1991; Pimentel *et al* 1995; Jones *et al*, 1997). Also, during the erosion process, organic matter and essential plant nutrients are removed from the soil and the soil depth is reduced. These change not only inhibits vegetative growth, but reduces the preserve of valuable biota and the overall biodiversity in the soil (Troch *et al.,* 1991; Pimentel *et al.,* 1995). Because these factors interact with one another, it is almost impossible to know the specific impacts of one factor from another. Hence, Jones *et al.,* (1991) asserts that the loss of organic matter increases water runoff, which reduces water-storage capacity, which diminishes nutrient levels in the soil and also reduces the natural biota biomass and the biodiversity of ecosystems (Lal and Stewart, 1990; Jones *et al.,* 1997).

3.1 Water availability

Water is a prime limiting factor of productivity in soils because all vegetation require environs qualities of water for it growth and the production of fruit (Falkenmark, 1989). According to Klocke*, et al.,* (1996), 1 hectare of corn or wheat will transpire more than 5 to 7 million liters of

water each growing season and loss additional 2million litres of water by evaporation from soil (Donahue, *et al.,* 1998). During erosion by rainfall, the amount of rainfall significantly increases, with less water entering the soil, and less water available for vegetation growth (Wendt *et al.,* 1986). Availability of soil water in agricultural land is important for plant biomass productivity. Major reduction in plant biomass not only diminishes crop field, but adversely affect the overall species diversity in the soil (Wendt *et al.,* 1986).

3.2 Nutrient loss

Eroded soil carries away vital plant nutrients including potassium, calcium, phosphorus and nitrogen. Atom of fertile topsoil averages 1-6kg of Nitrogen, 1-3kg of Phosphorus and 2-30kg of Potassium, whereas, the soil on eroded land has average Nitrogen levels of 0.1-0.5kg per ton (Troel *et al.,* 1991). Typically, eroded soil contains about 3times more nutrients than that left in the remaining soil (Lony, 1989).

According to Schertz *et al.,* (1989), nutrient deficient soils produce 15 to 30% lower crop yield than uneroded soil. When nutrients resources are depleted by erosion, plant growth is stunted and overall productivity declines (Lal and Stemart, 1990; Pimentel, 1995).

Large qualities of fertilizers are often applied to offset the nutrient losses erosion inflicts on crop production. The lost of soil nutrient cannot be estimated in developing countries. According to Troch *et al.,* (1991), ascertain that the lost of nutrients costs US agriculture $20 billion annually. The lost nutrient can be replaced with application of commercial fertilizers. However, this replacement strategy is expensive for farmers, and nation and usually not affordable by poor farmers.

Soil organic matter

Soil organic matter content is a valuable resource because it facilitates soil porosity and improves water holding capacity of soil. The organic matter aids, catron exchange, enhances plant root growth and stimulates the increase of important soil biota (Wardle *et al.,* 2004). Fertile soil typically contain about 100tons of organic matter per hectare or 4% of the total weight (Follett *et a.,* 1987).

About 95% of the soil Nitrogen and 25-50% of the Phosphorus is contained in the soil organic matter (Allison, 1973). Because most of the soil organic matter is found close to the soil surface as decaying leaves and stems, erosion seldomly decreases soil organic matter. Leaving behind large soil particles and stones, both wind and water erosion selectively removed the fine organic particles in the soil. Allision, (1973), opines that the soil removed by either erosion is 1.3 to 5 times in organic matter than the remaining soil left behind. According to Libert (1995), the reduction of organic matter from 1.4 to 0.9% lowered yield potentials for grain by 50%. Once the organic matter layer is depleted it is observable through the productivity of soil as measured by volume of plant biomass, declines both because of the degraded soil structure and depletion of nutrients contains inorganic matter.

3.3 Soil depth

Soil depth can be reduced by erosion prevalence, when soil depth is substantially reduced by erosion from 30cm to less than 1cm, plant roots space is minimal, and plant production is significantly reduced. According to Wardle *et al.,* (2004), Opined that growing plants require soils of adequate depth in which to extend their roots. Various soil organisms like earthworms, also require a specific soil depth since organic matter aids soil porosity, cation exchange and stimulates the increase of soil micro organism. Adequate soil depth facilitate water infiltration and ultimately the overall soil productivity. Conversely, inadequate soil depth lower the yield potentials of crops. According to Sandgyist (2000), the reduction of soil depth through soil erosion lowered the yield potentials for crops.

Many poor Nigerian farmers respond to declining land productivity by abandoning the degraded land and moving to a new land for crop cultivation Traditional farming system (Shifting

Cultivation). Land degradation is a process of land reduction in values and productivity of land resulting from soil loss, breakdown in soil structure, water logging, loss of nutrients, and pollution from toxic substances. It is viewed as any act on land that changes it from its natural ecological status and makes it unfit for effective use. Hence, it is the reduction in capacity of the land to produce benefits from a particular land use under a specified form of land management. If soil is degraded, its productivity is reduced and may be further reduce until steps are taken to stop the menance and restore it productivity. The unhindered degradation can completely ruins its productive capacity for human uses (Douglas, 1994). The reasons for increasing land degradation includes rapid population growth and intensification of land use. Also, high percentage of tropical soil is unstable and have to inherent fertility. It has been estimated that about 64 percent of agricultural land in Africa is low potential land (FAO, 1994).

Non sustainability of agriculture in the sloppy land is erosion. Although, the extent of anthropomorphic soil erosion is debatable (Oweman*et a.,,* 1999), activities like deforestation and intensive land use in the upland have undoubtedly led to increased soil erosion (Oyekale and Adepoju, 2012). Some possible causes of land degradation will includes Steep Slope Cultivation, depletion of organic matter during cultivation, reduced fallon periods as a result of intensive land cultivation.

The extend of land degradation in Nigeria is presently alarming and there is urgent need to effectively manage available agriculture lands. Nigeria is blessed with abundant land and water resources which are capable of indefinite regeneration over a give period of time if the prevailing management practices are conducive. Management process has to be taken with interest of resources sustenance, given that these resources constitute the productive base for Nigeria agriculture upon which the livelihood of many rural and urban households depends.

Due to increasing demographic and environmental pressure and some pertinent changes in social and political situations, these traditional farming systems are suffering from several internal and external disruption increasing agricultural intensification, the choice of land use, financial status of farmers, information asymmetry in relation to soil properties, suitability and capability poor incentives for natural resources conservation, have subjected fragile soil nutrients to serious exploitation and depletion.

In Nigeria, issues of concern to sustainable agriculture include, the problems of soils vis-à-vis human induced soil degradation, bush burning and soil compaction (FAO, 2000). The problem of resource degradation has been identified as the most crucial environmental challenges that faces the nation (Worldbank, 1990).

Nigeria policy makers must come to understand that sustainable management of land is a pre-requisite for providing enabling environment for agricultural development which is pivotal for ensuring food security and availability (accessibility and affordability). Land monitoring and evaluation assess the trends, the performance and suitability of land for some specified uses.

In order to achieve high and sustained production as well as ecological stability some factors must be taken into consideration when land is being cleared for agricultural production. These are preservation of delicate ecological balance among vegetation, climate and soil. Maintenance of a regular and adequate supply of organic matter on the soil surface; encouragement of soil future activity, maintenance of physical condition of the soil suited to land use, replenishment of soil nutrients that are removed by cropping; creation of a desirable balance and soil reaction, prevention of a buildup of pests and undesirable plants, adaptable of a natural nutrients recycling mechanism to avoid leaching of nutrients; and preservation of ecological diversity.

4.0 Soil productivity and food security.

There is no doubt that soil erosion is a crucial problem in Nigeria. Erosion is a slow insidious process. Indeed 1mm of soil easily lost in one rain or wind storm, is so little that its loss goes unnoticed. Yet this loss of soil over a hectare of farmland amounts to 15t/ha. Replenishing this amount of soil under agricultural conditions requires approximately 20years. While the proned soil

is increasingly less able to support crop production. At the same time, important losses of water, nutrients, soil organic matter and soil microbes are occurring. Whenever soil lose is ignored, the negative impact is created on the forest farmlands, rangeland and national ecosystems (Wendt *et al.,* 1986).

Where farmland degradation is allowed to occur, crop productivity is significantly reduced. According to Brown(1997), shortages of cropland are already harming negative impacts on world food production. Availability of food per capita has been declining for nearly two decades, based on available cereal grains. (FAO, 1961-2000). Now and in the future decades, crop yields must be shared with more and more people (FAO, 1961-2000; PRB, 2002).

Worldwide, soil erosion continues inabated while human population and its requirements for food, fibre and other resources expand geometrically. Achieving future food security in Nigeria for all people depending on biological resources. Prudent management of all these vital resources deserve high priority to ensure the effective protection of Nigeria agricultural land and vegetations. According to WHO (2004), if conservation is ignored, 3.7 billion malnourished people in the world will grow and per capita food production will decline futher.

The adverse effects of erosion on crop production is more profound in subsistent agriculture. In Nigeria, farmers are predominantly subsistent in practice. Subsistent farmers are farm families conceptualized as any family that has agriculture as her major source of livelihood and her members are engaged in farming. According to Akinbile and Ndaghu (2005), farm families spend all their times on the farms working laboriously year-in-year-out and engaging in several non farm activities in the dry season.

These farmers live in rural areas and have undoubted indispensable sustaining power of the entire populace without any attention. Majority of Nigerians rely on agriculture for their livelihood (WorldBank, 2007; Fan *et al.,* 2008). A large proportion of food produced in developing countries is still being associated with the efforts of rural dwellers. In the opinion of CBN (2000), developing countries Nigeria inclusive has 70% their population living in the rural setting and mainly engaged in agriculture. Majority of Nigeria farmers still produce at subsistence level cultivation that is characteristically peasntly (Atura mu, 2003). An inventing of all efforts soil analyzing subsistence in Nigeria, will produce small scale farmers who live in rural areas who are poor and lack political power vis-à-vis their city dwelling counterparts; the family in that setting consist of production and consumption units (Spencer, 1998).

Conclusion, Recommendations and Suggestions

In conclusion, the following recommendations and suggestions are pertinent for checking the challenges of soil degradation and ensuring a secure soil in Nigeria. The dynamics of land use in Nigeria have resulted into land degradation largely accelerated by human activities. The resilience of most soils in Nigeria is inherently low when the high level of degradation upon cultivation. The lack of body charged with the supervision of the use, management and treatment of soils in Nigeria has degenerated in the progressive abuse of the soil through indiscriminate deforestation, bush burning, grazing, land clearing etc. This must not continue, but the following strategies be adopted in the establishment of National Institute of Soil Research in Nigeria. Charged with compiling research information on the capability of soils for different crops; developing guidelines for soil conservation and management in different ecological zones in Nigeria. Carrying out basic research that could generate baseline data applicable at the farmers's level is imperative and desirable. The establishment of such institute will arrest the deteriorating situation of soil abuse.

Integrated soil quality management approach should be adopted in agricultural soil use to ensure sustainable agricultural production, food security and environmental conservation. Detail map of Nigeria focused on potentially agriculturally productive areas should be compiled to allow for planned sustainable intensification. Establishment of body charged with supervision of the use, management and treatment of soil in the country. The establishment of such institution will go a long way to arresting the deriorating situation of incessant soil erosion.

Government should make conscious effort to strengthen the extension services adequately. To enhance their abilities to disseminate information at farm gates on soil suitability soil conservation strategies and other soil management technologies for sustainable soil security and food production.

Government should build a mass of educated farmers using the students in agricultural institutions to educate farmers on adoption of modern conservation technologies since education level influence greatly the level of adoption of technology.

The study of agriculture and soil service should be emphasized in schools. The mitigation of soil degradation and the maintenance of a secure soil must not be left for government alone. Everybody has the onus to ensuring the sustainably of our soils. Suggestions however includes replenish whatever is taken from soil (fertilizer application). Keep soil always vegetated rather than leaving it bare, avoid bush burning and replace every cut down tree by planting their seeds of tree.

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Production and Physicochemical Compositions of Spiced Red Sorghum (*Sorghum bicolor* L.) Pastas

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Abstract

Red sorghum pastas spiced with garlic (*Allium sativum*), ginger (*Zingiber officinale*) and cloves (*Syzygium aramaticum*) were produced and evaluated for their physicochemical properties. The ginger-based pasta exhibited peak values of protein (24.87±0.45 %) and fat (15.69±0.20 %) while cloves-based pasta exhibited the least values of protein (14.95±0.40 %) and fat (14.87±0.20 %). Generally, the decreasing order of the proportions of the minerals in the three pastas was K>Na>P>Mg>Ca>Fe. Among the pastas, the concentrations of K, Na, P, Ca and Fe were highest in garlic-based. A slight deviation was obtained in terms of Mg for ginger-based pasta. All the pastas absorbed oil more than water. While ginger-based pasta possessed the highest water absorption capacity (WAC), 20.02±0.10 % the garlic-based pasta had the highest oil absorption capacity (OAC), 60.34±0.10 %. The pasta were significantly different in terms of their emulsion capacity and emulsion stability ($p<0.05$). The bulk densities of the pasta were generally less than unity, ranging between 0.59±0.10 and 0.65±0.10 g/ml. The least gelation concentration of the pasta were 10.00±0.00 % in garlic-based, 6.00±0.00 % in cloves-based and 2.00±0.00 % in ginger-based. These pastas could serve as quick-cooking food with high nutritional qualities.

Keywords: Garlic, ginger, cloves, pasta, red sorghum

Introduction

Sorghum (*Sorghum bicolor* L.) grains are used as the staple food in several regions of the semi-arid tropics of Africa and Asia, and are important component in traditional farming systems and in diets of millions of people. The crop belongs to the elite handful of plants that collectively provide more than 85 % of all human energy. Wide diversity exists within the crop with different types of sorghum being grown in different parts of the world and the crop has great potential because of its diversity in use. However, this potentially promising crop has not realized its full potential because of several drawbacks that have kept its production at lower levels as compared to other cereals.

The major drawbacks of sorghum include (i) lack of status, with the crop being regarded as a "coarse grain" fit for animal feed and being food of the peasant classes, (ii) regard as crop of low food value of 12 % protein, 3 % fat and 70 % carbohydrate, though it hardly differs from maize and wheat. It is regarded as food of low value mainly because of tannins which occur in the seed coats of brown sorghum grains and a large proportion of the protein is prolamine, an alcohol-soluble protein that has low digestibility in humans and (iii) difficulty in processing(International Pasta Organization, 2016).

Pasta is a healthy carbohydrate-containing food at the centre of traditional eating patterns around the world such as the Mediterranean, Asian, Latin American and Vegetarian Diets and is one of the most environmentally friendly foods to produce. Due to its low price, ease of preparation, stable shelf life, and overall versatility, pasta is consumed by many people worldwide (International Pasta Organization, 2016). Setting a standard in innovation, Italian pasta makers formed trade associations by the 16^{th} century. These organizations regulated the industry by requiring things such as special license to produce pasta made from anything other than durum wheat (Kill, 2001a).

This highly regulated nation has set the benchmark for quality and preparation everywhere. The versatility of pasta allows it to be formed into almost any shape and size. It comes in varieties such as spaghetti, fettuccine, macaroni, rotini, and farfalle. It can even be stuffed with meats or cheeses to make ravioli (Kill, 2001a).

Pasta is sold either dried, fresh, cooked, or frozen (Rubin, 1996).Fresh pasta eliminates the drying step and allows for a much quicker product to be made, but has only a portion of the shelf life of dried pasta. According to Kill (2001a), creating good quality pasta relies on three crucial factors: raw material, mixing and production, and drying.

The National Pasta Association states that more Americans are eating pasta than ever before (NPA, 2000). The U.S. per capita consumption of flour and cereal products was 200 pounds in 1997, an increase from 145 pounds in 1980 and 136 pounds in 1970 (Putnam and Gerrior, 1999). In the last quarter century, wheat flour per capita consumption increased 28%, from 110.9 pounds to 141.7 pounds per year (King *et al.*, 2000). Durum flour comprised 11% of the total wheat flour per capita consumption and in the last quarter century consumption increased from six

pounds per year to 12.9 pounds per year (King *et al.*, 2000). Statistics indicate that consumers eat pasta more than once per week (Pszczola, 2000). Additionally, children eat more pasta than any other age group. In 1997, pasta was a $5.5 billion market in the United States that was rapidly growing.

Since basic pasta is made using flour and water, the use of quality flour is essential, hence, the strong preference to durum wheat. Another common variation of pasta is egg noodles. Adding egg increases nutritional value, changes mouth-feel, and makes for a stronger noodle (Kill, 2001b). Another frequent practice in pasta making is altering the color from its traditional yellow 4 to red or green. This is done by adding powdered spinach or tomato to the flour before hydrating (Kill, 2001b). The mixing process in pasta making is essential for protein binding and gluten matrix formation. In this step, water is added to the dry ingredients to achieve a dough with moisture content of 30-32% (Dintheer, 2001).

There are three approaches to forming and extruding the pasta dough. The approach used most often at-home and in small scale pasta production utilizes a batch mixer and hand-held extruder. In this process, the dough is formed by hand or in a small mixer, and then run through the extruder. A semi-continuous approach requires first mixing the flour and water into a crumbly dough mass before being homogenized by screw presses and then extruded (Dintheer, 2001). The last approach, most often utilized by industrial pasta manufacturers, is continuous mixing/kneading where flour and water are added directly to the twin-screw extruder and homogenized right before being extruded (Dintheer, 2001). The temperature, moisture content, and pressure are all important parameters of pasta production and have a direct effect on pasta quality (Dintheer, 2001).

In commercial pasta production, these parameters have been carefully established and are closely monitored. The third critical aspect of creating quality pasta is drying. Studies have shown that the drying of pasta is very important to the structure and stability of pasta, and when dried, the moisture content is similar to that of the original material (Kill, 2001a).

In 1999 a patent was issued for a calcium-fortified pasta that contains at least 800-8,000 mg of calcium per pound of product. Whole-wheat pasta, which contains 5 grams of fiber per serving, compared to regular pasta, which contains only 2 g of fiber per serving is now available. Additionally, wheat-free pastas for consumers with gluten allergies and high-protein pastas, made of soy flour, wheat germ, and yeast or dairy products that contain 20 – 100% more protein than a regular serving of pasta, are also available (Rubin, 1996). Pasta choices are also becoming hotter and more flavorful as gourmet pastas with ethnic flair are hitting the markets. There are also flavored, colored pastas that are aesthetically pleasing, which come in all shades of the rainbow including green, red, black, and speckled. New pastas containing fish and shellfish are also gaining popularity as "health conscious" pasta dishes. Some of these dishes include Maryland Crab Shells and Seafood Pasta Stir-Fry (Pszczola, 2000).

Methodology

Source of materials

Sorghum (*Sorghum bicolor* L.), ginger (*Zingiber officinale*), cloves (*Syzygium aramaticum*), garlic (*Allium sativum*), salt and emulsifier were purchased in Auchi, Etsako-West Local Government Area, Edo State.

Sample preparation

The pasta sample was produced by adopting the method of Nagao (1996) with slight modifications. Two (2) kg of red sorghum (*Sorghum bicolor* L.) grains were sorted, milled and sieved. 200 g of sorghum flour sample was mixed with 130 ml water, followed by addition of NaCl, Xanthan gum and garlic. The resultant dough was needed with hand for 5 mins and allowed to rest for 20 mins, then folded and sheeted through a pasta machine Tortiglioni Disc 0.5″ diameter ribbed tube. It was dried in an oven at 60 ^{o}C for 24 h, packaged and sealed in HDPE film and kept for further analysis. The same procedure was used to produce samples with ginger and cloves.

Proximate analysis

Proximate composition of the sample was according to AOAC (1990) to determine the moisture, ash, fat, crude fibre and crude protein contents while available carbohydrate was calculated by difference.

Mineral analysis

2g of each sample was ignited in a Muffle furnace for 6 hours at 550^{o}C and the resulting ash was cooled in a desiccators after which 0.1M HCI solution was added to break up the ash. It was then filtered through acid washed Whitman number 43 filter paper into 100ml volumetric flask, and diluted to 100ml with the distilled water. The solution was analyzed for calcium, iron, potassium, sodium, lead and cadmium using an atomic absorption spectrometer with different hollow cathode lamps for different metals (Pearson, 1976). The content of phosphorus for each sample was determined by pipetting 5 ml of the ash solution into a 100 ml volumetric flask and made up to the mark with distilled water. 4 ml of ammonium molybdate was added and shaken followed by the addition of 0.7 ml of 2% tin (II) chloride solution and shaken. The solution was analyzed for phosphorus using a colorimeter using a red filter (Ceirwyn, 1995).

Water and Oil Absorption apacity

Water absorption capacity was determined using the centrifugal method. 1.0 g of the sample was mixed with 10 ml of distilled water in a 50 ml centrifuge tube. The content was stirred for 3 min using a mechanical stirrer. Then the content was centrifuged for 30 min at 5000 rpm. At the end of the centrifuging, the content was allowed to stabilize and the supernatant was carefully decanted into a graduated measuring cylinder. The ratio of weight of water absorbed to the weight of the sample was expressed as percentage water absorption capacity. Likewise, oil was

substituted for distilled water. The ratio of weight of oil absorbed to the weight of the sample was expressed as percentage oil absorption capacity.

Emulsion capacity and emulsion stability

The method of Padmashree *et al*. (1987) was adopted to determine the emulsion capacity and emulsion stability of the pasta samples. An emulsion of 2 g of the pasta sample, 20 ml of distilled water and 20 ml of groundnut oil was prepared in a calibrated centrifuge tube. The emulsion was centrifuged at 3,500 rpm for 5 min. The ratio of the height of the emulsion layer to the total height of the moisture was calculated as the emulsion capacity expressed in percentage. The emulsion stability was done by treating the emulsion contained in a calibrated centrifuge tube at 50 ^{o}C for 30 min in a water-bath cooling for 15 min under running tap water and centrifuged at 3,500 rpm for 15 min. The emulsion stability expressed as a percentage was calculated as the ratio of the height of the emulsified layer to the total height of the mixture.

Bulk density

Bulk density of the pasta samples was determined using Kinsella (1976) method. A known weight of the sample was measured into 25 ml graduated measuring cylinder. The sample was packed by tapping the cylinder gently on the bench top ten times from a height of 5 cm. The volume of the sample after tapping was recorded.

Least gelation concentration

The method of Coffman and Garcia (1977) for the determination of least gelation concentration was adopted. 2-20% suspensions of each of the samples were prepared with distilled water. 10ml of each suspension was put in a test tube and heated for 1 hour on boiling water bath, followed by a rapid cooling in a bath of cold water. The test tubes were further cooled at 4 ^{o}C for 2 h. The concentration at which the gels did not fall down from the inverted test tubes was taken as the least gelation concentration of the pasta sample.

Results and discussion

From the Table 1, ginger-based sorghum pasta exhibits the highest moisture content (14.91±0.30%) while garlic-based the lowest (12.95±0.20%). This implies that the ginger-based sorghum pasta may be most susceptible to microbial growth under the same conditions with the other samples. However, during processing, low quantity of water may be required for cooking ginger-based sorghum pasta. Peak value of ash content (3.23±0.10%) is obtained in garlic-based sample while the least (2.13±0.10 %) in cloves-based sample. The relatively high ash contents of the samples are indications of availability of minerals in them. The percentage fat contents of the samples are in the decreasing order of 15.69±0.20 %> 15.10±0.20 % > 14.87±0.20 % for ginger-, garlic- and cloves-based sorghum pasta respectively. Without High fat content is a

complimentary source of energy to carbohydrate. Ginger-based and garlic-based sorghum pastas contain almost twice the percentage of crude protein of the cloves-based sample. The values of crude fibre and carbohydrate by estimate are in favour of cloves-based sorghum pasta compared to the other samples.

The mineral compositions of the garlic-, ginger- and cloves-based sorghum pastas are depicted in the Table 2. The most abundant mineral in the pasta samples is potassium with the peak value (337.00±0.01 mg/kg) obtained for garlic-based pasta while the least value (249.00±0.01 mg kg) for ginger-based pasta. The availability of potassium in the pastas is followed by sodium. These values are in full agreement with the report by Olaofe and Sanni (1988) that potassium is the predominant mineral in some Nigerian agricultural products. High potassium to sodium ratio may be an additional benefit in the diet of patients with high blood pressure, who have to restrict their sodium intake (Meneely and Battarble, 1976). In addition, high K/Na ratio serves as maintenance of a correct osmotic equilibrium and fluid pH in the body, which is essential for the movement of metabolites across cell membranes and around the body (Lake and Waterworth, 1980).

The relative abundance of calcium in the pasta is in the decreasing order: 32.00±0.01 mg/kg > 26.00±0.01mg/kg> 24.90±0.01 mg/kgfor garlic-based, cloves-based and ginger-based sorghum pastas respectively. Calcium plays a significant role in the strengthening of body tissues and bones. Ca, P and Vitamin D combine to avoid rickets in children and osteomalacia (adult rickets) (Chesworth, 1992.).In the same decreasing order, the relative abundance of magnesium (mg/kg) in the pasta samples is 50.40±0.02 > 40.90±0.01 > 27.00±0.01 for ginger-based, garlic-based and cloves-based sorghum pastas respectively.

Iron is the least mineral possessed by the pasta samples. The increasing order of its relative abundance is 3.96±0.01 mg/kg< 5.80±0.02 mg/kg< 11.00±0.01mg/kg for cloves-based, ginger-based and garlic-based sorghum pastas respectively. In addition to their deleterious influences on calcium metabolism, iron deficiency is known to reduce work capacity and productivity in adults, increase the severity and incidence of infection, and increase maternal and prenatal mortality (Scrimshaw, 1991). Perhaps the most serious effect of iron deficiency is the often irreversible impairment of a child's bearing ability (Scrimshaw, 1991) and appetite (Pollit, 1993).Garlic-based sorghum pasta exhibits the highest value of relative abundance of phosphorus (66.92±0.02 mg/kg) followed by cloves-based (52.01±0.02 mg/kg). Phosphorus is always found with calcium in the body both contributing to the supporting structure of the body. It is an essential component of nucleic acids and nucleoproteins, which are responsible for cell division, reproduction and transmission of dietary traits (Hegsted, 1973).

From the Table 3, the ginger-based pasta exhibits the highest water absorption capacity (20.02±0.10%) followed by cloves-based (18.00±0.20%). An opposite trend is observed for the samples in terms of percentage oil absorption capacity. This shows the extent to which water or oil will be added during processing.

Emulsion capacity is usually defined as the volume of oil (ml) that can be emulsified by the sample (g) before phase inversion or collapse of emulsion occurs. The emulsion capacity is high in the cloves-based pasta sample (41.33±0.20%) while emulsion stability however, refers to the ability of sample to form an emulsion that remains unchanged for a particular duration under specific conditions for the sorghum pasta, (40.00±0.10%) in cloves-based pasta was the highest. Less oil was emulsified at higher emulsifying speeds.

Cloves- and garlic-based pasta exhibited the highest percentage of bulk density with (0.65±0.10g/ml), it implies that these samples may well be suitable as binders and disintegrate in pharmaceuticals.The least gelation concentration is the capacity to form gel under practical condition. The smaller the value the better the gelation ability of the sorghum pasta, ginger-based pasta exhibited the least with (2.00±0.00%)

Conclusion

Pastas of red sorghum spiced with ginger, garlic and cloves have been prepared and evaluated for their proximate, mineral and functional properties.

Ginger-based sorghum pasta is more preferred to garlic-based and cloves-based, although the processing of the former may require less quantity of water to sustain its susceptibility to microbial attack.

Garlic-based red sorghum pasta possesses highest relative abundance of minerals in terms of sodium, potassium, calcium, iron and phosphorus. Nevertheless, garlic-based pasta is still more abundant in magnesium than cloves-based.

Functional properties of food samples are of prime importance in the development of food samples in industries, studies of the functional properties have revealed food nutrition constituents for the three samples at different parameters considered.

These pastas could serve as quick-cooking pastas due to their easy processing, medicinal values and high nutritional qualities.

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Table 1: Proximate compositions of garlic-, ginger- and cloves-based red sorghum pastas

Parameter (%)	Sorghum Pasta		
	Garlic	**Ginger**	**Cloves**
Moisture content	12.95±0.20^{a}	14.91±0.30^{c}	13.05±0.20^{b}
Ash content	3.23±0.10^{c}	2.36±0.10^{b}	2.13±0.10^{a}
Fat content	15.10±0.20^{b}	15.69±0.20^{c}	14.87±0.20^{a}
Crude protein	24.69±0.42^{b}	24.87±0.45^{bc}	14.95±0.40^{a}
Crude fibre	1.55±0.10^{a}	1.59±0.10^{a}	1.82±0.10^{b}
Carbohydrate	42.49±0.20^{ab}	42.24±0.30^{a}	53.23±0.20^{c}

Results are means±standard deviation of the triplicate determinations. Values in the same row with the same superscript letters are not significantly different ($p < 0.05$).

Table 2: Mineral compositions of garlic-, ginger- and cloves-based red sorghum pastas

Parameter (mg/kg)	Sorghum Pasta		
	Garlic	**Ginger**	**Cloves**
Sodium	125.00±0.00^{c}	116.00±0.00^{a}	119.00±0.01^{b}
Potassium	337.00±0.01^{c}	249.00±0.01^{a}	265.00±0.01^{b}
Calcium	32.00±0.01^{c}	24.90±0.01^{a}	26.00±0.01^{b}
Magnesium	40.90±0.01^{b}	50.40±0.02^{c}	27.00±0.01^{c}
Iron	11.00±0.01^{c}	5.80±0.02^{b}	3.96±0.01^{a}
Phosphorus	66.92±0.02^{c}	49.03±0.01^{a}	52.01±0.02^{b}

Results are means±standard deviation of the triplicate determinations. Values in the same row with the same superscript letters are not significantly different ($p < 0.05$).

Table 3: Functional properties of garlic-, ginger- and cloves-based red sorghum pastas

Parameter	Sorghum Pasta		
	Garlic	**Ginger**	**Cloves**
Water Absorption Capacity (%)	17.31±0.10^{a}	20.02±0.10^{c}	18.00±0.20^{b}
Oil Absorption Capacity (%)	60.34±0.10^{c}	53.12±0.10^{b}	51.01±0.10^{a}
Emulsion Capacity (%)	37.84±0.20^{b}	36.62±0.20^{a}	41.33±0.20^{c}
Emulsion Stability (%)	36.89±0.10^{b}	35.11±0.10^{a}	40.00±0.10^{c}
Bulk Density (g/ml)	0.65±0.10^{b}	0.59±0.10^{a}	0.65±0.10^{b}
Least Gelation Concentration (%)	10.00±0.00^{c}	2.00±0.00^{a}	6.00±0.00^{b}

Results are means±standard deviation of the triplicate determinations. Values in the same row with the same superscript letters are not significantly different ($p < 0.05$).

PRODUCTION AND SENSORY EVALUATION OF ICE-CREAM FROM COCONUT (*Cocos nucifera*) MILK EXTRACT.

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Abstract

Coconut ice-cream was produced from coconut milk. Three samples were produced, Sample A coconut ice cream flavoured with vanilla, Sample B coconut ice-cream flavoured with strawberry flavour and Sample C coconut ice-cream unflavoured. Sensory evaluation was carried out on the samples by ten panellists, the observation of the sensory evaluation panellists was analysed statistically using the SPSS 10 statistical package. There was significant difference ($p \geq 0.50$) among the parameters investigated. Sample A had the highest value (8.20 ± 1.22) for colour while sample C had the least value (6.90 ± 1.20). Sample B had the highest value (8.60 ± 0.77) for texture and sample A (7.90 ± 0.88) the lowest. Sample B had the highest value for taste (8.70 ± 0.48) and sample A (7.50 ± 0.8) the least. Sample B had the highest value (8.30 ± 0.82) for flavour while sample C (7.50 ± 1.43) had the least value. The general acceptability of coconut ice-cream flavoured with strawberry was highest (8.30 ± 1.06) while the ice-cream flavoured with vanilla had the least value (7.80 ± 1.23). Coconut usage can be diversified while ice-cream production will be a source of economic empowerment for small scale industry.
Keynote: Coconut, coconut milk, coconut ice-cream, flavour, strawberry, vanilla.

Introduction

Coconut (*Coco nucifera*) tree is a member of the family *Arecaceae* and the only species of the genus *Coco.* Botanically, coconut is a drupe. Coconut water is made up of cytokinnins which is antiaging, anticarcinogenic and anti-thrombotic. Another component of coconut water is kinetin which inhibits platelet aggregation and can prevent blood clotting (Dia, 2005).

Coconut ice-cream is produced from coconut milk. Coconut milk is a milky fluid obtained by manual or mechanical extraction of fresh coconut (*Cocos nucifera*) kernel without addition of water. Coconut milk (with no addition of water) contains 56.3% moisture, 33.4% fat, 4.1% protein, 1.2%minerals and 5.0 % carbohydrate (Solangi and Igbal, 2011). Coconut milk is nutritious and rich in fibre, Vitamins C, E, $B_{1,}$ and $B_{3.}$ It also contains beneficial fat called lauric acid a chain fatty acid that is easily absorbed and used for energy. Coconut milk can help lower cholesterol level, improve blood pressure and prevent heart attack or stroke. It is a white opaque protein, oil, water emulsion and essentially free from fibre (Gwee and Seow, 1997). It is valued mainly for its characteristics nutty flavour and for its nutritional contents. It has been reported that 25% of the world's output of coconut is consumed as coconut milk (Gwee and Seow, 1997). There is a growing demand for coconut milk and is now being used in ice-cream confectionaries.

Coconut ice-cream is a highly complex food matrix containing protein, fat, and sugar (Frost *et al*., 2005). Ice-cream is a frozen mixture consisting of edible fat and milk solids with or without vegans and it is a cholesterol free product. Ice-cream is a highly complex food matrix containing proteins, fat, sugar, air, materials and countless interfaces between the different constituent (Satyavatis, 1987).

Sweeteners or sugar impart the sweet taste to ice-cream and enhance the flavour (Pearsall, 1999). Moreover, sweetness control ice-cream is very crucial in order to achieve maximum consumer acceptance (Solangi and Igbal,2011). Sucrose is the most widely used sweeteners in ice-cream which provides high calories and high glycemic index (GI)which makes it unhealthy for the obese and diabetics.

The aims and objectives of the work include to extract milk from coconut to produce ice-cream from extracted milk as well as sensory evaluation of the ice-cream.

Materials and methods

Materials

Matured coconut, vanilla flavour, strawberry flavour, sugar, eggs.

Collection of materials

Matured coconuts were purchased from Jattu market, in Auchi, Edo State. Eggs, flavours (strawberry and vanilla flavours) and sugar were obtained from Uchi market, Auchi, Edo state.

Sample preparation

Milk was extracted from coconut. The endosperm (flesh/meat) was separated from the endocarp with a knife. The back (brown part) was scraped and cut into smaller pieces, washed, grated and blended. The blended coconut was put in a muslin cloth and sieved to collect the first extract in a bowl that is the thick coconut milk. The chaff was blended again with small water and sieved.

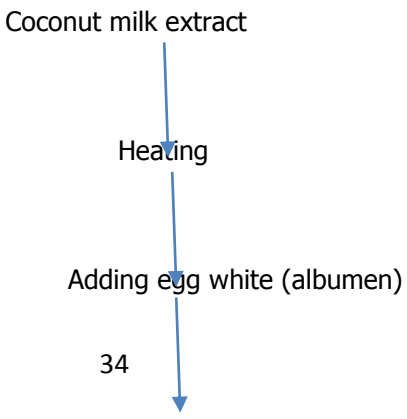
Egg white (albumen) was separated from the egg yolk.

Coconut milk ice-cream production

Water was boiled in a pot and reduced to a simmer. A heat proof bowl was placed over it to create a double boiler and coconut milk was poured in it and heated until hot but was not allowed to boil. The egg albumen was mixed in a separated bowl.

The albumen was tempered and added to the hot coconut milk while stirring vigorously and slowly bring the temperature up without cooking the egg. Sugar was added while stirring. It was stirred for a couple of minute's non-stop to form a thick mixture. The mixture was removed from the heat source and cooled.

The ice cream was divided into three samples. Sample A Coconut milk ice-cream flavoured with vanilla flavour, Sample B Coconut milk ice-cream flavoured with strawberry flavour and Sample C Coconut milk ice-cream without flavour. The samples were kept in the freezer for 30 minutes.



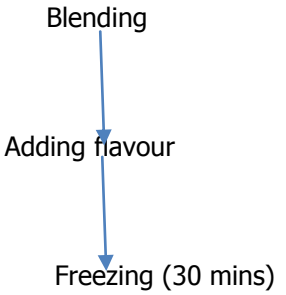


Fig: 1. Flow chart showing the production of ice-cream from coconut milk extract.

Sensory evaluation

The coconut milk ice-cream produced from the coconut milk with different flavours (strawberry, vanilla and unflavoured)were evaluated by a 10 man panellists that were familiar with ice-cream based on 9 point hedonic scales, where 9 represented liked extremely and 1 represented disliked extremely to evaluate the colour, flavour, texture, taste and general acceptability of the ice-cream samples. Each panellist was provided with enough privacy to ensure no distractions and biased results. Pure water was served also after they had tasted each ice-cream sample to rinse their mouth to minimize the influence of the previous sample on the new one (Iwe, 2002).

RESULTS AND DISCUSSION

Results

TABLE 1: Sensory evaluation of coconut milk ice-cream flavoured with different flavours.

SAMPLE	COLOUR	TEXTURE	TASTE	FLAVOUR	GENERAL ACCEPTABILITY
A	$8.20^{a}\pm 1.22$	$7.90^{c}\pm 0.88$	$7.50^{c}\pm 0.86$	$7.80^{ab}\pm 0.63$	$7.80^{ab}\pm 1.23$
B	$7.50^{ab}\pm 0.85$	$8.60^{a}\pm 0.70$	$8.70^{a}\pm 0.48$	$8.30^{a}\pm 0.82$	$8.30^{a}\pm 1.06$
C	$6.90^{c}\pm 1.20$	$8.20^{ab}\pm 0.40$	$8.10^{ab}\pm 1.52$	$7.50^{c}\pm 1.48$	$8.00^{a}\pm 0.82$

Values with the same superscript letters in the same column are not significant different (P>0.50).

Discussion

The results of the sensory evaluation showed that there was significant different (P>0.05) in the sensory attributes of the ice-cream based on the different flavour used. Vanilla flavoured ice-cream had the highest value (8.20 ± 1.22) for colour while the unflavoured ice-cream had lowest value (6.90± 1.20). The flavour imparted colour to the ice-cream (Frost, *et al.,* 2005).

Strawberry flavoured ice cream had the highest value (8.60 ± 0.70) for texture while vanilla flavoured ice cream had the least value (7.90 ± 0.88).The addition of albumen to the ice cream enhanced the texture of the ice-cream (Goff, *et al.,* 1995).

Sample B, (strawberry flavoured ice-cream) had the highest value (8.70 ± 0.48) for taste while sample A(vanilla flavoured ice-cream) had the least value (7.50 ± 0.86) this implies that the flavours imparted different taste to the ice-cream and strawberry flavour was most desirable (Stampanoni-Koeferli, *et al.,* 1996).

Strawberry flavoured sample B had the highest value (8.30 ± 0.82) for flavour while sample C (unflavoured) had the lowest value (7.50 ± 1.48). Flavour has become an important aspect of food that makes it appetizing and gives distinctive characteristics (Frost, *et al.,* 2005). Strawberry flavour was recorded as the highest value and the panelists observed that all the samples were generally accepted.

However, coconut milk ice-cream can be produced using different flavours like strawberry, vanilla, milk and so on. From the result, coconut milk ice-cream produced using strawberry flavour was mostly rated and there is significant different in all the parameters.

Conclusion

The result revealed the coconut milk ice-cream prepared from fresh coconut using different flavours like vanilla and strawberry were highly accepted by the consumers.

Also, in all the parameters (i.e. colour, taste, texture, flavour) except for general acceptability, the sensory evaluation shows that there was significant difference.

Recommendation

Based on this research work the following recommendations are made:

In view of the non-availability of coconut milk ice cream in the country, coconut milk ice-cream can serve as source of income for small scale industry and young graduates.

Nutritional benefits as well as education on preparation of coconut milk ice-cream should be made available both in rural and urban areas that are ignorant of the nutrition potential of coconut milk ice-cream.

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GOVERNMENT EXPENDITURE AND ECONOMIC GROWTH IN NIGERIA (2000-2016)

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Abstract
The study is on government expenditure and economic growth in Nigeria from 2000-2016. The study adopted the Ordinary Least Square (OLS) analysis method for the estimation process. Data were extracted from the Central Bank of Nigeria Statistical Bulletin and regressed with the aid of Eviews 7.0 econometric software package.It was found from our study that total government expenditure on social and community services, economic services, and transfer exert positive and significant impact on the growth of Nigerian economy. We therefore recommended that expenditures on items/activities that are irrelevant or have no significant linkage to growth should be avoided.
Keywords: Government expenditure, Economic growth

1. Introduction

Government expenditure is an important instrument for government to control the economy. It plays an important role in the functioning of an economy whether developed or underdeveloped. Government expenditure was born out of revenue allocation which refers to the redistribution of fiscal capacity between the various levels of government or the disposition of responsibilities between tiers of the government. Broadly speaking, government expenditure affects aggregate resources use together with monetary and exchange rate. Specifically, government expenditure refers to the value of goods and services provided through the public sector.

In the Nigerian economy government expenditure can broadly be categorized into capital and recurrent expenditure. The recurrent expenditure are government expenses on administration such as wages, salaries, interest on loans, maintenance etc., whereas expenses on capital projects like roads, airports, health, education, telecommunication, electricity generation etc., are referred to as capital expenditure (Obinna, 2003). The size of government expenditures and its effect on economic growth, and vice versa, has been an issue of sustained interest for over decades now.

Government spending in Nigeria has continued to rise due to the huge receipts from production and sales of crude oil, and the increased demand for public (utilities) goods like roads, communication, power, education and health. There is increasing need to provide both internal and external security for the people and the nation. Available statistics show that total government expenditure (capital and recurrent) and its components have continued to rise in the last three decades. For instance, government total recurrent expenditure increased from N4, 805.20 million in 1980 to N36,219.60 million in 1990 and further to N1, 589,270.00 2007. On the other hand, government capital expenditure rose from N10, 163.40 million in 1980 to N24, 048.60 million in 1990. Capital expenditure stood at N239, 450.90 million and N759, 323.00 million in 2000 and 2007 respectively. The various components of capital expenditure have risen between 1980 and 2011.

It is disturbing to note that government expenditure seems to have not replicated same level of economic growth in Nigeria, for instance between 1980 and 1990, while the GDP growth rate was decreasing (57.15% down to 2.87%), government expenditure growth rate was increasing (23.2% to 41.24%). Thus, there is an inverse relationship between the two periods. However, it is found that the growth rate of government expenditure in 2000 and 2010 was 15.53% and 2.15% respectively, while GDP growth rate witnessed 8.79% and 1.54% in the same period respectively.

Thus, government expenditure growth rate has been greater than GDP growth in the same period. Due to the mixed feeling on the above the debate has been inconclusive on whether or not increasing government spending induces economic growth or not.

In line with this view, the rising government expenditure in Nigeria is expected to translate into meaningful growth and development but Nigeria still ranks among the poorest countries in the world today while many Nigerians have continued to wallow in abject poverty with more than 50 percent living below US$1 per day and less than 2 percent are abnormally rich. Bad roads and epileptic power supply have led to the collapse of many industries accompanied by high level of unemployment and abandonment of projects. In addition, the macroeconomic indicators such as balance of payments, import obligations, inflation rate, exchange rate, national savings, foreign reserves, debt profile and mortality rate are all showing that Nigeria is not doing well economically in the last couple of years.

Based on the above, this paper attempts to investigate whether increasing government expenditure induces economic growth in Nigeria.

2. Literature review

Government expenditures play key roles in the operation of all economies. It refers to expenses incurred by the government for the maintenance of itself, provision of public goods, services and works needed to foster or promote economic growth and improve the welfare of people in the society. Government expenditures are generally categorized into expenditures on administration, defense, internal securities, health, education, foreign affairs, etc. and have both capital and recurrent components. It is an important instrument for government to control the economy and it plays an important role in the functioning of an economy whether developed or underdeveloped. Government expenditure was born out of revenue allocation which refers to the redistribution of fiscal capacity between the various levels of government or the disposition of responsibilities between tiers of the government. Broadly speaking, government expenditure affects aggregate resources use together with monetary and exchange rate. Specifically, government expenditure refers to the value of goods and services provided through the public sector.

Oriakhi (2004), defines government expenditures as the expenses which government incurs for the maintenance of the government and the society in general. Olowononi, (2006) sees government expenditures as the expenses the government incurs in carrying out its programmes. According to Anyanwu (1997), government expenditure involves all the expenses which the public sector incurs for its maintenance for the benefit of the economy.

Generally, government expenditure in Nigeria can be categorized into two components parts namely capital expenditure and recurrent expenditure. Capital expenditure is incurred on the creation or acquisition of fixed assets (new or second-hand) while recurrent expenditure is incurred on the purchase of goods and services, payment of wages and salaries and settlement of depreciation on fixed assets. Increase in government expenditure on socio-economic activities and infrastructural development is an impetus for economic growth in any country. Specifically, some

of the reasons adduced for the increase in government expenditure overtime are: inflation; public debt; tax revenue and the population.

- **Empirical Review**

Empirical researches on the effect of government expenditure on economic growth reported results such as: positive effect, negative effect, and those who observed mixed results and those who could not establish any relationship between them.

Using panels of annual and period-averaged data for 22 Organizations for OECD countries during 1970 to 1995, Bleaney et al (2001) studied the impact of government spending on economic growth. Applying OLS and GLS methods, they found that productive public expenditures enhance economic growth, but non-productive public spending does not, in accordance with the predictions of Barro (1990) model.

Gemmell and Kneller (2001) provide empirical evidence on the impact of fiscal policy on long-run growth for European economy. Their study required that at least two of the taxation/expenditure/deficit effects must be examined simultaneously and they employ panel and time series econometric techniques, including dealing with the endogeneity of fiscal policy. Their results indicate that while some public investment spending impacts positively on economic growth, consumption and social security spending have zero or negative growth effects.

Abu-Bader and Abu-Qarn (2003) employed multivariate co-integration and variance decomposition approach to examine the causal relationship between government expenditures and economic growth for Egypt, Israel and Syria. In the bivariate framework, the authors observed a bi-directional (feedback) and long run negative relationships between government spending and economic growth. Moreover, the causality test within the trivariate framework (that include share of government civilian expenditures in GDP, military burden, and economic growth) illustrated that military burden has a negative impact on economic growth in all the countries. Furthermore, civilian government expenditures have positive effect on economic growth for both Israel and Egypt.

Niloy, Emranhul and Osborn (2003) used a disaggregated approach to investigate the impact of public expenditure on economic growth for 30 developing countries in 1970s and 1980s. The authors confirmed that government capital expenditure in GDP has a significant positive association with economic growth, but the share of government recurrent expenditure in GDP was shown to be insignificant in explaining economic growth. At the sectoral level, government investment and expenditure on education are the only variables that had significant effect on economic growth, especially when budget constraint and omitted variables are included.

Similarly, in Sweden, Peter (2003) examined the effects of government expenditure on economic growth during 1960-2001 periods. The author emphasized that government spend was too much and it might slowdown economic growth.

Loizides and Vamvoukas (2004) employed the trivariate causality test to examine the relationship between government expenditure and economic growth, using data set on Greece, United

Kingdom and Ireland. The authors found that government size granger causes economic growth in all the countries they studied. The finding was true for Ireland and the United Kingdom both in the long run and short run. The results also indicated that economic growth granger causes public expenditure for Greece and United Kingdom, when inflation is included.

Mitchell (2005) also evaluated the impact of government spending on economic performance in developed countries. He assessed the international evidence, reviewed the latest academic research, cited examples of countries that have significantly reduced government spending as a share of national output and analyzed the economic consequences of these reforms. Regardless of the methodology or model employed, he concluded that a large and growing government is not conducive to better economic performance. He further argued that reducing the size of government would lead to higher incomes and improve American's competitiveness.

Bose et al. (2007)also examined the effects of government expenditure for a panel of 30 developing countries over the decades of 1970s with a particular focus on sectoral expenditures and employed Seemingly Unrelated Regression technique. Their results revealed that the share of government capital expenditure in GDP is positively and significantly correlated with economic growth with the exception of recurrent expenditure which is insignificant.

Komain and Brahmasrene (2007) examined the association between government expenditures and economic growth in Thailand, by employing the Granger Causality Test. The results revealed that government expenditures and economic growth are not co- integrated. Moreover, the results indicated a unidirectional relationship, as causality runs from government expenditures to growth. Lastly, the results illustrated a significant positive effect of government spending on economic growth.

Gregorious and Ghosh (2007) made use of the heterogeneous panel data to study the impact of government expenditure on economic growth. Their results suggest that countries with large government expenditure tend to experience higher economic growth.

Another study by Brady (2007), investigated the relationship between government expenditures and economic growth in Thailand for the period 1993 to 2006 and employed Standard Granger Causality test and Ordinary Least Square (OLS) method. The results showed a unidirectional causality from government expenditure to economic growth without feedback. Furthermore, estimation from the ordinary least square confirmed the strong positive impact of government expenditure on economic growth during the period of investigation.

In India,Ranjan and Sharma (2008) examined the effect of government development expenditure on economic growth during the period 1950-2007. They discovered a significant positive impact of government expenditure on economic growth. They also reported the existence of co- integration among the variables.

Liu-Chih, Hsu and Younis (2008) examined the causal relationship between GDP and public expenditure for the US data during the period 1947- 2002. The causality results revealed that total government expenditure causes growth of GDP. On the other hand, growth of GDP does not cause

expansion of government expenditure. Moreover, the estimation results indicated that public expenditure raises the US economic growth. The authors concluded that, judging from the causality test Keynesian hypothesis exerts more influence than the Wagner's law in US.

Alexiou (2009) used pooled time series and cross-section data for 7 countries in the South Eastern Europe (SSE) spanning from 1995 to 2005 to carry out a survey study. The results indicate that out of five variables used in the estimation, government spending as dependent variable on capital formation, development assistance, private investment and a proxy for trade-openness all have positive and significant effect on economic growth, in contrast, population growth was found to be statistically insignificant.

Cooray, (2009) examined the relationship between government spending and economic growth for the period 1987 to 2006 by applying bounds testing approach and MWALD Granger causality test. The author found that the share of government spending and share of investment to GDP have negative impacts on economic growth in the long run.

According to Pham (2009), public spending is negatively correlated with economic growth due to inefficiency of the public sector especially in the developing countries where large proportion of public spending is attributed to non-developmental expenditure like defence and interest payments on debt.

In Nigeria, many authors have also attempted to examine government expenditure - economic growth relationship. Akpan (2005) used a disaggregated approach to determine the components (that include capital, recurrent, administrative, economic service, social and community service, and transfers) of government expenditure that enhances growth, and those that do not. The author concluded that there was no significant association between most components of government expenditure and economic growth in Nigeria.

Olugbenga and Owoye (2007) investigated the relationships between government expenditure and economic growth for a group of 30 countries during the period 1970-2005. The regression results showed the existence of a long-run relationship between government expenditure and economic growth. In addition, the authors observed a unidirectional causality from government expenditure to growth for 16 of the countries, thus supporting the Keynesian hypothesis. However, causality runs from economic growth to government expenditure in 10 of the countries, confirming the Wagner's law however, the authors found the existence of feedback positive relationship between government expenditure and economic growth for a group of four countries.

Olorunfemi, (2008) studied the direction and strength of the relationship between public investment and economic growth in Nigeria, using time series data from 1975 to 2004 and observed that public expenditure impacted positively on economic growth and that there was no link between gross fixed capital formation and Gross Domestic Product. He found that from disaggregated analysis, the result reveal that only 37.1% of government expenditure is devoted to capital expenditure while 62.9% share is to current expenditure.

The inconsistent relationship between public expenditure and economic growth is also supported by the findings of Olukayode (2009**)** who investigated the impacts of government expenditure on economic growth in Nigeria using time series data from 1977 to 2006 and adapting Ram (1986) model in which government expenditure is disaggregated into private investment, human capital investment, government investment and consumption spending at absolute levels. The results showed that all the expenditures have positive effects on economic growth.

Ighodaro and Oriakhi (2010) used time series data for the period 1961 to 2007 and applied Cointegration Test and Granger Causality test to examine government expenditure disaggregated into general administration and community and social services in Nigeria. The results revealed negative impact of government on economic growth.

Olopade and Olepade (2010) assessed how fiscal and monetary policies influence economic growth and development. The essence of their study was to determine the components of government expenditure that enhance growth and development, identify those that do not and recommend those that should be cut or reduce to the barest minimum. The study employs an analytic framework based on economic models, statistical methods encompassing trends analysis and simple regression. They find no significant relationship between most of the components of expenditure and economic growth.

Nurudeen and Usman (2010) result show that the variables- total capital expenditure, total recurrent expenditure, and government expenditure on education have negative effect on economic growth. While government expenditure on transport and communication, and health, have positive impact on economic growth.

Moreso, Abu and Abdullah (2010) investigated the relationship between government expenditure and economic growth in Nigeria from the period ranging from 1970 to 2008.They used disaggregated analysis in an attempt to unravel the impact of government expenditure on economic growth. Their results reveal that government total capital expenditure, total recurrent expenditure and Education have negative effect on economic growth. On the contrary, government expenditure on transport, communication and health result in an increase in economic growth. They recommend that government should increase both capital expenditure and recurrent expenditure including expenditure on education as well as ensure that funds meant for development on these sectors are properly utilized. They also recommend that government should encourage and increase the funding of anti-corruption agencies in order to tackle the high level of corruption found in public offices in Nigeria.

Loto (2011) investigated the impact of sectoral government expenditure on economic growth in Nigeria for the period 1980-2008 and applied Johansen co-integration technique and error correction model. The results inferred that in the short run expenditures on agricultures and education were negatively related to economic growth. However, expenditures on health, national security, transportation, and communication were positively related to economic growth, though the impacts were not statistically significant.

Lastly, Oni, (2014), carried out an analysis on the growth impact of health expenditure in Nigeria by employing multiple regression technique. The result showed that total health expenditure, gross capital formation and labour force productivity are important determinants of economic growth in Nigeria while life expectancy impacted negatively. It was observed from the study that increase in health expenditure over the years has raised the level of national income by enhancing the marginal productivity of labour as an average worker lives healthier and contributes more to gross domestic product (GDP) but that, lives are however, being shortened due to socio-political problems, incessant road accidents and other social violence ravaging the country.

- **Theoretical Review**

Generally, economic growth theory deals with long-run growth trend of the economy, or potential growth path (Branson, 2002). The focus is on factors that lead to economic growth over time and analysis of the forces that allow some economies to grow rapidly, some slowly and others not at all. Early growth theories emphasized on different aspects of the economy. For instance, Mercantilists emphasized surplus balance of trade, Physiocrats emphasized agriculture as the source of all wealth while the Cameralists favoured taxation and state regulation for strong economy (Lombardini, 1996). Some of the theories are explained below;

- **Musgrave Theory of Public Expenditure Growth**

This theory was propounded by Musgrave as he found changes in the income elasticity of demand for public services in three ranges of per capita income. He posits that at low levels of per capita income, demand for public services tends to be very low, this is so because according to him such income is devoted to satisfying primary needs and that when per capita income starts to rise above these levels of low income, the demand for services supplied by the public sector such as health, education and transport starts to rise, thereby forcing government to increase expenditure on them. He observes that at the high levels of per capita income, typical of developed economics, the rate of public sector growth tends to fall as the more basic wants are being satisfied.

- **The Wagner's Law/ Theory of Increasing State Activities**

Wagner's law is a principle named after the German economist Adolph Wagner (1835-1917). Wagner advanced his 'law of rising public expenditures' by analyzing trends in the growth of public expenditure and in the size of public sector. Wagner's law postulates that: (i) the extension of the functions of the states leads to an increase in public expenditure on administration and regulation of the economy; (ii) the development of modern industrial society would give rise to increasing political pressure for social progress and call for increased allowance for social consideration in the conduct of industry (iii) the rise in public expenditure will be more than proportional increase in the national income (income elastic wants) and will thus result in a relative expansion of the public sector.Musgrave and Musgrave (1988), in support of Wagner's law, opined that as progressive nations industrialize, the share of the public sector in the national economy grows continually.

- **The Keynesian Theory**

Of all economists who discussed the relation between public expenditures and economic growth, Keynes was among the most noted with his apparently contrasting viewpoint on this relation. Keynes regards public expenditures as an exogenous factor which can be utilized as a policy instruments promote economic growth. From the Keynesian thought, public expenditure can contribute positively to economic growth. Hence, an increase in the government consumption is likely to lead to an increase in employment, profitability and investment through multiplier effects on aggregate demand. As a result, government expenditure augments the aggregate demand, which provokes an increased output depending on expenditure multipliers.

- **The Solow's Theory**

Robert Solow and Swan introduced the Solow's model in 1956. Their model is also known as Solow-Swan model or simply Solow model. In Solow's model, other things being equal, saving/investment and population growth rates are important determinants of economic growth. Higher saving/investment rates lead to accumulation of more capital per worker and hence more output per worker. On the other hand, high population growth has a negative effect on economic growth simply because a higher fraction of saving in economies with high population growth has to go to keep the capital-labour ratio constant. In the absence of technological change &innovation, an increase in capital per worker would not be matched by a proportional increase in output per worker because of diminishing returns. Hence capital deepening would lower the rate of return on capital

3. Methodology

The causal/analytical research design was employed in this study. The reason being that it is the type that explains the cause, effect and relationship amongst observed variables in a research of this nature. The study covers Nigerian economy as a whole using data from 2000 to 2016, which is a period of sixteen (17) years

This study employed secondary data which were obtained from Central Bank of Nigeria (CBN) Statistical Bulletin (2017). The use of secondary data was necessitated by the fact that such data are readily available and easily accessible with less probability of inaccuracy. By virtue of the nature of this empirical study, the Ordinary Least Squares (OLS) regression method will be carried out to test the stated hypotheses. The statistical analysis package that was used is the E-Views 7.0.

- **Model specification**

In specifying the relationship between government expenditure and economic growth in Nigeria, the study adopted the model built by Nworji et al (2012) with some modifications. Total expenditure (Capital plus Recurrent Expenditure) was disaggregated into four components; total expenditure on administration, total expenditure on social and community services, total expenditure on economic services and total expenditure on transfer

Thus, the functional relationship between government expenditure and economic growth of Nigeria is expressed in the following way:

RGDP = F (TEA, TESCS, TEES, TET) ……1

The model to be estimated is specified thus:

$RGDP_t = \beta_0 + \beta_1 TEA_t + \beta_2 TESCS_t + \beta_3 TEESt + \beta_4 TET_t + \mu$.....2

Where;

RGDP = Real Gross Domestic Product (Proxy for Economic Growth)

TEA = Total Expenditure on Administration

TESCS= Total Expenditure on Social and Community Services

TEES= Total Expenditure on Economic Services

TET= Total Expenditure on Transfer

U = Stochastic variable or the error term.

A priori expectation It is expected that total expenditure on Administration, Social and community services, economic services and transfer will have a positive relationship with economic growth in Nigeria. i.e. $\beta_1, \beta_2, \beta_3, \beta_4 > 0$.

- **Operationalization of variables**

Real Gross Domestic Product (RGDP) of monetary Value of goods and services produced within a country over a period of time, adjusted for price level changes.

Total Expenditure on Administration (TEA) is the value of government total spending on administration, which comprises spending on general administration, defense and internal security, internal security and national assembly.

Total Expenditure on Social and Community Services (TESCS) is the value of government total spending on social and community services comprising basically education and health.

Total Expenditure on Economic Services (TEES) is the value of government total spending on Economic services comprising agriculture, construction, transport and communication and other economic services.

Total expenditure on transfer (TET) is the value of government total spending on transfers comprising public debt servicing, pensions and gratuities, contingencies/ subventions.

4. Presentation and analysis of regression result

The long run relationship between the dependent variable (RGDP) and the regressors is estimated using Ordinary Least square (OLS) technique. The result is presented in table 1 below:

Table 1: Long run Regression Result

Variables	Coefficient	T-Ratio	Prob
TEA	3.36	0.84	0.41
TESCS	15.57	3.08	0.01
TEES	8.95	3.04	0.00
TET	16.08	5.73	0.02
Adjusted R^2 0.99 DW Stat 1.67 F-Stat 459.94 (0.000)			

The result above reveals that after adjusting for the degree of freedom the model explained about 99% systematic variations in gross domestic product (GDP) as shown by the adjusted R-square of 0.99.

On the basis of the overall statistical significance of the model as shown by the F-statistics, it was observed that the overall model was statistically significant since the calculated F-value of 459.94, with the probability of 0.0000 is greater than the critical F-value at 5% level of significance. Thus, all the explanatory variables jointly have a significant impact on real gross domestic product in the long run and the existence of the hypothesis of a significant relationship between the dependent variable and the independent variables in the long-run is validated.

On the basis of the individual statistical significance of the model as shown by the t-ratios, the result shows that three of the explanatory variables; total expenditure on social and community services (TESCS), total expenditure on economic services (TEES) and total expenditure on transfer (TET) have significant relationship with real gross domestic product (RGDP) in the long run since their calculated t-values were greater than the critical t-value at 5% level of significance respectively. Total expenditure on administration (TEA) have no significant impact on real gross domestic product (RGDP) in Nigeria in the long-run.

The result also reveals that all the explanatory variables; total expenditure on administration (TEA), total expenditure on social and community services (TESCS), total expenditure on economic services (TEES) and total expenditure on transfer (TET) have the expected positive signs.

The coefficients of total administrative expenditure of 3.36 indicate that a unit increase in total administrative expenditure will bring about 3.36-unit increase in real gross domestic product. The coefficient of total expenditure on social and community services of 15.57 signifies that a unit increase in total expenditure on social and community services will lead to 15.57-unit increase in real gross domestic product. The coefficient of total expenditure on economic services of 8.95 denotes that a unit increase in total expenditure on economic services will lead

to 8.95-unit increase in real gross domestic product. lastly, the coefficient of total expenditure on transfer of 16.08 suggest that a unit increase in total expenditure on transfer will result to 16.08-unit increase in level of economic growth.

Finally, the Durbin Watson statistic of 1.67 which is approximately equal to 2.00, indicates the absence of autocorrelation in the model.

5. Conclusion and recommendations

This study has examined the effect of government expenditure on economic growth in Nigeria for the 2000-2016 period. Existing literature shows that researchers are yet to reach a consensus about the effect of government expenditure on economic growth in Nigeria. Therefore, the effect is yet to be well established. This study has contributed to the research effort at empirical measure of the effect of government expenditure on economic growth. Data analysis revealed that a relationship exists between government expenditure and economic growth, and that while three of the components of government expenditure exerted positive and significant effect on growth, one exerted positive and insignificant effect. As disaggregated components, total expenditures on economic services, total expenditure on social and community services and total expenditure on transfer exerts positive but significant effect, total expenditure on administration exert a positive and insignificant effect, on economic growth. However, the aggregated effect of government expenditure on economic growth is statistically significant. This supports the Keynesian (1936) view of government active intervention in the economy using various policy instruments. Also, as available CBN data on government expenditure and economic GDP exhibit increasing trend, the analysis equally supports the Wagner's (1813) postulate of Ever Increasing State Activity. Consequently, this analysis supports growing evidence that government expenditure has a relationship with and exerts significant effect on economic growth.

Based on our findings, the following recommendations are advanced.

1. Considering the current state of Nigeria's economy, capital expenditure should be greater than recurrent expenditure in order to lay the foundation for sustainable development and growth. There is need for rational utilization of the nation's resources.

2. Expenditures on items/activities that are irrelevant or have no significant linkage to growth should be avoided. Prudence on the part of the government is highly desired and this requires strong political will.

3. Higher budgetary allocation to capital formation is not just what is needed. Utilization of disbursed funds meant for capital projects should be closely monitored, especially in the area of procurement (of goods, services and works) as this constitute a major channel

through which political office holders and other government appointees connive with government contractors to siphon or embezzle public funds in the country.

4. The Bureau of Public Procurement (BPP) should be strengthened to carry out its functions effectively. Those entrusted with utilization of public funds for development purposes should be made to account for every kobo expended. To this end, the anti-corruption agencies in the country (EFCC, ICPC) should be empowered and equipped to effectively carry out their functions. They should be allowed to function independently, instead of being used as tool for witch-hunting political opponents.

5. Strong (effective and efficient) mechanism should be put on ground to ensure that the poor who are in the majority benefit from the expenditures of the federal government, as the state exists for the common good and none should be excluded from the benefits it offers. This is necessary to enhance improved welfare as the welfare of the people is a veritable ingredient for a robust economy.

6. Transparency, rationality, responsiveness, equity, accountability, efficiency, adherence to the rule of law, economy, should be the guiding principles in the utilization of public funds. Until these are observed, the intended objectives and goals of government expenditure will not be realized.

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AN ASSESSMENT OF WORKSHOP FACILITIES MANAGEMENT PRACTICES IN TECHNICAL COLLEGES OF EDO STATE

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Abstract
Craftsmen and Technicians are invaluable in the practice of the Engineering profession. The major goal of technical college education is to produce efficient and relevant craftsmen and women that will promote industrial development in the area of maintenance, goods production and general services. Incidentally, these technical colleges appear not fulfilling these objectives due to haphazard management, inability to equip students with the requisite skills, attitude and knowledge needed for gainful employment. This study was carried out to assess the workshop facilities management practices in Technical Colleges in Edo State. A structured questionnaire was developed and administered to the technical teachers and administrators. Mean and standard deviation were used to analyze the data obtained from the respondents. It was found that among others, facilities were not arranged according to existing engineering principles, technical teachers were not involved in planning of the workshop facilities and maintenance were poorly implemented. With these findings, it is recommended that all stakeholders especially the technical teachers should be involved in planning and management of workshop facilities and the implementation of the relevant maintenance policies required in keeping these facilities in good conditions.
Keywords: *Facilities, Technical Colleges, Planning, Management and Maintenance*

Introduction

National Policy on Education (2004) made the production of craftsmen, artisans and other sub-professional skilled personnel the responsibility of technical college education and maintained that on completion of the technical college programmes, they shall;

- Secure employment either at the end of programme or after completing one or more modules of employable skill.
- Set up their own business and become self-employed and be able to employ others
- Pursue further education in advanced craft and technical programme in tertiary technical institution such as science and technical colleges, colleges of education (technical), polytechnics and universities.

However, these goals cannot be attained if the workshop facilities are not effectively managed. Workshop facilities management practices involve the various strategies and techniques of running these workshops. Workshop facilities management techniques are various ways or methods adopted with a view to deploying the facilities necessary to enable the students to acquire the requisite practical skills and knowledge. In the same vein, Danjuma, (2008) added that techniques are important ways which when appropriately adopted results into effective teaching and learning of practical subjects. According to Agu (2006), techniques are ways or mode of doing things such as planning techniques for training workshops. Nwachukwu (2003) noted that for any effective instruction in the workshop, appropriate instructional techniques must be arranged, utilized and kept in order so that an acceptable occupational work habit and operational procedure are successfully imparted. In effective planning, there must be among others, appropriate selection and positioning of facilities such as materials, tools and equipment (Olaitan, 2003). He also noted that all devices and facilities to be used must be safe and in good operational condition. Okoro (2000) emphasized that preventive and other maintenance techniques must be implemented for the facilities to be sustained in good operational condition.

Organizing techniques for workshops facilities: Organization in the workshop entails the arrangement of tools and equipment in the order they should be utilized and in the step to step delivery of instruction. These techniques include, equipment and tools to be organized in sequence like uses, sizes and colours and other criteria as specified by Engineering principles of arrangement for easy accountability. Tools to be arranged so that teachers and instructors can inspect and immediately identify worn out, broken and lost or damaged tools.

Coordinating technique for workshop facilities: According to Whawo (1999), coordinating is the bringing together of related activities in school workshop to ensure frictionless flow of work.

Wale (2004) looked at coordinating process in terms of workshop facilities management as ensuring that all facilities involved in the teaching and learning process are adequate, in good state, maintained and are brought together, harmonized and unified for effectiveness of workshop instruction. Akpakwu (2008), in his contribution said that coordinating is the synchronization of safety of students and material resources to achieve effective workshop instructions.

Workshop management techniques keep the workshop materials, machines, tools and equipment in good working conditions if properly applied the teachers, managers and all the stakeholders. In line with the statement above, Ogwo and Oranu (2006) observed that good workshop facilities management do enable students to exercise self-control and influences the amount of time they are engaged in meaningful learning. It as well enables the teacher, with the aid of other workshop attendants and other personnel in the workshop to ensure that records are kept, materials are supplied/improved and cared for tools and equipment are well maintained and accident are prevented.

However, Oshiobugie (2014) observed that many technical colleges in Edo state are not organized and planned for daily routine activities and that there are frequent damage to tools, fixtures, equipment and machines by students and teachers. Accidents occur frequently in the workshops and the few facilities needed to be maintained to achieve the objectives of technical colleges. Enemali (1994) lamented that technical colleges are haphazardly managed and lack the ability to equip students with requisite skills, knowledge and attitude needed for gainful employment. It is probable that workshop facilities management practices adopted by the teachers may be responsible for these. Therefore there is need to assess the management of the available workshop facilities in some technical colleges in Edo State with a view to ascertaining whether the existing practices adopted in planning, storing and maintenance of workshop facilities affect the students performances. Assessment in this context which is in line with UNESCO (2002) is a systematic process of generating data about effective management of workshop facilities for the purpose of making evaluative judgments.

Methodology

In order to obtain relevant data to achieve the purpose of this research, the following research questions where formulated to guide the study;

1. What are the current workshop management practices utilized in the planning of facilities in Technical Colleges in Edo State?
2. What are the present workshop management principles used for storing the various training equipment, materials, machine spares etc.
3. What are the workshop facilities maintenance management techniques adopted?

4. What management mechanisms or techniques should be adopted in the management of workshop facilities in the technical colleges in Edo State?

To achieve the above, a survey research was adopted. A total of 160 respondents which consist of 123 technical teachers and 38 administrators of the three technical colleges in Edo State formed the population of the study. A questionnaire structured in the form of WFMPAQ was developed by researchers and is validated by experts from the industrial and Technology Education Department. Four rating scales of strongly agree (4), Agree (3) disagree (2) and strongly disagree (1) was assigned to the questionnaire and were distributed to the teachers and administrators of these technical colleges. The return rate of the duly filled questionnaires was 90.2%. To analyze the data, mean and standard deviation was applied as the statistical tools while a t-test statistics was used for testing the hypothesis at 0.05 significant level. To benchmark the results for acceptance or rejection, a mean score of 2.50 was used. The implication is that items with a mean score of 2.50 and above were considered *agreed* while those with a mean score below 2.49 were considered *disagreed*.

The results have been presented according to the research questions using the following parameters;

N_1 - Number of Technical teachers N_2 - Number of Administrators

X_1 - Mean responses of Technical teachers X_2 - Mean responses of Administrators

X_t - Mean responses of all respondents and $X = \frac{1}{2}(X_1 + X_2)$

Results and analysis

The results have been presented in tabular forms and analysis according to the four research questions.

Research question 1: What are the current workshop management practices utilized in the planning of facilities in technical colleges in Edo state?

Table 1: Mean responses of technical teachers and administrators on the current workshop management practices utilized in the planning of facilities in technical colleges.

$N_1 = 123$, $N_2 = 38$

S/N	Items	X_1	X_2	X_t	Decision
1.	Technical teachers participate in the planning of workshop facilities	3.48	2.64	3.06	Agree
2.	Course contents for programmes determines the planning of existing facilities	2.74	2.54	2.64	Agree
3.	Improper planning of facilities leads to failure	4.56	4.68	4.62	Agree
4.	Learning objectives influences the planning of workshop facilities	2.95	2.85	2.90	Agree
5.	Student enrolments are taken into cognizance when planning the workshop facilities	3.86	3.78	3.82	Agree
6.	When planning the training facilities, attention is given to the topic areas	3.07	3.03	3.05	Agree
7.	Planning of facilities assist in achieving the objectives of the school.	2.67	2.53	2.60	Agree
8.	In planning the available facilities, provisions for spare parts are taken into consideration	2.92	2.77	2.88	Agree

From table 1, it is revealed that the two set of respondents agree with all the items as workshop management practice adopted in planning of training facilities in the technical colleges of Edo State.

Research Question 2: What are the preset workshop management principles used for storing the various training equipment, materials, machine spares etc.

Table 2: Mean responses of technical teachers and administrators with respect to the storage of the various training facilities.
$N_1 = 123, \quad N_2 = 38$

S/N	Items	X_1	X_2	X_t	Decision
1.	Hand tools are stored in the tool room	2.38	2.02	2.20	Disagree
2.	Bench tools are stored properly	1.56	2.00	1.78	Disagree
3.	Appropriate tool inventory system is adopted	2.12	2.48	2.30	Disagree
4.	Workshop facilities are kept in accordance with Engineering principles of arrangement	1.78	2.46	2.12	Disagree
5.	Available facilities having adequate storage space	1.38	2.42	1.90	Disagree
6.	Proper inventory of facilities kept	1.90	1.70	1.80	Disagree
7.	Tools are stored in rack and boxes	1.66	2.10	1.88	Disagree
8.	Training facilities are kept under the care of technical teachers	2.36	2.04	2.20	Disagree
9.	School Administrators are actively involved in the storage of training facilities	2.32	2.08	2.20	Disagree
10.	Training facilities are kept under the care of store keeper	2.12	2.16	2.14	Disagree
11.	There is regular audit training facilities	1.86	2.02	1.94	Disagree

Analysis in table 2 revealed that the respondents jointly disagree with all the items as workshop management practices adopted for storing of available training facilities in the technical colleges.

Research question 3: What are the workshop facilities maintenance management adopted in the technical colleges?

Table 3: Mean responses of technical teachers and administrators in the maintenance of workshop training facilities in technical colleges.
$N_1 = 123, \quad N_2 = 38$

S/N	Items	X_1	X_2	X_t	Decision
1.	Tools and equipment are repaired after complete breakdown	2.60	1.00	1.80	Disagree
2.	Tools and equipment that have been damaged are left without effort to repair them	2.12	2.04	2.08	Disagree
3.	Students are encouraged to clean tools and equipment after use	3.86	2.74	3.30	Agree
4.	There is regular maintenance of tools and equipment in the workshop	3.76	3.00	3.38	Agree
5.	Damaged tools are replaced by students	1.18	1.98	1.58	Disagree
6.	Machine lubrication is done as prescribed	3.77	3.03	3.40	Agree
7.	Lubricants are readily available in the workshops	2.66	3.54	3.10	Agree
8.	Technical teachers adopt appropriate maintenance principles for tools and equipment	1.30	2.10	1.70	Disagree
9.	There is planned maintenance policy in workshop for equipment maintenance	1.94	1.78	1.86	Disagree
10.	There are operating manuals for the equipment	1.9	1.70	1.80	Disagree

	and machines				
11.	There is regular service of the training facilities	2.05	2.05	2.05	Disagree
12.	Preventive maintenance is observed on regular basis	2.00	2.14	2.07	Disagree
13.	Adequate funding are provided for maintenance activities	2.10	1.70	1.90	Disagree
14.	Maintenance activities involving outside personnel or original equipment management (OEM)	2.24	1.16	1.70	Disagree

From table 3, it is seen that the respondents have different views in some items on the workshop management practices adopted in the maintenance of training facilities in the technical colleges.

Research question 4: What are the management mechanisms that should be adopted in the management of workshop facilities in the technical colleges?

Table 4: Mean responses of technical teachers and administrator on the mechanisms adopted in the management of workshop facilities in technical colleges.

$N_1 = 123$, $N_2 = 38$

S/N	Items	X_1	X_2	X_t	Decision
1.	Disciplinary action should be taken in the event of theft	3.48	3.32	3.40	Agree
2.	Adequate security should be provided for the training facilities	3.10	3.04	3.07	Agree
3.	Technical teachers should be engaged in the management of training facilities	3.30	2.10	2.70	Agree
4.	Workshops, seminars and conferences should be organized periodically for technical teachers	2.66	3.10	2.88	Agree
5.	There should be adequate and regular training for technical teachers	3.44	2.56	3.00	Agree
6.	Adequate supervision should be given when carrying out lubrication and other maintenance activities	2.66	3.10	2.88	Agree
7.	Tools and equipment should be stored and positioned according to Engineering principles of arrangement	2.70	3.10	2.90	Agree
8.	Proper layout of workshop to show carriage way s and location of machine tools and fixtures	3.30	3.10	3.20	Agree

Analysis in table 4 revealed that the respondents jointly agree with all the items as the mechanisms that should be adopted in the management of workshop facilities in the Edo State technical colleges.

Findings and discussion

As contained in table 1, it is found that the respondents together disagreed with all the items, as current workshop practices employed in the planning of facilities in the Edo State Technical Colleges. This paper is of the opinion that planning of the workshop facilities should be predicated on what a workshop is designed for and should further be determined by the type of tools, equipment and the students to be engaged at a time. This is in consonance with Aromolaran (2000) who opined that effective planning of workshop training facilities to a large extent determines the level of achievement of learning objective.

Findings in table 2 revealed that the respondents disagreed with all the items as workshop management practices adopted for the storage of available training facilities in technical college. This response agreed with Ekah (1981) who posited that most technical colleges lack the storage capacity for consumables, working tools and materials. It has also been found that storage facilities like racks and boxes for tool storage are not available in most of the technical colleges. The view of this paper is that effective tool inventory system and involvement of technical teachers for proper storage and management of materials and tools to ensure easy reach of students are generally absent in most of the technical colleges.

Table 3 summarizes the views of the respondents on items in respect of the workshop management practices adopted in the maintenance of training facilities. The findings revealed that although lubricants are available in the workshops but there has not been any planned maintenance policy to cater for equipment maintenance. This is in agreement with the views of Doyin (2004) who posited that lack of planned maintenance policy affect the facilities in the workshop which according to him results to poor teaching and learning of the technical courses in the technical colleges. However, this paper is of the view that any maintenance policy that is adopted should provide well organized maintenance instructions with periodic inspections to ensure compliance.

All the items, in respect of the mechanisms that should be adopted in the management of workshop training facilities in technical colleges in Edo State were agreed upon by the respondents. Based on these responses, it is the opinion of this paper that there should be provision for better conditions of service, a clear-cut code of conduct, broad minded workshop management and maintenance policy and periodic organization of workshops and seminars for technical teachers and workshop personnel in order to update their skills.

Conclusion

The aims and objectives of the technical colleges cannot be fully realized as a result of improper planning and management of workshop training facilities, poor or improper storage of available training facilities, poor or effective maintenance programmes for these facilities as well as lack of effective mechanisms to effectively manage workshop training facilities in Edo State technical colleges. It is evident that if the findings from this study are effectively implemented, the objectives of the establishments of technical colleges would be achieved.

Recommendations

Based on the findings above, this paper recommends the following:

- The Management of Technical Colleges should strive to engage technical teachers and workshop personnel with good skills and training habit.

- There should be adequate and proper storage facilities for tools, equipment materials and other workshop training facilities and their arrangements must be in consonance with engineering principles of arrangement.
- There should be renewed interest in ensuring adequate security for workshop facilities. All stakeholders must be involved in the implementation of security activities
- Technical teachers should be allowed to participate in the planning of workshop facilities and should be made to attend workshops and seminars in order to improve on their skills on regular basis.
- There should be a clear-cut maintenance policy and the strategy of implementation must be understood by those concerned, preventive maintenance activities should be implemented and monitored to achieve a reasonable level of compliance to maintenance schedules.

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EXAMINING THE LEVEL OF COMPLIANCE TO SAFETY AND HEALTH REGULATIONS IN MECHANICAL ENGINEERING WORKSHOPS OF AUCHI POLYTECHNIC

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Abstract

Unsafe conditions are undesirable in Engineering workshops and the consequences of non or poor implementation of safety and health regulations cannot be overemphasized. In this work, the level of compliance of the activities of the Mechanical Engineering Workshops to safety and health regulations was examined and evaluated by benchmarking the practices with world best safety and health regulations. The relationship between safety and health regulations performance in terms of downtime and availability and usage of Personal Protective Equipment (PPE) was also assessed in this study. Primary data was obtained from a target population of the mechanical workshops namely; Foundry. Welding and Fabrication, Machine shop 1 and Machine shop 2. This study used these data which were gathered by means of a self-administered questionnaire issued to the respondents and a secondary data that was extracted from internal operational reports in the various workshops. The data were processed using some statistical tools and the results obtained were critically examined and benchmarked with world best standards. It was established that the Mechanical Engineering Workshops of Auchi polytechnic has in place a moderate safety and health regulations policy and practices. However, when these practices were benchmarked with world best standards it was apparent that downtime of machines was extremely high but surprisingly, the availability of PPE and machine guards recorded very good results. This study conclude that although the workshops implements a moderate safety and health regulations practices, the high downtime of machines and loss of productivity recorded was as a result of poor adherence to safety and health regulations and guidelines. The study recommend that the Department of Mechanical Engineering in collaboration with the polytechnic management, should undertake a general survey to determine the actual impact of improving safety and health regulation practices in terms of reduction in accidents, breakdown of machines and equipment and delay of production, reliability of workshop staff and profitability of the workshops. Other recommendations have also been made in this report.

Keywords: *Regulations, Safety and Health, Standards, Compliance and Downtime*

Introduction

There is no doubt that Mechanical Workshop is indispensable in the training of students offering technological courses in educational institutions. Due to the various activities carried out in such workshops, accident could result because of wrong handling, inappropriate positioning of equipments and tools, inadequately trained technical and related personnel thereby causing damages to equipments and devices (Machida, 2009). Undoubtedly, accidents occur in industries and if not minimized or checked would ultimately affect productive management of the workshops in educational institutions in general.

Yakubu (2014), in his study on Engineering Workshops of some selected institutions in Nigeria revealed that some students in the workshop often sustain injuries, damage tools and render machines non-functional during practical work, He also posited that in most cases, it was as a result of non-observance of simple workshop rules and regulations and in some cases these students are being exposed to hazards without the necessary safety instructions to guide them during practical exercises. He went further to explain that lack of adherence to safety rules in Mechanical Workshop has rendered many tools, machines and materials in-effective. Provision of safety equipment, tools, fire extinguishers, first aid boxes and dispensaries environment where mechanical workshops are sited have been neglected (Akinyele, 2010). Lecturers often fail to inculcate safety practices skills into the students due to the fact that instructional aides such as posters, bulletin boards and films are not provided by the authority concerned. Where they are available the lecturers may lack the knowledge and skills to apply and administer the safety tools and equipment. Also, some activities or operations (gas welding, cutting, drilling) in the Mechanical Engineering Workshop sometimes inflict serious injuries to students such as deep cut, arc burns, electric shock and even serious explosion during gas welding in some instances. If safety practice skills are identified and included in the training of students, there are possibilities of reducing accident, damage to tools, machines and wastage of materials in Engineering Workshops.

Mechanical Workshop safety encompasses all aspects of maintaining a safe workplace, including workplace arrangement, environmental health risks and unsafe work practices conditions. Safety in the workshop, according to Ezenwa, (2001) means having an environment free from injury and hazards. Proper processes and procedures, if applied by students and staff in the workshop will ensure safety. When educational institutions take measures to ensure a safe working environment for their students and staff, there is often increased morale and dedication to their workshop practice. Safe workplaces suffer fewer lost-times, accidents and worker's compensation claims, thus increasing financial performance (Idoro, 2011). The management of health and safety in engineering workshops is about identifying the potential risks and adopting the right precautions taking account of time, money and resources.

The role of management in the Health and Safety issue is stressed byIdoro (2008) who emphasized that management should issue a written statement of safety policy, establish an organization and allocate responsibilities of workshop in health and safety matters, establish safety committee ensure first aid facilities exist, provide appropriate procedures and document to

minimize accidents, consult with safety representative with a view to making and maintaining arrangement which promote and develop measure for safety and health of employees and checking the effectiveness of such measures.

According to Olubukola (2011), safety training spells out the rules and provides information on potential hazards and how to avoid them. It is part of a preventive program done through: induction course; transfer to new job or change in working methods; refresher course and training should be provided to deal with aspects of health and safety to employees. Weil (1991) argues that lack of experience and poor training are the main cause of accidents at work.According to article 6(c) of the occupational safety and health act, it is the duty of the employer to ensure the health, safety and welfare at work of all persons in the workplace, this involves the provision of such information, instruction, training and supervision as is necessary to ensure that health and safety at work of every person employed (World Health Organization, 2007). Every employee should be made aware of any risks from new technologies imminent danger and ensuring that person employed participates in the application and review of health and safety measures management commitment gives a powerful message to the workforce by what they do for health and safety, they should personally get involved in health and safety inspections and audits, health and safety consultation meetings and also in the investigation of accidents, ill-health and accidents.(Adeogun & Okafor, 2013)

According to Fajana (2012), a number of regulations on management of health and safety at work came into force in 1993 requiring employees to undertake risk assessment exercise intended to identify potential dangers to health and safety. Bankole and Lawal (2012), adds that risk assessment identify hazards and quantify the risks attached to them. The occupational safety and health act. TheSafety and Factory act of 1958 have stipulated certain regulations that must be adopted as standards in engineering workshops. Even with the periodic review of the act to world best standards and practices, it has been observed that establishments are still poorly compliant with these provisions (Kalejaiye, 2013).

The mechanical workshop in Auchi Polytechnic is made up of three workshops consisting of the foundry workshop, welding and fabrication workshop and machine shop. The users which include; Lecturers, Instructors, Technologists, students, and other technical staff could be susceptible to accidents due to the nature of operations involved. The operations include welding and fabrication,foundry and casting, forging, machining and fitting. These operations also involve working with hot metals, sharp objects, working with infra-red light, combustible gases and substances, hazardous tools, materials and equipment. For these operations to be carried out effectively, users must possess safety practice skills in order to prevent or totally eliminate occurrences of accidents which will result in human and material resource wastage.

This study was carried out to establish the extent to which health and safety management system is implemented in Mechanical Engineering Workshops of Auchi Polytechnic and also to investigate whether the level of compliance of workshop safety and health is in line with world

best practices. More so, this study is also embarked on with a view to finding out the impact of safety management on workers performance in the workshops.

Methodology

This work was designed to obtain data required for the identification of safety and health practices in the workshops of Mechanical Engineering of Auchi Polytechnic, Auchi, comparing them with world best practices and determining the influence it has on personnel and student performance.. The primary data was gathered through objective observations and survey. The main instrument for data collection was structured questionnaires that allowed for uniformity of responses to questions administered. Questions were constructed so as to address specific objectives and provide a variety of possible responses. Data collected were subjected to statistical test in order to evolve probable and recommendable solutions. The respondents included Lecturers, Technologists, Foremen and Technicians. The study targeted a sample population of 36 staff in all the operational areas of a population of 150 staff and students.

The population of study was drawn from the Foundry, Welding and Fabrication, Machine Shop and Air Conditioning and Refrigeration in the Department of Mechanical Engineering of Auchi Polytechnic. Stratified random sampling method was used to select sample unit. According to (Kothari, 2004), a sample of 25 percent of the population is adequate when the sampling frame is well stratified.To establish the relationship between the safety and health practices and workers and students' performance, secondary data was required. The secondary data like past studies, financial records (for procurement of first aid equipment, treatment and PPE) and operation's department's reports were utilized in this study. The data collected under this category were for a period of not less than 5 years. However, due to the difficulty in establishing past detailed safety practices, the data captured was limited to costs on safety operations, fire extinguishers and procurements and servicing, and provision and replenishment of the first aid boxes as a measure of safety and health regulation compliance.

The questionnaires were administered to 49 Technical Staff and Students who utilizes the workshops in the Department of Mechanical Engineering of Auchi Polytechnic with a return rate of 91.84% response. The entire return rate is statistically representative, therefore, enhancing generalization of the research results. Of the 45 workshops operators and students who participated in this study, 48.89% had attained diploma or higher national diploma level of education,17.78% had degree level of education and 3 of them equal to 6.66% had masters' degree. This indicates that the workshops operators and students have attained necessary knowledge to respond to the questions. More so, 9 of them equal to 20.00% were from the Foundry Workshop, 10 of them equal to 22.22% were from the Machine Shop 1, while 7 of them equal to 15.56% were from the Machine Shop 2. The Welding and Fabrication Workshop had a representation of 33.33%. The reason is thatthe section has experiences the highest level of activities. Air conditioning and refrigeration workshop had the least representation of 8.89%. This distribution indicates that all the areas were represented.

The study used quantitative method of data analysis. To ensure ease of analysis and minimize the margin error, the questions were coded according to each of the separate variables. Available data analysis tools and software packages were used to analyze the primary data. The statistical technique of regression analysis was specifically used to analyze the secondary data to determine the relationship between the machine or equipment or facilities/operators availability against their respective breakdown (downtime) due to improper or non adherence to safety and health regulations. The raw quantitative data was keyed into the computer and analyzed using Statistical Package for Social Sciences (SPSS) program.. The model used in the study is given as:

$Y = a + \beta_1 X_1 + \beta_2 X_2$, Where β_1, β_2 = Correlation coefficients

Y= Machine or equipment or facilities/operators availability

X_1 = Safety and Health Related Costs, X_2 = Number of Breakdowns.

Results and analysis

The data obtained were processed and the results summarized in tabular form in line with the items on the questionnaires and the results benchmarked with world best regulations and practices

Table 1 addresses the general understanding of safety and health regulations and practices in the various mechanical workshops and their respective consequences

Table 1: Safety and Health Regulation Practices in Mechanical Workshops

S/N	Description	Frequency	
		Yes	%
1	Are you familiar with safety regulations?	45	100
2	Are you familiar with health regulations?	45	100
3	Are you familiar with safety and health provisions?	45	100
4	Are you familiar with the usage of PPE and Fire Extinguishers?	21	46.67
5	Are you familiar with the peculiar safety and health regulations of the equipment, machines and facilities?	42	93.33
6	Do you observe safety and health regulations in your operations and activities in the workshops?	41	91.11
7	Are these peculiar safety and health regulations implemented for the respective machines and equipment?	41	91.11
8	Are the peculiar safety parameters during operations benchmarked to any known standard?	40	88.89
9	Does your section have an annual safety and health training plan for every workshop staff?	26	57.78
10	Do you have a service level agreement for provision of PPE, First Aid Provisions and Fire Extinguishers (and/or the Servicing)?	6	13.33
11	Has any injury been recorded due to failure or improper adherence to safety and health rules over a period of five years?	31	68.89
12	Has there been any breakdown in machines and equipment due to unsafe acts over a period of five years?	29	64.44
13	How many breakdowns have been recorded in five years and what was the average machine/equipment downtime?	18	40.00

As shown in table 1, all the respondents (100%) were familiar with safety and health regulations and less than 47% of them use Personal Protective Equipment (PPE) and Fire Extinguishers on instances of fire outbreaks. Equally, over 91% of the respondents observe safety and health regulations in operations and activities in the workshops. The respondents were divided

in the ratio of 26:19 on existence and non existence of an annual training program for the workshop staff. However, majority (86.67%) of them indicated there were no service level agreements for provision of PPE, First Aid Provisions and Fire Extinguishers (and/or the Servicing).

A reasonable percentage (68.89 %) of the respondents confirms that injuries had been sustained over the specified period due to non adherence to safety and health guidelines. 64.44% of the respondents agreed that there has been breakdown of machines/equipments due to unsafe acts over the specified period and from the response of 40.00% of the respondents, it took an average of about one month to restore such breakdowns.

Table 2 addresses the objective of benchmarking and evaluation of Mechanical Engineering Workshops Safety and Health practices with the world best practices.

Table 2: Benchmarking and Evaluation of Mechanical Engineering workshops Safety and health practices with world best practices.

S/N	Description	Mechanical Engineering Workshops mean	Standard Deviation	Benchmark	% Variation
1	Machine guards availability BM(>95)	89.98	0.76	95	5.28
2	Percentage of daily work carried out with PPE BM(> 95)	77.02	2.71	95	18.92
3	Variance between cost of implementation of safety and health regulations work BM (5%)	3.93	0.16	5	21.40
4	Percentage of workshops covered with first aid facilities BM(90)	70.21	4.49	100	29.79
5	Percentage of workshops with serviceable fire extinguishers BM(100)	66.47	4.30	95	30.03
6	Percentage of workshops with local exhaust systems BM(100)	65.04	5.27	100	34.99
7	Percentage of safety and health regulations trainings BM(90)	44.76	3.81	70	36.06
8	Response rate to injuries and breakdown within an hour BM (75%)	35.90	5.89	75	52.13
9	Percentage of total overtime for restoration of downtime as a result of injuries BM (5%)	9.52	0.68	5	(90.40)
10	Percentage of safety and health provision costs BM (15-30%)	10.08	1.87	22.5	52.20
11	Callouts per month for provision of safety and health facilities BM	7.50	0.38	5	50.00
12	Percentage of work orders generated by breakdowns due to unsafe act BM(10)	40.08	4.53	10	(300.80)

As shown in table 2, there were four parameters where the Mechanical Engineering Workshops of Auchi Polytechnic's safety practices variance against the world best practices were in

the range from 29.79% to 36.06% close. These variables were Percentage of workshops covered with first aid facilities, Percentage of work with serviceable fire extinguishers, and Percentage of workshops with local exhaust systems and Percentage of safety and health regulations trainings.

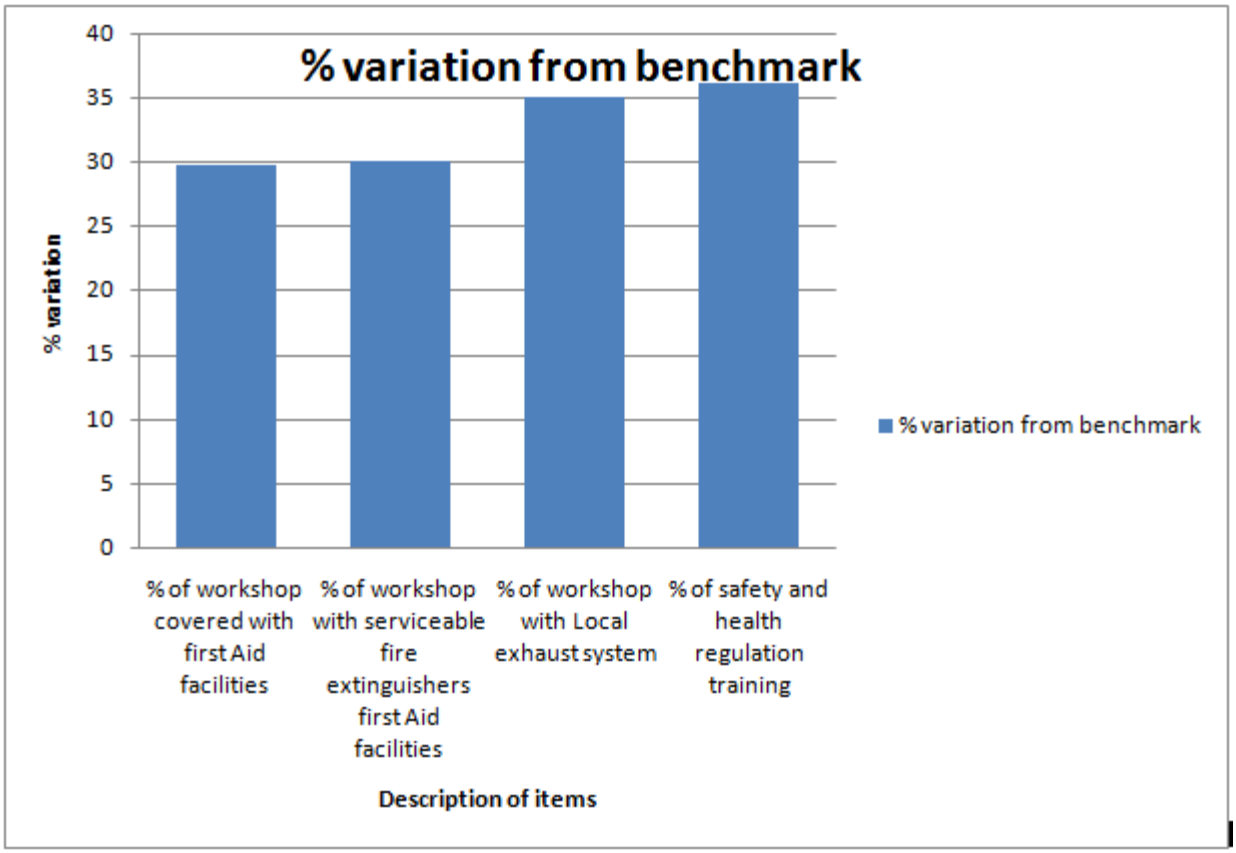

Figure 2: Variance against Benchmarks

All the four aspects of safety practices shown in fig. 2 involved the approval and subsequent provision of money for their implementation. The bureaucracy in government owned tertiary institutions and paucity of funds experienced in this sector is largely responsible for the big variance recorded when benchmarking them. Other areaof utmost concern as evident in the variances which are extremely high are as shown in fig 3.

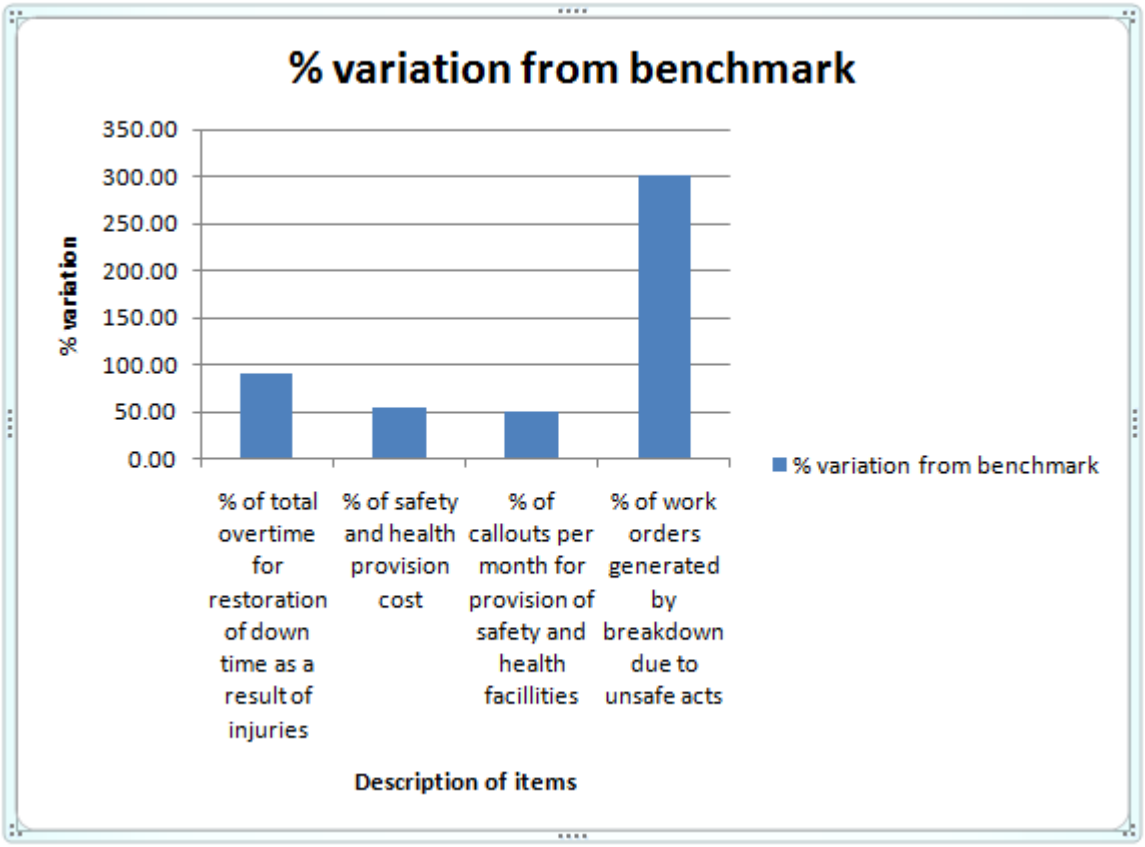

Figure 3: Safety and Health Regulation Implementation Costs

The figure3 above compares safety and health regulations implementation aspects in relation to costs. With the highest score of 300.80% recorded on percentage of work orders generated by breakdowns due to unsafe acts, Percentage of safety and health provision costs was moderately high as well as callouts per month. This really compromises the level of compliance to safety and health regulations. Comparatively, Machine guards availability recorded the best performance of a small variance of 5.28%

DISCUSSION

From majority of the respondents, it is evident that lack of safety equipment such as the PPE and the non or, irregular servicing of the fire extinguishers in the various workshops is undoubtedly an impediment to the compliance to safety and health regulations. It has also been found that the workshops staff are not adequately and regularly retrained on the specific safety measures that must be ensured will utilizing most of the facilities, machines, equipment and tools. When the present level of compliance to safety and health regulations in the workshops was compared to world best practices, it was found that the best performance was recorded on machine guard availability with the smallest variance of 5.28%. Four of the items recorded moderate variations of between 29.79% and 36.06% with world best practices. It was also confirmed that injuries have been sustained due to non adherence to safety and health guidelines and in some cases, resulting to equipment or machine breakdown. It has also been found that it took an average of one month for such equipment or machine to be repaired or restored. The reason is easily discernable with the high variance of 300.8% recorded for repair orders generated by breakdown due to unsafe acts. This compromises the reliability of the equipment and facilities and the productivity by these workshops. From the findings, majority of the Technologists, Technicians and Students had scarcely adopted and implemented any meaningful health and safety management system in these workshops. In agreement with Olubukola, 2011, this paper suggests that a guiding principle that involves developing a workshop health and safety policy should be implemented. More so, there should be a periodic organization of training in the compliance with the provisions of health and safety performance standards

Conclusion

The study found that there is awareness of safety and health regulations by the users of the Mechanical Engineering Workshops in Auchi Polytechnic. However, some of these regulations and guidelines appear not to have been strictly adhered to. It was found that the PPE's and provisions for first aid have not been adequate and regular. More so, the fire extinguishers have been found to be inadequate and at most times not in good service conditions. There have also been a significant number of machine downtimes and injuries sustained as a result of unsafe acts. On such occasions there had been poor response to make such equipment or machinery available. There were no existing contract agreements between the Institution and the manufacturers on the provision of PPE, First aid facilities, Fire extinguishers and Spares due to breakdown cause by unsafe activities. The level of breakdown maintenance carried out due to unsafe acts was found to be extremely high compared with world's best practices. Machine guards' availability was the best performance on the benchmarked categories. The study further showed that the Response rate to injuries and breakdown within an hour was poor and significantly varied from world best safety and health practices.

Recommendations

To improve the level of compliance of health and safety regulations in the Engineering workshops of Auchi Polytechnic and also to ensure that they are practiced according to world standards, the following recommendations are made;

- All operators of the workshops must be provided with safety manuals on the use of the various machines, facilities, equipment and tools.
- The department should liaise with management of the polytechnic to ensure the provision of fire extinguishers, safety kits and first aid equipment and their sustenance.
- All the operators and workshop staff should be periodically and adequately retrained on modern knowledge of safety and health regulations practices in line with world standards.
- The school management should enter into service level agreements for the maintenance and provision of spares so as to facilitate maintenance and repair in the event of breakdown. This will significantly reduce downtime due to breakdown.
- Managers of the workshops should ensure and sustain strict monitoring, adherence and compliance to the safety policy without any alteration.
- The Department of mechanical Engineering in collaboration with the management of the polytechnic should undertake a general survey to determine the actual financial impact of improving safety and health regulations in terms of reduction of accidents, failures of machines and equipment, production delay, reliability of workshop staff and profitability of the institution. It is believed by this researchers that the result, if properly conducted will encourage the management to put all the machinery in motion to ensure that all that is required is done to secure compliance to safety and health regulations.

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IN THE NIGERIAN BUILDING SECTOR (A CASE STUDY OF EDO STATE)

BY

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Abstract

Cost estimating is the forecast of project costs that is performed before any significant amount of information is available from detailed design. One of the challenges faced by project managers is selection of the most accurate cost estimate at completion method to improve tracking their project. The objectives of this study were to identify cost estimating techniques in the Nigerian building sector, to assess the effects of design variables on the cost of a building and to evaluate the variables which affect the accuracy of estimating project in the Nigeria building sector. The aim of the study is to assess the accuracy of cost estimating techniques with a view to improving the accuracy of estimate in the Nigerian building industry. A total of 65 questionnaires were administered to various categories of respondents and 42 of them were collected and found suitable for analysis. The targeted population include Client, Contractors, Engineers, Quantity Surveyors, Builders and Project managers. Mean Score and Ranking were used in analyzing data collected. It was observed that cubic metre method was ranked first by the respondents as the most frequently used estimating technique. Based on the findings, it was recommended that cost estimating of the projects should be well harnessed in order to arrive at accurate estimating of construction projects before the commencement of actual execution of such projects.
Keywords: Estimating, Techniques, Building, Cost

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1.1 Background of the Study

Cost estimating is defined as the forecast of project costs that is performed before any significant amount of information is available from detailed design and with incomplete work scope definition, with the purpose of using it as the basis for important project decisions like go/no-go and the appropriation of funds decisions.

The degree of accuracy will very much depend on the type of information provided to the Quantity Surveyor and the quality of pricing information and judgment that is used (Ashworth, 2004).
Accurate cost estimate assists the overall cost-control programme by serving as the first check against the budget. It will indicate the cost overruns early enough for the project team to review the design for possible alternatives

One of the challenges faced by project managers is selection of the most accurate cost estimating method. The fact still remains that an estimate should truly reflect the scope of work if the scope of work is not well defined and according to Ahmed (2003), reality, input-and output will always balance each other. American Association of Cost Engineers (AACE) International (2018), reiterated the above assertion when it defined an estimate as "an evaluation of all costs of the elements of a project or effort as defined by an agreed-upon scope".
It is defined as the forecast of project costs that is performed before any significant amount of information is available from detailed design and with incomplete work scope definition, with the purpose of using it as the basis for important project decisions like go/no-go and the appropriation of funds decisions (Elbeltagi, n.d)

Based on the agreed-upon scope of work, a good estimate can be prepared based on all available resources but it can still be overrun unless adequate control of expenditures is exercised. During the last four decades cost estimates of building projects have been prepared from basically four sources. These are: published cost information, cost from similar projects and cost of project equipment and historical company cost data files and from in-house projects.

This study evaluates cost estimating techniques in the Nigerian building sector. The growing need for construction of all types coupled with a high cost of finance has provided the

industry with a big challenge to cut cost. The total cost of construction in normal circumstances is expected to be the sum of the following cost which include materials, labour, site overheads, equipment/plants, profit and head office cost. These costs according to Aibinu and Jagboro (2002) have obvious negative implication to the industry in general. To the client, high cost implies added cost over and above those initially agreed upon at the onset resulting in less returns on investment. To the end user, the added costs are passed on as higher lease costs or prices. To the consultants, it means inability to deliver value for money and could tarnish their reputation and result in loss of confidence reposed on them by the clients. To the contractors it implies loss of profit through penalties for non-completion if at fault.

2.0 Literature review

2.1 Purpose of cost estimating

Abiola and Richard (1999) states that the purpose of estimating is to indicate probable construction costs. This is an important factor that clients consider when deciding to build because it determines the feasibility of a project or even provides the basis for budget control during tendering and construction estimating. It is used to encourage the client to push forward with the scheme design of a project and to get detailed working drawings drawn up. However, if the estimate is excessive, it can scare the client away from the opportunity. Alternatively, if the estimated costs are too low, it can result in an aborted design, losses, or even litigation from the client. Estimates are an excellent basis for negotiation as they set the benchmark for the costs that are expected. Over-estimating or over-provision of funds for one project means fewer funds are available for other business opportunities. Estimates form the basis for tender negotiation according to Eshofonie (2008). As an estimate is an indicator of construction costs, the client can use it as an indicator of probable costs from the early stages of construction in order to monitor costs and the project budget (Dysert (2006) cited by Barzandeh (2011) . It can also serve as a tool to enable the client to evaluate the tender process and determine the most competitive bid. Essentially, the estimator is intended to look into the future and create a cost which will continue to be feasible and adequate at the time the project is completed. The purpose of cost estimation is to produce an accurate and reliable cost estimate of a construction project (Barzandeh, 2011).

2.2 Cost estimating techniques

Ashworth (2004), lists and classifies different types estimating methods with notes as:

- Conference - Based on a consensus viewpoint
- Financial methods - Used to determine cost limits or the building costs in a developer's budgets
- Unit - Applicable to projects having standard units of accommodation. Often used to fix cost limits for public sector building projects
- Superficial - Still widely used, and the most popular method of approximate estimating. Can be applied to virtually all types of buildings
- Superficial perimeter - Never used in practice
- Cube - Used to be a popular method amongst architects, but now in disuse
- Storey-enclosure - Largely unused in practice
- Approximate quantities - Still a popular method on difficult and awkward contracts and where time permits
- Elemental estimating - Not strictly a method of approximate estimating, but more associated with cost planning; used widely in both the public and private sectors for controlling costs
- Resource analysis Used mainly by contractors for contract estimating and tendering purposes
- Cost engineering - Mainly used for petrochemical engineering projects
- Cost models - These methods are still in the course of development.

Cost per unit: According to Abiola and Richard (1999) cost per unit is commonly used by national and international bodies such as education services, health services and office building investors at the inception stage of project development. It is adequate for projects for which there is recent comparable unit data available. The total cost of the project will be given by total cost = cost per unit x number of units depending on the type of building, for example theatre seat, car-park, hotel bedroom, hospital bed spaces etc. The method is very easy.

Floor area method: The floor area method is very popular in many countries because of its simplicity. It is also adequate for preliminary estimating but obviously needs some more

information from the project than the cost per unit method described above. The total cost of the project will be given by: Total cost = Cost per square metre x total project area. In order to use the method, the building must be first measured by its internal dimensions at each floor level. No deductions are made for internal walls, lifts or staircases.

Cost per square metre: This can be used for calculation of the total project cost by using the above expression. According to Okafor (2003), adjustments may be made to historical data for location and inflation. Subjective judgment may also be needed for establishing the adequate cost per square metre to use. For example the standard of finishes, the shape of the building and the number of storeys may possibly unbalance average data collected from similar buildings.

Single rate estimating method: This may be used for certain external works especially in road and railway projects. The advantages and limitations of the method are identical to those described above. An example is a municipal road project where the main works and rates are identified.

Approximate quantities: According to Joshua (2005), the most reliable method of approximate estimating is that in which the rates are produced simultaneously with the quantities. The method adopts traditional taking-off procedure and composite rates obtained from the bill of quantities. Doors and windows are measured as extra-over the walls. This method is the most complicated of all the estimating methods because it involves great number of calculation and the measurement required for this method can be carried out fairly rapidly depending on the experience of the quantity surveyor. The composite pricing rate requires much care and effort and the composition of composite items depends on the experience of the Quantity Surveyor and the nature of the building.

Cubic metre method

This method used to be very popular but has been replaced by the superficial method. The volume of the building is calculated by using the rules set up by RIBA as follows:

- a) the length and width are measured overall external walls.
- b) the height is measured for different types of roofs
- - for an unoccupied pitched roof, the height is taken from the top of the foundation to half the height of the roof.

- - if occupied, it is taken up to ¾ of the height of the roof.
- - if there is a parapet wall, the height will be measured up to that level but if height of the parapet is less than 600mm, the minimum extra height of 600mm shall be used.
- - from the top of the foundation to 0.61m above the roof in case of flat roof. For buildings which consist of two or more different user groups e.g. residential and office or different forms of construction (steel frame or concrete frame), the cubes of the various sections are often measured separately and different price rates applied for each part. It is fairly easy to measure and calculate the cost using this method but a great deal of skill and adjustment is required in order to arrive at a unit rate. This is because many variables such as shape, storey height, construction methods among others cannot be easily accessed and incorporated.
- **vii. Storey enclosure method**
- According to Kasimu (2012), this method is aimed at overcoming the drawback of the previously described methods. It takes into account most of the more expensive items in a building and allows for some difference in plan shape and storey height by measuring external walls and floor area, Number of stairs / total height of the building (by using different multiplying factors for different storey). It also provides extra cost for works below the ground level. This method has not been in common use for the following reasons:
- - It involves more vigorous calculations than the earlier methods.
- - Rates for use are not usually published and so the Quantity Surveyor would need to spend much time working out suitable rates from previous projects.
- - This method does not assist either the Architect or the Client during the design process.
- - It does not help the Quantity surveyor in Elemental or comparative cost planning.
- - The effect of changes in specification in the unit rate used may be difficult to assess.

Cost estimating is essential for cost planning and budgeting and takes place in all stages of project development. Methods for cost estimation vary as the project evolves from the early stages of

conception to the construction phase. In principle, as the project evolves, more information becomes available; thus more accurate estimation.

2.3 Research method

A mixture of quantitative and qualitative, research methods were used to carry out the research

2.4 Research methodology

This study seeks to evaluate cost estimating techniques used in Nigeria construction industry with reference to Edo state. The following steps were followed in order to achieve the objective of the study:

1. Identification of the problem , 2. Definition of the problem , 3. Delimitation of the problem, and 4. Analysis of the problem

2.5 Research design

The research design for this work is cross – sectional survey design

2.6 Characteristics of the study population

The targeted research population consists of the Engineers, Quantity Surveyors, Client, Builders and Contractors.

2.7 Sampling design and procedures

Consultants and contractors are the target groups for conduct of this research, sixty five respondents were randomly selected using stratified random sampling technique as a type of probability sampling in order to give everyone that falls into any of these identified target groups equal and independent chance of being included in the sample.

2.8 Data collection instrument

Two sets of data were used for conduct of this research; namely primary and secondary. The primary data which refers to field data were obtained through the use of well structured questionnaire developed

2.9 Data analysis

The descriptive survey method was used. Seventy well-structured questionnaires were distributed among of the construction industry, i.e. the client, the consultant and the contractor. Frequency and percentages were used for the descriptive data.

2.9.2 Sampling Frame

The sample is a portion of the total population of a group selected in such a way that is representative of the group. The sample frame is represented in Table 1.

Table 1: Sampling frame of Respondents

Respondents	Population
Client	22
Contractors	20
Engineers (Civil and Mechanical/Electrical)	32
Quantity surveyors	31
Total	**105**

Table 2: Sample size of the Respondents

Respondents	Population
Client	14
Contractors	13
Engineers	20
Quantity surveyors	18
Total	**65**

Table 3: Identified factors that affect design variables on the cost of a building.

Identified Factors		5	4	3	2	1	Total	Mean score	Rank
Size of Building	16	20	6	-	-	42	4.24	1	
Total perimeter of building		15	18	8	-	-	42	4.09	2
Plan Shape		20	10	8	4	-	42	4.09	3
Plot Size		14	16	12	-	-	42	4.04	4
Story height		12	18	6	4	2	42	3.81	5
Floor area ratio	12	16	9	3	2	42	3.78	6	
Functional requirement	8	12	18	2	2	42	3.33	7th	

From the analysis carried out in Table 3 above, it is evident that size of building have the highest significant effect on the cost of a building with a mean score of 4.24 while some of the respondents concurred that total perimeter of building and plan shape have significant effects on the cost of a building with a mean score of 4.09 respectively with functional requirement having the least significant effect on the cost of a building with a mean score of 3.33.

Table 4: Identified variables which affect the accuracy of cost estimating of projects.

Identified Variable	5	4	3	2	1	Total	mean score	Rank
Market conditions	12	22	8	-	-	42	4.09	1
Cost control factors	12	20	8	2	-	42	4.00	2
Procurement method	10	22	8	2	-	42	3.93	3
Completion time	8	16	18	-	-	42	3.76	4
Type of engaged contractor	8	12	20	1	1	42	3.59	5
Financial status of client	8	10	21	3	-	42	3.55	6
Location of project	6	12	20	3	1	42	3.42	7

Table 4 shows that market conditions is the highest significant variable which affect the accuracy of cost estimating of projects with a mean score of 4.09.This is closely followed by cost control factors with a means score of 4.00 and procurement method which depends on the method used in carrying out the work with a mean score of 3.93.However location of project with a mean score of 3.42 is the lowest ranked significant variable which affect the accuracy of cost estimating of projects.

Table 5: Identified cost estimating techniques in the Nigerian building sector.

Cost estimating techniques	5	4	3	2	1	Total	mean score	Rank
Cubic metre method	22	14	4	2	-	42	4.52	1
Cost per unit (unit costing)	22	16	4	-	-	42	4.43	2
Floor area method	16	20	4	2	-	42	4.19	3
Single rate estimating method	12	18	6	4	2	42	3.81	4
Storey enclosure method	8	8	20	5	1	42	3.40	5
Approximate quantities	8	6	22	4	2	42	3.33	6

Table 5 shows that cubic metre method with a mean score of 4.53 is the most frequently used cost estimating technique in the Nigerian building sector. This is closely followed by cost per unit and floor area methods with .a mean score of 4.43 and 4.19 respectively while approximate quantities with a mean score of 3.33 have the lowest ranking among the cost estimating techniques used in the Nigerian building industry.

1.5 Conclusion

This study has been able to discuss the concept of cost estimating techniques in the Nigerian building sector. The study identified the factors that affect design variables on the cost of a building. The study also identified the variables which affect the accuracy of cost estimating of a project. It is therefore established that design variables and cost estimating techniques applied to a given project affects the cost of a building.

1.6 Recommendations

The following policy recommendations are advocated:

(i) Since the study has been able to identify cost estimating techniques in the Nigeria building sector, it is therefore suggested that appropriate and suitable estimating techniques should be used with reference to specific types of projects.

(ii) From the findings, it is clear that there are some design variables which affect cost of building. This should be well evaluated during the design of construction projects bearing in mind the cost implication of such design variables.

(iii) The variables which affect the accuracy of cost estimating of projects should be well harnessed in order to arrive at accurate estimating of construction projects before the commencement of actual execution of such project.

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IMPACT OF CONSTRUCTION PLANT UTILIZATION IN THE PERFORMANCE OF CONSTRUCTION PROJECTS IN BENIN-CITY, EDO STATE.

BY

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Abstract

The use of plants and equipment is seen globally as a tool for improving productivity, efficiency and performance. The study therefore evaluated the level of plant usage in some selected construction operation with a view to enhancing project delivery on time and to the desired quality. A total of 77 questionnaires were administered to contractors randomly selected from Benin- City in Edo state and a total of 50 questionnaires were retrieved and found suitable for analysis. The data collected from the respondents were analyzed using percentage and mean scores ranking. The result from the analysis revealed that the level of plant utilization in construction operations is below average and that many construction operations are still labour based. The study also identified the impact of plant utilization in construction projects which are speed up of production, minimization of prolonged delivery and delay, reduced cost of construction, reduced wastage and achieving good workmanship and realizing improvement in the overall cost of project. The challenges facing contractors were also identified which are high cost of plant, high machinery maintenance cost, domination by foreign firms etc. Based on the findings of the research, the study recommended that proper awareness about the impact of plant and equipment should be created. It was also recommended that government should encourage local production or assembly of some construction plants and reduce duties on the importation of plants that cannot be produced or assembled locally.

Keywords: Construction projects, Plant utilization, Construction plant and equipment

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1.0 Background of the study

The importance of plant and equipment in the achievement of project objectives seem to be increasing on daily basis. Omonuyi (2012), asserts that increase in the use of plant and equipment in the construction work can speed up construction and reduce the overall cost of construction. Supporting this view, Idoro (2008) opines that, plants is considered as a tool for achieving project objectives and quality performance. This has made the assessment of work methods and mechanical plants possessed by the intending contractor an important and integral part of tendering process. Plebankiewicz (2009), posits that plant and equipment possessed by contractor is one of three criteria that are used to determine the technical ability of contractors during pre-qualification.

More so, Idoro (2008) discovered that, Nigerian clients attach greater importance to quality than project delivery time and cost for good workmanship which can be achieved by the adequate use of plant and equipments. The realization of this important role that the use of mechanical plant plays in the success of a project prompts the assessment of the level and effectiveness of the application of mechanical plant in project delivery. Thus the study therefore is to evaluate the effect of some selected construction plant utilization on project performance.The introduction of plant does not always result in economic savings since extra temporary site works such as road works, hard standings, foundations and anchorages may have to be provided at a cost which is in excess of the saving made by using the plant. The saving layout and circulation may have to be planned around plant positions and movements rather than around personnel and material movements and accommodation. To be economic plant must be fully utilized and not left standing idle since plant, whether hired or owned, will have to be paid for even if it is non-productive. Full utilization of plant is usually considered to be in the region of 83% of onsite time, thus making an allowance for routine, daily and planned maintenance which needs to be carried out to avoid as far as practicable plant breakdowns which could disrupt the construction programmed. Many pieces of plant work in conjunction with other items of plant such as excavators and their attendant haulage vehicles therefore a correct balance of such plant items must be obtained to achieve an economic result (Chudley and Greeno, 2006). On large contracts where a number of plant items are to be used, it may be advantageous to employ a skilled mechanic to be on site to carryout all the

necessary daily, preventive and planned maintenance task together with any running repairs which could be carried out on site (Omonuyi, 2012).With the exception of small pieces of plant, which are usually purchased, items of plant can be bought or hired or where there are a number of similar items a combination of buying and hiring could be considered. The choice will be governed by economic factors and the possibility of using the plant on future sites thus enabling the costs to be apportioned over several contracts. According to Omonuyi (2012), the contractor must check the following points when considering the need to own plant:

- ✓ Will the item of plant generate sufficient turnover to provide an adequate rate of return on the capital employed.
- ✓ Is it absolutely necessary for the business to own the plant rather than obtaining it through other means?
- ✓ Is outright purchase the only way of acquiring the plant?

If the answer to the above questions is not a sure and positive reply, then there should be some other sound commercial reason for making the purchase.

1.1 Construction plant and equipment

Mechanical plant is one of the most important resources in construction, without these plants, massive construction work and most especially soil movements would be difficult to achieve in this country. Plant is large machinery that is used in construction processes and will generally save time, manpower, cost and produces a better finish to the construction work. There is need to state that cost are only reduce by good management of plant. Such management involves factors such as; out put method appraisal continuity of work; training of operatives; organization of plant work; maintenance and repair of plant; economic selection of plant.

However, it is necessary although not compulsory to have contractors, plant department that will be responsible for the provision of the requisite plant and equipment for the site, Omonuyi (2012)

Ogunsemi (2012) opined that, in selection plant and equipments, the plant manager or contract manager should consider the following factors;

- ✓ The work load to be undertaken
- ✓ The time allowed in the construction programme for the work.
- ✓ The capability of the machine or equipment.

- ✓ The various tasks which any one piece of plant could accomplish.
- ✓ The transportation costs involved
- ✓ Maintenance facilities

1.2 General considerations

Items of builders' plant ranging from small hand held power tools to target pieces of plant such as mechanical excavators and tower cranes can be considered for one or more of the following reasons (Ogunsemi, 2012).Thus:

- ✓ Increased production
- ✓ Reduction in overall construction cost
- ✓ Carry out activities which cannot be carried out by traditional manual methods in the context of economics
- ✓ Eliminate heavy manual work thus reducing fatigue and as a consequence increasing productivity
- ✓ Replacing labour where there is a shortage personnel with the necessary skills
- ✓ Maintain the high standards required particularly in the context of structural engineering works.

1.3 The impact of plant utilization in construction

The use of mechanical plant in an operation is known to have numerous advantages. Omonuyi (2012) opines that, it increased mechanization building operations, speeds up production and reduces cost of construction. Akinsola and Adenuga (2004) observed that, industrialization brought about modern plants and equipment which increased productivity, efficiency and consequently reduced costs. Fisk (2008), argued that careful investigation of construction methods was one of projects. Koskela and Ballard (2003) identified mechanization as one of the most important attributes of manufacturing and asserted that these attributes make the industry more efficient and productive in construction. There is no gain saying in the assertion that plant and equipment play significant role in the achievement of the objectives of every project. It increases the speed of construction thereby minimizing prolonged delivery period and delay. It helps to reduce the final cost of project to ensure effective and efficient utilization of resources, reduce waste age achieve good workmanship or quality standards. The need for improvement in the workmanship and

quality standards of construction work among construction contractors especially the indigenous ones has become an important issue (Okedele, 2008).Moreover, Idoro (2010) discovers that Nigerian client give preference to expatriate contractors in the award of contracts and that this preference is sustained by better workmanship and quality of material among other factors. Giving these benefits, it is essential for state holders in the construction industry especially contractors to promote increased use of plant and equipment in project execution.

1.4 The level of utilization of plant

In some selected construction operations, the level of utilization of plant in the operation can be influenced by the extent to which key sustainability indicators are obtainable in the plant and equipment used for the operation. Examining specific construction plant, Ulubeyi and Kazaz (2009) maintain that the use of suitable concrete pump on the job site improves site productivity, increases the quality of products and services and reduces the duration and task of casting concrete. The free Dictionary (2010) states that utilization refers to the use of machines either wholly or in part to replace human or animal labour. It states further that unlike automation which may not depend at all on a human operator, utilization requires human participation to provide information or instrument. Idoro (2008) describes utilization as the process of applying the use of mechanical plant in carrying out the task. He opines further that the level of utilization can be explained in two ways namely; the number of plant and equipment employed or the number of activities carried out by mechanical plant in an operation.

1.5 Challenges facing contractors in the utilization of plants in construction projects.

Ulubeyi and Kazaz (2009) identified some challenges facing contractors in the utilization of plants in construction. Some of the identified challenges are:

i High cost of plant and equipment

Akinsola and Adenuga (2004) opined that when considering the need to own plant, the contractor must check the following points:

- If the item of plant will generate sufficient turnover to provide an adequate rate of return on the capital employed.
- If it is absolutely necessary for the business to own the plant rather than obtaining it through other means.

- If outright purchase is the only way of acquiring the plant.

If the answer to the above questions is not a sure and positive reply, then there should be some other sound commercial reason for making the purchases. Moreso many contractors, however prefer to hire only those items of plant which are required to meet peak demand or specialized activities. The alternative decision to purchase will have importance financial consequences for the contractor, since considerable capital sums will be blocked up in the plant which must be operated at an economic utilization level to produce a profitable rate of return on the investment.

ii Plant maintenance

Some factors have to be taken into consideration when selecting a particular plant for use. They include pollution safety regulations, usage and maintenance.

Maintenance of plant is a vital task of site management. For a plant to perform effectively in the site. It must be in good working condition as frequent breakdown affects progress of work, time and money.

Ulubeyi and Kazaz (2009) opined that, the cost of maintenance or servicing is carried out on regular basis say daily while routine checks are done daily. They further submit that the maintenance cost covers the following; cost of lubricants, batteries, tyres, hydraulics, replacement of ropes, tracks and Anti-rust. They concluded that it is will be difficult for indigenous contractor to buy his own plant.

iii. Maintenance cost

Maintenance cost depends on the following.

i. Age and condition of plant.

ii. Labor and overhead charges.

iii. Cost and diligence of operators

iv. Care and diligence of operators

v. Availability of maintenance facilities.

1.6 Methodology

The methodology for the study is as shown and presented in this section comprising the sampling frame, sample size, method of data collection as well as data analysis and findings.

1.6.1 Sample size

The sample size is assessed by how well it represents the whole population of participants from which the sample is drawn. The total population for the study was a total of 50 selected registered contractors within the study area comprising of 25 registered contractors who are engaged in large scale contracts, 14 registered contractors who engage in medium level construction and 11 registered contractors engaging in small contracts.This is to enhance as well as facilitate a balanced opinion by all the various categories of contractors selected under the survey.

1.6.2 Method adopted for data collection

Data were collected using structured questionnaire. The activities that constituted the two operations (excavation and concrete works) selected for investigation were identified. Data was also obtained on the construction method (manual or mechanical) that was used to carry out each activity.

1.6.3 Data presentation and analysis

The data obtained was analyzed using the mean item score and ranking for all the identified factors under the survey with the selected contractors as the respondents.

Table 1: Ranking the level of plant usage in concreting operation.

Concreting task	Method	N	%		Ranking
Loading of concrete materials	Manual		35	70.0	1
	Mechanical	15	30.0		2
	Total		50	100	
Batching of materials	Manual		40	80.0	1
	Mechanical	10	20.0		2
	Total		50	100.0	
Mixing of concrete materials	Mechanical	45	90.0		1
	Manual	5	10.0		2
	Total		50	100.0	
Transporting of concrete mat.	Mechanical	30	60.0		1
	Manual	20	40.0		2
	Total		50	100.0	
Casting of concrete	Manual		36	72.0	1
	Mechanical	14	28.0		2
	Total		50	100.0	
Curing of concrete	Manual		40	80.0	1
	Mechanical		10	20.0	2
	Total		50	100.0	

Source: Field Survey (2018)
N= Number of respondent, % = percentage.

From Table 1, the result reveals that the level of use of manual method ranks first in loading of materials 70%, batching of materials 80%, casting of concrete 72%, curing of concrete 80%. The level of use of mechanical method ranks first in mixing of concrete 90% and transportation of material 60% but ranks second in concrete curing 20%, concrete casting 28%, batching of materials 20% and loading of materials 30%. The results indicate that the application of plant and equipment in carrying out construction operation is more favored than manual method for mixing and transporting of concrete while loading of materials for concreting casting batching, curing of concrete are more labour-based tasks than mechanical.

Table 2: Ranking the level of plant usage in excavating operation.

Excavating task	Method	N	%	Ranking	
Top soil excavation	Mechanical	35	70	1	
	Manual	15	30	2	
	Total		50	100.0	
Excavation to reduce level	Mechanical	30	60	1	
	Manual	20	40	2	
	Total		50	100.0	
Trench excavation	manual	35	70.0	1	
	Mechanical		15	30.0	2
	Total		50	100.0	
Removal of excavated materials	Manual	36	72.0	1	
	Mechanical		14	28.0	2
	Total		50	100.0	

N = Number of Respondent, % = percentage

From Table 2, the result reveals that for Top soil excavation, Mechanical 70% ranks first in level of plant usage, excavation to reduce level mechanical 60% but ranks second, in trench excavation 30% and removal of excavated materials 20%. The level of use of manual method ranks first in trench excavation 70%, removal of excavated materials 72% while it ranks second in top soil excavation 30% and excavation to reduce level. The result indicates that the application of plant and equipment in carrying out construction operations is more favored than manual for top soil excavation and excavation to reduce level while trench excavation and removal of excavated materials are more labour-based task than mechanical.

Table 3: Respondents' identified impact of plant utilization in construction activities.

Identified impact	5	4	3	2	1	Total	Mean score	Ranking
Speed up production	40	10	-	-	-	50	4.80	1st
Minimizing prolonged Delivery and delay	35	15	-	-	-	50	4.70	2nd
Reduce cost of construction	25	20	5	-	-	50	4.40	3rd
Reduce wastage and achieve good workmanship	35	15	-	-	-	50	4.40	3rd
realizing improvement in the overall cost of project	30	10	10	-	-	50	4.30	5th
increase productivity	20	10	10	10	-	- 50	3.80	6th

Table 3 shows that speed up production was ranked first with a mean score of 4.80 closely followed by minimizing prolonged delivery and delay with a mean score of 4.70 and the least ranked was increased productivity with a mean score of 3.80.

Table 4: Respondents' identified challenges facing contractors in the utilization of plant.

Identified challenges	5	4	3	2	1	Total	Mean score	Ranking
High cost of plant	50	-	-	-	-	50	5.00	1st
High machinery maintenance Cost	45	5	-	-	-	50	4.90	2nd
Domination by foreign firms	40	10	-	-	-	50	4.80	3rd
Lack of qualified expertise	10	10	20	10	-	50	4.60	4th
Scarcity of spare parts	30	10	10	-	-	50	4.40	5th
Effect of government policies	25	20	5	-	-	50	4.40	5th
Lack of indigenous manufacturing Industry	25	15	10	-	-	50	4.30	6th
Shortage of manpower.	20	10	20	-	-	50	4.00	8th

Table 4 shows that the high cost of plant ranked first with a mean score of 5.00 closely followed by high machinery maintenance cost with a mean score of 4.90, domination by foreign firms with a mean score of 4.80, lack of qualified expertise with a mean score of 4.60, scarcity of spare parts with a mean score of 4.40 and shortage of manpower with a mean score of 4.00.

1.7 Conclusion

The study has revealed the level of plant usage prevailing in the Nigerian construction industry and the influence of usage on project outcome. The results have established that the levels of use of plant and equipment for carrying out construction operations is above average and that many construction operations are still labour- based. The results also show that the use of plant and equipment for construction operations will improve the quality standards of construction works and enhance productivity. This invariably implies that the incidences of shoddy jobs and building collapse which have been described as the bane of the construction industry can be minimized by

increased use of plant and equipment. The influence that the use of plant and equipment has on project outcome should encourage all the stakeholders in the industry to embark on measures that will promote greater use of plant and equipment in project execution.

1.8 Recommendations

Since the use of mechanical plants helps to achieve project objectives and high quality standards, clients may have to consider granting advance payment to contractors for plants that are needed for the execution of projects. Productivity and performance based processes and time-saving procedures should be designed and implemented when mechanical plants are used in order to justify their application. It is therefore suggested that governments will have to encourage local production or assembly of some construction plants and reduce duties on the importation of plants that cannot be produced or assembled locally.

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THE IMPACT OF FOREIGN PORTFOLIO INVESTMENT ON THE NIGERIA STOCK MARKET: (1980 – 2016)

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Abstract

This study examines the impact of foreign portfolio Investment (FPI) on the Nigerian Stock market for the period of 36 years (1980 – 2016). The major objective of the study is to establish empirically whether foreign portfolio investment contributes to the growth of the Nigerian stock market capitalization and thus the growth of the Nigerian economy. The ordinary least square (OLS) method and the parsimonious error correction model specification were used in the study. The Augmented Dickey Fuller unit root test was used to test the stationary status of the variables before carrying out co-integration regression which shows non-stationarity of the variables. The co-integration test finds that the variables co-integrate. The Parsimonious error correction mechanism was used to estimate the variables and that all the variables were found to be significant in explaining 84% of the variation in the dependent variable (Market capitalization). The result shows that foreign portfolio investment has a positive impact on capital market growth with the speed of adjustment from short run to long run as indicated by the ECM-1 having a relatively high value of 34% in absolute terms and there is a strong relationship between FPI and stock market growth and domestic savings are complementary and not substitute to the growth of the Nigerian stock market in both the short run and the long run . The study concluded that the presence of foreign portfolio investment has increased the market capitalization of the Nigeria stock market. FPI has grown recently in proportion to other types of capital flow in Nigeria because it complements domestic savings to get the desired level of investment. It recommended that authorities and policy makers should come up with policies that are more investment friendly, furthermore, the policy of internationalization of stock market operations should be sustained as these would boost domestic investment.

Keywords: Foreign Portfolio Investment, OLS, Market capitalization, Stock Market.

1.0 Introduction

The slow pace of development in the third world countries is usually traceable to inadequate resources to speed up economic growth and development. Saving, in this part of the world, is usually low for the investment needed. In order to bridge this gap, most economies have resorted to foreign borrowings while others gear efforts toward attracting foreign contributions and grants to stimulate development. Thus, the importance of foreign portfolio investment either by private or public agencies in promoting growth and development in developing countries cannot be overemphasized. Foreign portfolio investment (FPI) is an aspect of international capital flows comprising of transfer of financial assets such as: cash, stock or bonds across international borders in want of profit. It occurs when investors purchase controlling interest of 10% and above in foreign companies or buy securities or notes. Just as trade flows result from individuals and countries by exploiting their own comparative advantage, so also are capital flows from individuals and countries seeking to make themselves better off, moving accumulated assets to wherever they are likely to be most productive (Baghebo and Apere, 2014). This type of investment as a result of economic globalisation has become an increasing significant part of the world economy over the past three decades and an important source of fund to support investment not only in developing countries but also developed ones.

Foreign portfolio investment, though a recent phenomenon in Nigeria compared to foreign direct investment, (Oversea Development Assistance (ODA) and bank loans), has been on the increase since the mid-80s. The importance of portfolio investment to emerging market economies like Nigeria's has been attributed to the significant role played by the Nigerian capital market in the recent years. The deregulation of the capital market in 1993 made the federal government to internationalize the market in 1995, with the abrogation of laws that constrained foreign participation in the Nigeria capital market. Following the abrogation of the exchange control Act 1962, foreigners can now participate in the Nigerian stock exchange market as part of the financial liberalization policy of Nigeria in the mid 2000s, and there had been increased inflows of foreign capital flow into the Nigerian economy through the capital market (CBN, 2006). Over the years, successive Nigerian governments have viewed foreign investment as a vehicle for political and economic transformation of Nigeria. Hence, the thrust of government policy has been to reduce the hindrance of indigenization policy promoted by the Nigeria Enterprise Promotion Decree (NEPD) to regulate foreign investment, to a maximum of 40% foreign participation. This had resulted in a decline in both foreign private direct and portfolio investment. This trend is what is being reversed now to allow greater participation of foreign investors in the economy.

Stock market is a vehicle of savings fund mobilization for investment to facilitate economic growth and development. Theoretical evidence shows a positive effect of stock market development on economic growth (Yartey 2008; Filler, Hanousek and Campos, 1999; Singh, 1997; and Levine and Zervos, 1998). The development of stock market is the outcome of many factors like exchange rate, political stability, (Gay, 2008), foreign direct investment, and economic liberalization (Adam

and Anokye et al, 2008). One of the key motives for FPI is to globalize production and competition. A second reason is to move some production to more profitable locations. Firms in advanced countries have moved much of their labor-intensive production to developing nations where wages are lower.

It is doubtful that many (or any) of today's poor countries could achieve sustained, rapid growth paths without a substantial amount of FPI brought in by foreign owned transnational. Without such FPI, both the transfer of technology and foreign networking would be difficult to achieve. Financial markets, and especially stock markets, have grown considerably in developed and developing countries over the last two decades as a result of rapid financial and political transformation. To increase their share of FPI flows, most of the countries ease restrictions on FPI, strengthened macro stability, privatization of state-owned enterprises, domestic financial reforms, capital account liberalization, tax incentives and subsidies have been instituted. The role of FPI in the development of stock markets of developing economies is considered very strong. It is observed that there is triangular causal relationship between these two; (1) FPI stimulates economic growth (2) Economic growth exerts positive impact on stock market development and (3) implication is that FPI promotes stock market development (Adam and Anokye et al, 2008).

Although, the drive towards the establishment of stock markets in African countries during the last few decades may be linked to other important developments in the global economy. The financial markets of many advanced countries have undergone tremendous changes and become increasingly integrated. These changes have resulted from the operation of a number of interrelated factors (Cosh, Hughes, and Singh, 1992). Such factors include the progressive deregulation of financial markets both internally and externally in leading economies; the internationalization of these markets; the introduction of a number of financial products allowing riskier and bigger financial investments; and the emergence and the increasing role of new actors in the financial markets particularly, institutional investors. These developments in the financial systems of advanced countries have led them to seek liberalization in the international trade and exchange of services in world trade negotiations. The establishment of stock markets in African countries and the liberalization of capital accounts can be seen as parts of this global liberalization trend. Thus, it is expected to boost domestic savings and increase the quantity and quality of investment. More generally, stock markets are seen as enhancing the operations of the domestic financial system in general and the capital market in particular (Kenny and Moss, 1998).

Critics, however, argue that the stock market might not perform efficiently in developing countries and that it may not be feasible for all African markets to promote stock markets, given the huge costs and the poor financial structures (Singh, 1999). Also, there has been considerable research on the relationship between financial market development and macroeconomic variables, financial reform, and other country –specific factors, and the relationships among the development of the various parts of a financial system. It is clear from the previous studies that financial markets tend to develop as the economy grows and financial reform progresses. Stock market development is

embodied in the general financial sector development. In other words, stock market complements the development of other parts of the financial system. For instance, Singh (1997) finds positive relationship between economic growth and stock market development and a large number of empirical studies on the role of FPI in host countries suggest that FPI is an important source of capital, complements domestic private investment, is usually associated with new job opportunities and enhancement of technology transfer, and boosts overall economic growth in host countries. However, not much attention has been centered on joint effect of stock market development and foreign portfolio investment on growth in Nigeria. Thus, this study intends to fill this gap.

Given this background, the broad objective of the study is to establish empirically whether foreign portfolio investment contributes to the growth of the Nigerian stock market and, thus, growth of the Nigerian economy. While the specific objectives of the study are to: examine the trend of foreign portfolio investment and stock market development in Nigeria; establish the relationship that exists among foreign portfolio investment, stock market development and economic growth in Nigeria. The study is organized in sections. Following this introductory section is section two which discusses the reviews of the available literature on the subject matter, the trend of foreign direct investment and stock market development; the model, data sources and estimation techniques are contained in section three. Section four presents model estimation results and interpretations. The summary of findings and policy recommendations are contained in section five.

2,0 Literature review

2.1 Conceptual definition

Oyarenti (2003) asserts that Foreign Portfolio investment refers to the acquisition of asset by a foreign national or company in a domestic stock market or money market through holding of transferable securities, issued or guaranteed by the government of the host country. Such securities are held in the form of equity shares, debentures, bonds, promissory notes and money instruments. Unlike Foreign Direct Investment (FDI), Foreign Portfolio investments are usually motivated by short term profit consideration (particularly dividends and capital gains) which do not involve management control over the companies in which securities are acquired and are more volatile, thereby having the tendency of causing more disruption to the national economic policy. Obadan (1999) opines that portfolio investment is mostly used for diversifying risks, the availability of advance information technology makes this form of foreign investment to be the fastest means of transferring capital across countries. Private international investment flows became dominant in the 1980s and 1990s particularly when the official foreign investment started to wave.

Foreign Portfolio Investment (FPI) is an aspect of international capital flows comprising of transfer of financial assets such as: cash, stock or bonds across international borders in want of profit. It occurs when investors purchase non-controlling interests in foreign companies or buy foreign corporate or government bonds, short-term securities or notes. Accordingly, just as trade flows result from individuals and countries seeking to maximize their wellbeing by exploiting their own

comparative advantage, so too, are capital flows as individuals and countries seeking to make themselves better off, moving accumulated assets to wherever they are likely to be most productive (Ololade and Ekperiware 2015).

According to Economic Times (2018), capital market is a market where buyers and sellers engage in trade of financial securities like bonds, stocks, etc. The buying/selling is undertaken by participants such as individuals and institutions. It consists of primary markets and secondary markets. Primary markets deal with trade of new issues of stocks and other securities, whereas secondary market deals with the exchange of existing or previously-issued securities. Another important division in the capital market is made on the basis of the nature of security traded, i.e. stock market and bond market.

A security, in a financial context, is a certificate or other financial instrument that has monetary value and can be traded. Securities are generally classified as either equity securities, such as stocks or debt securities, such as bonds and debentures. The sale of securities to investors is one of the primary ways that publicly-traded companies drive new capital for operations. Capital markets help channelise surplus funds from savers to institutions which then invest them into productive use. Generally, this market trades mostly in long-term securities.

2.2 Theoretical Literature

In the neo-classical production function, output is generated by using capital and labour in the production process. With this frame work in mind, foreign investment inflows can have influence on each variable on the production function. Foreign investment increases capital, and may effectively improve the labour factor by transferring new technologies. It also has the ability to raise the total factor productivity. So, apart from having direct capital augmenting effects, foreign investment has added indirect effect and thus, promotes output growth rate. Goldstein and Razin (2010) show that the information-based trade-off between the two forms of investment may lead to a multiplicity of equilibria. The equilibrium outcomes depends on various assumptions about the setup costs of an investment project, the probability of being hit by a liquidity shock faced by a foreign investor and the degree of (capital market and corporate governance) transparency.

2.3 Empirical Literature

In the midst of various economic and financial crises in the 1990s and 2000s, there has been renewed research interest in examining the effect of FPI on economic growth of the recipient countries. Ezeoha *et al.* (2009) conducted a study on nature of relationship between stock market development and levels of domestic or foreign private investment flows in Nigeria. It revealed a positive link between capital market development and domestic private investment while a negative relationship is found between stock market development and foreign private investment in Nigeria. Afeeze and Kazeem (2010) concluded that there exist a unidirectional relationship between market capitalization and economic growth, and an absence of causal linkage between economic growth and total value traded and bidirectional causality between economic growth and

turnover ratio. Ultimately, the result of the granger causality test shows that capital promotes economic development.

Olawoye (2011), conducts a study on the impact of capital market on economic growth of Nigeria. He used GDP as a proxy for economic growth and market capitalization, new issues, value of transaction and total listing as capital market variables. Multiple regression techniques were used for analysis and the results revealed a positive relationship between capital market and economic development. Eniekezimene (2013), examines the impact of foreign portfolio investment on capital market growth: evidence from Nigeria. Ordinary Least Square method was used to analyze the data collected. It was revealed that foreign portfolio investment has a positive impact on capital market growth. Edame and Okoro (2013), discuss on The Impact of Capital Market on Economic Growth in Nigeria. The scientific method of Ordinary Least Square (OLS) regression technique was used in the study. From the findings it was obtained that capital market has positive and significant impact on economic growth in Nigeria.

Okwu and Obiakor (2011), employ Ordinary Least Square to analyze the impact of capital market development on Nigerian Economy Growth from 1981 to 2008. They found that market capitalization, gross capital formations of foreign private investment are significant determinant of Nigerian economic growth while the volume of share traded relate positively but insignificantly. Baghebo and Edoumiekumo (2012) used group unit root and Johansen co-integration test to examine the relationship between Foreign Private Capital Accumulation and Economic Development in Nigeria from 1970 to 2010. It was discovered that current and lagged FPI have positive impact on economic development. However, while the latter is statistically significant, the former is not. Thus formulating policies that encourage such investment would be a way forward. Uremadu (2010) examined the impact of Foreign Private Investment on Capital Formation in Nigeria from 1980 to 2004 using Ordinary Least Square method. The result showed a negative influence of foreign exchange rate, gross national savings, inflation rate, debt service ratio, lending rate, exchange rate all discourage gross capital formation in Nigeria. However cumulative foreign private investment, index of energy consumption and banking system credit to domestic economy showed a positive influence.

Ololade and Ekperiware (2015) reveal that there exist a positive relationship between Foreign Portfolio Investment and Capital Market Development in Nigeria. The coefficient of multiple determination shows that the model has a good fit while the degree of determination shows that FPI accounts for 84.86% of the variation in Market capitalization. Co-integration test however shows a lack of long run relationship between market capitalization and foreign direct investment and hence the reliance on regression results. Durbin Watson shows that data are free from serial autocorrelation. The relationship between stock market development and economic growth in Pakistan was investigated in the empirical study by Shabaz et al, (2008). They found long-run bi-directional causality between stock market development and economic growth.

However, for short-run, their results showed one-way causality i.e., from stock market development to economic growth. Naceur et al (2007), investigated the role of stock markets in economic growth and identified the macroeconomic determinants of stock market development in the Middle Eastern and North African region. They found saving rate, financial intermediary, stock market liquidity and the stabilization variables as important determinants of stock market development.

Fritz and Mihir et al (2005), made an effort to explore the relationship between outbound FDI and levels of domestic capital formation through regression analyses for a much broader sample of countries for the 1980s and 1990s and concluded that it had been natural to assume that foreign investment came at the expense of domestic investment. Claessens, Daniela et al (2002), studied the determinants of Stock market development across the globe, the causes of internationalization and the effects on local exchanges by examining the data of 77 countries from January, 1975, to November, 2000. They concluded that the global migration of funds was beneficial for the stock market development due to more funds for corporations and more flexibility for investors. Krkoska (2001), explored the relationship between FDI and gross fixed capital formation in transition countries and showed that capital formation is positively associated with FDI. Garcia and Liu (1999) estimated the macroeconomic determinants of stock market development particularly stock market capitalization by using pooled data on fifteen industrialized and developing countries for the period of 1980-1995. The results showed that real income, saving rate, financial intermediary development, and stock market liquidity are the important determinants of stock market development. Macroeconomic volatility did not prove significant. Errunza (1983) found long term impact of foreign capital inflows on stock market development.

Conversely, Idowu and Babatunde (2012), investigated the effect of financial reforms on capital market development in Nigeria over the period 1986 to 2010. Ordinary Least Square (OLS) technique was also used. The findings, however, revealed that the variables that represented the development of the banking sector interacted negatively with market capitalization which implies that the activities of those institutions deterred the development of the capital market. Akinlo (2004) found that foreign capital has a small and not statistically significant effect on economic growth in Nigeria. Jerome and Ogunkola (2004) assessed the magnitude, direction and prospects of FDI in Nigeria. They noted that while the FDI regime in Nigeria was generally improving, some serious deficiencies remain. These deficiencies are mainly in the area of the corporate environment (such as corporate law, bankruptcy, labor law, etc.) and institutional uncertainty, as well as the rule of law. The puzzle in the literature over whether FDI has an impact on capital market development in Nigeria is the motivation behind this work.

2.4 Summary of Literature Review and the gap to be filled

Much literature review has been done in this study. It is discovered that there has not been a consensus on the findings which depend on the data and econometric tool used. However, not

much attention has been centered on joint effect of stock market development and foreign portfolio investment on growth in Nigeria. Thus, this study intends to fill this gap.

3.0 Method of Study

3.1.1. Data and Data Sources

This study covers a period of 36 years (1980-2016). For the purpose of this work, data are gathered from published or secondary sources such as publication by the Central Bank of Nigeria, Economic and Financial bulletin, Nigerian Stock Exchange fact books. The ordinary least square regression technique is used to measure the impact of foreign private investment and capital market development in Nigeria. The dependent variable which is the capital market development is proxy by all market share index, while the explanatory variables includes: foreign direct investment, Gross National Product, inflation rate and domestic saving.

3.4 *Model Specification*

This study is going to adopt the model of Rukhsana Kalim (2009). The log-linear modeling specification has been used. Bowers and Pierce (1975) suggest that Ehrlich's (1975) findings with a log linear specification are sensitive to functional form. However, Ehrlich (1977) and Layson (1983) argue on theoretical and empirical grounds that not only log linear form is superior to the linear form but also makes results more favorable and reduce data size to manageable size. To check the impact of foreign portfolio investment on stock market development, following equation for empirical estimation is being modeled in a linear form as thus:

$$\mathbf{MC = \alpha_0 + \alpha_1 FPI + \alpha_2 GNP + \alpha_3 INF + \alpha_4 SAV + \mu}$$

Taking log of the variables, we have;

$$\boldsymbol{LMC = a_0 + a_1 LFPI + a_2 LGNP + a_3 INF + a_4 LSAV + \mu_t}$$

a-prori expectation $\boldsymbol{a_1} > 0$; $\boldsymbol{a_2}$; > 0; $\boldsymbol{a_3} < 0$; $\boldsymbol{a_4} > 0$

Where:

a_0 = Intercept, a_{1-4} =coefficient of variables
MC = Market capitalization as share of GDP proxy stock market development
FPI = Foreign portfolio investment as share of GDP,
GNP = GNP per capita proxied for economic growth,
INF = Inflation rate[1], **SAV** = Domestic savings as share of GDP and
μ is error term. All variables are taken into log form except inflation.
Justification of variables taken in the model is discussed below:

3.3. Data analysis technique

The Ordinary Least Square (OLS) method and the parsimonious error correction model specification were used in the study. The Augmented Dickey Fuller unit root test was used to test the stationary status of the variables before carrying out co-integration regression. Hence the multiple regressions technique is used to estimate the parameters, the objective being to minimize the error term with a view of finding the regression equation that explains the data. This is preferred for its unbiaseness, consistency, efficiency and simplicity.

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[1] All variables are in log-form except inflation.

4.0 Presentaion and analysis of results

In this study, the Augmented Dickey Fuller (ADF) unit roots test was employed to test for the time series properties of the model variables. The importance of this derives from the fact that estimation in the presence of non-stationarity in variables usually leads to biased and inconsistent estimate of the standard errors of the coefficients and this could lead to misleading inference if appropriate technique is not applied to overcome the problem. The test was designed to examine the order of integration of the variables.

The decision rule is that the variable under investigation has a unit root if the ADF statistic value exceeds the critical value at a chosen level of significance (in absolute term).

These results are presented in table I below.

Table 1: Augmented Dickey Fuller Unit root

Variable	**ADF statistics**		**ADF statistics**	
	Level	**Critical values**	**1st difference**	**Critical values**
LMC	-1.8013	1% = 3.8575 5% = 3.040 10% = 2.6608	-3.726919	1% = -3.8877 5% = -3.0521 10% = -2.6672
LFPI	-1.44187	1% =-3.8575 5% =-3.040 10% =2.6608	-4.821866	1% =-3.8877 5% =-3.0521 10%= -2.6672
LGNP	-1.44959	1% =3.8575 5% =3.040 10% =2.6608	-5.199391	1% = -3.8877 5% =-3.0521 10% =-2.6672
LINF	2.26714	1% =3.6572 5% =3.040 10% =2.1608	-3.05474	1% = -3.8877 5% =-3.0521 10% =-2.6672
LSAV	3.1266	1% = 3.8575 5% = 3.1040 10% =2.6608		1% =-3.8575 5% =-3.0401 10% =-2.6608

Source: Author's computation with the use of E-view6

The results show that all values are statistically significant at 1% and 5% level of significance, since the ADF values are lower than the critical values at levels. This implies that there is a unit root in the series. In other words, there is non-stationarity in the variables, hence they can co-integrate.

Johansen Co-integration test

The next step after finding out the order of integration is to establish whether the non-stationary variables could be co-integrated.

The Johansen Co-integration Test was adopted in this study to check for long-term relationship among the variables. All the 1(1) and 1(2) variables are used in this test. The results obtained from the Johansen multivariate co-integration are presented below.

Table 2: Co integration

Sample: 1980 2014
Included observations: 34
Test assumption: Linear deterministic trend in the data
Series: LMC LFPI LGNP LINFR LSAV
Lags interval: 1 to 1

Eigen value	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.949987	103.5977	47.21	54.46	None *
0.532051	31.70650	29.68	35.65	At most 1 *
0.410271	13.48100	15.41	20.04	At most 2
0.033058	0.806798	3.76	6.65	At most 3

* denotes rejection of the hypothesis at 5% significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level
Source: Author's computation with the use of E-view

From the table 2, the co-integration result using the Johansen co-integration test, indicated two co-integrating equation at 5% significance level, hence there is a long run relationship existing among the variables used in the model.

The possibility of co-integration makes it possible to use the error correction mechanism (ECM) model, to align short run dynamics with long run situation. The ECM is a solution to the problem of spurious results associated with estimating equations involving time series variables, and to capture dynamic adjustment in the long run. Adopting the general to specific framework, an attempt was made to estimate the over-parameterized error correction model from where a parsimonious (Preferred) error correction model would be obtained. The relevance of the ECM is that it provides a framework for establishing the links between the short run and long run approaches to economic modeling. Thus, with the ECM, no information associated with the variable's differencing is lost because the modeling technique incorporates both the short run dynamics and long run information through the error correction term. The equation included the ECM term lagged one period, representing the past value of the error correction factor whose coefficient should be negative and statistically significant to support the existence of co-integration. This result is however substantiated by the over parameterized error correction result and the parsimonious error correction model result is presented below:

Table 3

Dependent Variable: LMC
Method: Least Squares
Sample(adjusted): 1980 2014
Included observations: 34 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.146291	1.032114	4.986166	0.0002
LOG(MC)	0.338860	0.112747	3.005501	0.0101
LOG(FPI)	0.237388	0.063797	3.721024	0.0026
LOG(GNP)	0.040812	0.052619	0.775614	0.4519
LOG(INFR)	-0.120885	0.037539	-3.220250	0.0067

LOG(SAV)	0.063897	5.348996	0.000617	0.0314
ECM(-)	-0.341784	0.2615784	-2.5150733	0.00453
R-squared	0.843485	Mean dependent var		15.64664
Adjusted R-squared	0.836131	S.D. dependent var		1.332589
S.E. of regression	0.088564	Akaike info criterion		-1.838621
Sum squared resid	0.101967	Schwarz criterion		-1.428874
Log likelihood	256.1367	F-statistic		677.4320
Durbin-Watson stat	1.939786	Prob(F-statistic)		0.000000

Source: Author's computation with the use of E-view

LMC = 0.5146291 + 0.237388FPI + 0.040812GNP + 0.132845INF + 0.341784SAV + μ_t

From the table 3 above, FPI is positive with a coefficient of 0.237388 which indicate a one percent change in foreign portfolio investment is associated with 23.74 percent increase in market capitalization and it significantly influenced market capitation and hence development of the Nigeria stock market. This shows that the relationship between foreign portfolio investment and stock market development is complementary and not substitute. Economic growth (GNP), though not statistically significant positively influences market capitation and the development of stock markets in the country with a coefficient of 0.040812. This indicates that a one percent growth in GNP will lead to four percent increase in market capitalization. The impact of inflation on stock market development is positive and significant. The positive association between inflation and stock market development supports the earlier study's proposition that Nigeria stock markets are hedging against inflation (Osinubi and Amaghioneodiwe 2010). It may be claimed that the stock market is safe place for investors to invest in Nigeria. Domestic savings seem to improve the efficiency of stock market in the country. It is concluded that one percent increase in domestic savings increases growth of stock markets by 6.38 percent. Spontaneous impact of foreign direct investment is also complementary. The R-squared (R^2 = 0.843485), adjusted R-squared (0.8361631) confirms that the model is a preferred one for economic forecast. 84% variation change in the dependent variable (MC) is explained by the independent variables. The F-statistics (677.4320) which is greater than the F- table value of (4.37) at 5% level of significance affirms the fact that the entire model is statistically significant as well as the Durbin Watson statistics (1.939786) which indicate the complete absence of first order serial correlation or auto correlation, given the traditional yard stick of 2.0.

The existence of an error-correction term among a number of co-integrated variables implies that changes in dependant variable are a function of both the levels of disequilibrium in the co-integration relationship (represented by the ECM) and the changes in the other explanatory variables. This tells us that any deviation from the long run equilibrium will feed back on the changes in the dependant variable in order to force the movement towards the long run equilibrium (Eniekzimene, 2013).

The error term tells us the speed with which our model returns to equilibrium following an exogenous shock. A negative sign shows a move back towards equilibrium whereas a positive sign indicates a movement away from equilibrium. The coefficient should lie between 0 and 1. 0 suggests no adjustment whereas 1 indicates full adjustment. The error correction term shows the speed of adjustment to restore equilibrium in the dynamic model. In particular, the ECM coefficients show how quickly or slowly the variables converge to equilibrium. As observed by Baghebo and Edoumiekumo, (2012) a highly significant error correction term is a strong confirmation of the existence of a stable long run relationship. The result of the error correction model indicates that the error correction term ECM (-1) is well specified and the diagnostic statistics are good. The ECM (-1) variable has the correct sign and is statistically significant. The speed of adjustment of 0.341748 shows a low level of convergence. In particular, about 34 percent of disequilibrium or deviation from long run of MC in the previous period is corrected in the current year. This indicates that there is a short run and long run relationship between the market capitalization and foreign portfolio investment in Nigeria.

5. Conclusion and recommendations

This study appraised the impact of foreign Portfolio Investment on the Nigerian stock market and analyzed the effect of foreign portfolio investment on the Nigerian stock market and hence the growth of the Nigerian economy. 36 years data were collected. Log linear form model for regression was formulated. The macroeconomic variables included in the model were Market capitalization, FPI, GNP per capita, domestic investment and inflation rate, and this was a time series analysis.

Consequently, the study employed the Augmented Dickey Fuller (ADF) unit root on the model which show non-stationarity of the variable, then the co-integration test which shows that the variables have a long run relationship. This made it possible to use the error correction mechanism (ECM) on the model. The OLS result with a parsimonious error correction component reveals that the coefficient of determination explains 84.73% of the systematic variation in market capitalization which proxies capital market growth in the reference period. The model shows that FPI is positively signed and statistically significant, confirming our a priori economic expectation. Specifically, it implies that a 100% change in FPI will lead to 0.237388 or approximately 23% increase in market capitalization. The results reveal that there is a strong relationship between FPI and stock market capitalization. This further show that FPI and domestic savings are complementary and not substitute to the growth of stock market development and hence, growth of the Nigerian economy

Recommendations

However, the findings from this study raise some policy issues which will reinforce the link between foreign portfolio investment and capital market growth in Nigeria, The government can

encourage FDI especially FPI in Nigeria by taking various steps. First and foremost measure may be the assurance of political stability in the country.

To further sustain foreign portfolio investment and to achieve other macroeconomic objectives of the government such as economic growth, government should ensure that;

(i) The policy of internationalization of stock market operations should be sustained;

(ii) The on-going liberalization of financial markets as well as privatization programs be sustained

(iii). Efforts should be made to reduce inflation to a single digit as shown from the study the relationship between inflation and economic growth is negative.

(iv). There is the need for greater foreign participation in the stock market which could be achieved by greater openness.

(v). Authorities should look for ways of strengthening the working mechanisms of the capital market especially against fraudulence to ensure the effectiveness of the policy tools in achieving the desired macroeconomic goals in the country.

(vii). Authorities and policy makers should come up with policies that are more investment friendly.

(viii). Adequate provision of infrastructure can enhance the FPI. Volatility of foreign exchange and the rate of interest should be minimized through appropriate monetary policy.

All these development might affect the observed relationship among stock market development and economic growth.

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CREATING INNOVATIVE CONCEPTS FROM FAILED METAL CAST SCULPTURE

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Abstract
Failed metal cast sculpture is a partial distorted concept or form due to accidented occurrence during the process of casting. Failure in lost wax (cire-perdue) process of metal casting is inevitable because any minor technical error or mistake in the process has already registered. The paper examines the technical stages of hot metal casting and identified stages where problem may likely occur. It analyses the means and stages of re-conceptualization, manipulation and reconstruction of the destroyed design that differs from the intended concept. It interrogates the phenomenon of accident and design, and finally encouraged casters and sculptors not to always abandon their failed metal cast as waste because a lot can be achieved from destroyed forms.

Introduction

Failed metal cast sculpture is partial or complete deformation of intended concept due to accidental occurrence during the process of hot metal casting through lost wax (cire-perdue) process. Failure in this technique of metal casting is inevitable because any minor technical error or mistake will register failure. Lost wax (cire-perdue) process has been the technique adopted by sculptors/casters in producing cast metal work till date. The earliest methods of metal casting and use of cast metals by human is lost to the distant past, but it can be linked to the early hunter story as pointed out by Langland (1999), that as early hunters gathered and were sitting by the fire, a lump of copper fell into the coals. In the intense heat, the copper melted and ran out on the ground in glowing stream. When cool, this shinning, heavy material became very hard and took new shape.

Early people saw this repeating episodes and they were excited in the process and began to collect lumps of copper so that they could throw them into the fire to watch the glow stream flowing. Someone among them (early people) had an idea and formed a shape in the sand, and allowed the metal run into it and it took the shape of the impression on the sand, perhaps a spear point or head for hunting. And from that moment came the metal casting of the century and that is what is been practiced up till date. Nearly in all occupations, different people devise different techniques of carrying out operation or get work done due to constant practicing. And when you discover new methods, process or tricks and added to your own, it now made it two ways of doing it. As the art of metal casting gained popularity the urge for experimenting in complicated forms started arising and the idea of using wax as temporary model began, that was how lost-wax (cire-perdue) process emanated. Sometimes complicated and intricate design enhanced failure in hot metal casting if spatial forms are not well linked to each other to feed directly from sprout or pouring gate.

There would be vacuum in the history of metal casting without mentioning the astonishing and skilful contributions of Benin traditional bronze casting culture. The tradition has been in practice for a very long time. According to the Benin traditions, the sixth recorded Oba Oguola to be precise who must have reigned about 1280 A. D. or slightly before, sent a request to the Oni of Ife, for the service of a master bronze-founder to instruct Benin craftsmen in the making of

memorial heads in cast metal(bronze) for the ancestral alters. History had it that bronze pieces had been possessed and cast previously at Ife before being used in Benin (Fagg. 1990).

The Oni responded by sending one Iguegha who taught the Benin craftsmen the art of bronze casting. According to Fagg (1990), Oguola is still being remembered and was represented with terracotta head by the bronze caster of Iguneromwon quarters in Benin City who are the custodian and controller of art of bronze casting in Benin kingdom. The trade or craft had been taught since about A.D. 1280 and has been in practice till date with little or no modification on the technique, process, materials, concepts and forms.

Egonwa (2003), stressed that the bronze or arts are made to the glorification of the Oba. From the range of materials that Oba's items were made (ivory, beads, brass, copper, bronze) it is vivid that they are the types that cannot be easily possessed by everybody. Peju (2002), buttressed the point that the processes involved in traditional metal casting are numerous, cumbersome, time consuming and very tedious.

The traditional methods of casting does not allow mass production, alteration of forms and design from identical concept, or design compared to modern or moulding technique of bronze casting that allow flexibility. Lost wax (cire-perdue) is the old aged method or technique of metal casting and is still very relevant up till date. However, there is new technologically improved method of metal casting that is being practiced in developed countries; they are ceramics shell and centrifugal methods. Moulding technique is an improved method of metal casting by sculptors/casters.

Stages of moulding technique

* Model (which could be in plastic, clay, wood, metal, etc.)
* Mould Taking (flexible rubber mould is required in order to achieve registered detail impression of the model.)
* Wax Model Casting.
* Wax Model Chasing and Iron Pin Tacking
* Introduction of Sprue, Vent(s) and Runners.
- Introduction of Investment, Core and Reinforcement.
- Introduction of Anchor

- De-waxing and Pre-Heating
- Pouring Molten Metal
- De-moulding, Chasing and Presentation.

Model: is a desired finished concept from any material that the negative impression can be taken from.

Mould taking: the mould should be taken in piece mould technique, section model into different areas with clay fence (area separator) for undercut to be taken care of. Apply surface separator (engine oil, grease, Vaseline, soap paste, palm oil, etc.) to cover all areas and surface. Mixed your chosen mould material with proportional and appropriate aggregates and apply several coats and reinforcement depending on the size of the model. In case of rubber mould, mould jacket is needed to hold the flexible material in place; this can be done in plaster or concrete.

Wax model casting: couple piece moulds in place after surface separator must have been applied. Melt wax (bee wax) into liquid form and allow it cool for a while, it will be ready to pour into the mould when clot is noticed on the wax. Ensure that the shim lines are being shielded with clay to prevent wax leakage. Liquid wax will be left in the mould for about 3-4 minutes in case of concrete mould; the rate of absorption varies from different materials. After pouring out the excess wax from the mould, cool water should be turned in and filled to the brim to prevent wax from cracking and cool it to facilitate quick removed from the mould. The thickness of the wax model could be checked at the tip of the mould. As many copies as possible can be cast out at this stage and it gives room for flexibility.

Wax model chasing and attachment pouring channels: this is very important stage where creativity and craftsmanship are being displayed. From the same mould, different concepts can be achieved through alteration of forms. At this stage cleaning of shims line, work up, signature, ornamentations and serial numbers are done. Attachment of pouring gate, vent(s) and runners are been done. Iron pins are been tacked on the high point of the wax model to put in place core and investment, when wax has been melted out of invested mould. Attachment of pouring channels is one important and delicate stage which if not well handled can lead to failure of the cast. All the channels (sprues, vents, pouring gates, runners) should be well attached to the right place and direct to the wax model.

Introduction of investment, core and reinforcement: This is another vital stage which if handled with levity can lead to failure of the cast. If the materials are not proportionally measured and mixed properly, it may lead to crack of the invested mould and may be too weak to carry the weight of the molten metal when poured inside the mould cavity. Either core or investment can come first, according to Mills (1976), but it is advisable to introduce investment first in order not to distort the form while turning the wax model round and while stuffing in core, it is just matter of handling and choice. Investment materials are mixed according to the specified ratio and proportion (plaster and grog or silica sand, sand and clay, laterite, etc).

The mixing ratio of plaster/sand or grog investment and core is 30% plaster and 70% sand or grog while mixing ratio of clay/sand investment and core is 5% clay and 95% of sand. After the first layer of investment to safe guard the fragile wax model form, core materials are mixed proportionally and stuffed in hollow cavity of the wax model. Reinforcement wire gauze and binding wires are introduced on the first layer of investment and covered up with final layer of the same material, proportioned and allowed to get dried before the next stage. The use of plaster and grog instead of red sand saves time and improve registration of forms and it also reduces the amount of clean up after casting.

Introduction of anchor: construction of anchor with iron rod or wire round the invested mould is needed to enhance its lifting from kiln after de-waxing or pre-heating.

De-waxing and pre-heating: this is the method of removing or eliminating wax from invested mould in preparation for pouring molten metal.

The mould is subjected to severe heat that is enough to burn off the wax in the mould. Flaming or smoking at the sprue or vent(s) indicate that there is still trace of wax in the mould and with wax inside the mould molten metal cannot penetrate. The two operations can be done simultaneously, but little or no wax will be retrieved except the operation is done one after the other.

Pouring molten metal into the mould: the invested mould must be securely packed in the sand pit, for it to be able to withstand the pressure and weight of the molten metal when pouring. The ideal sand in the sand pit is foundry sand, but clean-sieved sharp sand can also serve. The whole mould must be buried leaving the pouring gate and vent(s) to prevent leakage. The openings must be taken care of to prevent foreign matter from entering as this may affect the

quality of the casting. Then the molten metal is poured through the pouring gate. The operation must not stop until both pouring gate and vent(s) are completely filled to the brim. After the pouring the mould is de-invested, the positive metal cast is ready for chasing and finishing.

Accident and design

Accident is the unplanned, unforeseen and unfortunate event or circumstance resulting especially from carelessness or ignorance. Wikipedia free encyclopaedia 2013, defined accident as "an unexpected happening causing loss or injury which is not due to any fault or misconduct on the part of the person injured but for which legal relief may be sought". In this instance of accident destroyed design in the process of metal casting, creative relief is the next line of action to be sought in order to overcome the trauma that accident created.

Design is the means of creating or executing a given task in an artistic or highly skilful manner. Wikipedia free encyclopaedia 2013, also define design as "strategic approach for someone to achieve a unique expectation". It defines the specification, plans, parameters, costs, activities, processes and how and what to do within environment, safety, and economic constrains in achieving that objective. The person designing is called a designer, which is also a term used for people who work professionally in one of the various design areas, usually specifying which area is being dealt with (such as fashion designer, concept designer or web designer). A designer's sequence of activities is called design process; the scientific study of design is called design science.

The ability to create innovative concept out of failed metal cast sculpture requires skill to be able to identify the right and matching found object that would be suitable to fix into the lost or failed area. Sometimes construction technique could be adapted, but found object assemblage is more interesting and creative. Found object assemblage technique have to do with association learning, to associate previous experience with present situation in order to come out with what is unique and original. Originality is what distinguishes art from craft and what is been referred to as original work must not be a copy, reproduction, imitation or translation (Grillo1960).

The idea or attempt to create innovative concept out of destroyed form came about as a result of accident that led to induced-design. As stated by Odutokun (1981),

life's pattern is considerably influenced by the

phenomena of accident and design. They turn out to

be mutually complimentary, accident inducing design,

accident destroying design and design transforming a

design to be destroyed later by accident and recreated

and so the process continue in an endless cycle.

Fig. 1 Accident Induced Concept Intended concept

Fig.2 Intended Concept Accident Induced Concept

Art is problem solving activity, art brings ideals together to reinvest and reorganize things into new whole and this problem solving is achieved through selection of varied alternatives. If

design is destroyed by accident there is alternative with an artist's creative instinct to recreate the destroyed design in another form that is different from the initially intended concept and the operation can be improve upon continuously without end.

Fig. 3. Intended Concept Accident Induced Concept

Although there is more to recreation, artists are embodied with sufficient potential to make unique form or concept in as much as the artist is unique in style. Of course there have been, and will continue to be concept in sculpture that require articulation. Mills (1977), says accumulative knowledge is not the sole province of science, and to explore form at wide range as possible can lead to a proper use of influence. Such exploration of concepts will demand personal decisions, which coupled with technical accomplishment will result in a personal statement.

Conclusively, recreating destroyed concepts that are products of accident is not an easy task, they end up as new inventions though it is challenging and such trauma ignites artistic creativity to explore this aspect of art. It is matter of confidence and consistency in the practice that is required. According to Sullayman (2008), "There is no one way to reconceptualise, no better tool to use, no lesson that will make one perform creditably in re-creating accidental design until the first attempt and consistency in the practice is sustained". What matters about the phenomenon of accident and design is for artist to strive to express his/her inner most feeling towards rehabilitating destroyed design and to achieve unique dimensions in sculpture.

Recommendations:

* Accidental metal cast piece should not be always abandon as waste since unique design can be achieve from distorted forms.

* Adequate precaution should always be taken or considered while going through the technical procedures of hot metal casting in order to avoid error

* Materials and methods involved in production of metal casting should be improve to sophistication and advance level to abolish or minimize failure in____ casting.

* There should be a forum organized by art organization where experienced and____ skilful metal cast practitioner would share his/her experience with the_____ sculptors and casters.

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FEMINISM, SOCIAL CHANGE AND THE FEMALE VOICES IN CONTEMPORARY NIGERIAN FICTION: A TEXTUAL STUDY OF IFEOMA OKOYE'S *BEHIND THE CLOUDS*

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Abstract

Women, generally, are regarded as the weaker sex, a group that cannot be independent of the males, a group that is usually painted negatively in male-authored literary pieces and in fact, a group that must be seen but not heard and which is subject to the social whims and caprices of obnoxious patriarchal customs and traditions. This is rather appalling and because of it, female writers have taken it as a duty to redress and socially portray positively the battered image of the womenfolk. In doing this, they present the female group as a make up of people who can and are decent, virtuous, pious, hard-working, independent, capable and responsible. As such, it is our strong belief that to fully understand and appreciate this fact, an indepth study of Ifeoma Okoye's Behind the Clouds is worth it. This is what is being attempted here.

Introduction

Female dependency on the male is ageless, and consequent upon this phenomenon, the former has persistently struggled to achieve a reasonable degree of parity with her male counterpart. This struggle is borne out of the belief that she is oppressed and so is determined to end that oppression. It is upon this background that Ifeoma Okoye's *Behind the Clouds* is a novel worthy of detailed study.

Our scope in the study of Ifeoma Okoye's *Behind the Clouds* is woven around her dwelling on the consciousness of the Nigerian woman by making her aware of her second class status in Igbo patriarchal society as well as advocating a social change in attitude that gives rise to unnecessary sufferings in black women and sets out to correct the debased image of Nigerian women.

Before going into the main study, however, it is necessary to take a peep into feminism, as a term. A critic, Kelly (1988:163), defines feminism thus "Feminism minimally speaking is a belief that women are oppressed and a commitment to end that oppression".

Feminism as a concept is rather protean and as such, it becomes difficult to arrive at a universally acceptable definition. It is in recognition of these variations in definition that Sheila (1980:4) observes:

> Feminists do not agree among themselves on one all-inclusive and universally acceptable definition of the term feminism. Depending
> on one's political, sociological observations and goals; one's
> individual aspirations for womanhood and for humanity;
> one's understanding or interpretation of the word woman;
> and several other factors, the term feminism can mean different
> things and have variety of functions.

In other words, Sheila (1980), observes here that the meaning feminism is multifarious so that the definition one gives to it will depend largely on the perspective from which one views it.

Some female writers look at feminism from a radical perspective and in that regard, advocate a thorough and complete equality with the male in all ramifications without a compromise, while some others are more liberal in their approach. The former category best describes some of Buchi Emecheta's novels while Ifeoma Okoye, Flora Nwapa and Zaynab Alkali fall into the latter. Whichever way the term is viewed, however, it is not unconnected with the liberation of womanhood the group or gender which should be seen but never heard, from male chauvinism and social patriarchy.

The oppression of women is a universal phenomenon and because of this, the discourse is not devoid of a global dimension. De Beauvoir (1972:23) in this respect observes:

> The situation of women in the world is comparable to that of the American blacks. Both are being emancipated today from a like paternalism, and the former master class wishes to keep them in their place-that is second class citizen.

The above observation is not only applicable to women in Europe and America but also to Nigerian women. In fact, Buchi Emecheta, one of Nigerian's feminist writers, derives the title of her second novel-*Second Class Citizen* (1974) from De Beauvoir's phrase.

We want to state, at this point, that it is appalling to note that social thought is not only male-dominated but male-centred as well. The use of the word 'man', to represent humanity shows that the female is a derivation or subset of the male. This goes a long way to explain why more has been written about men than about women and why the little that has even been written about women displays open bias. Alexander (1989:47) points out in this respect:

> Even today, when bookshops are amply stocked with literature by women and about them and with specialized materials from feminist publishing houses, it is still the case that women's writing receives less critical attention than is given to men's writing.

Main discussion

Coming to the core of this study, literary genres happen to be one of the most effective media through which Nigerian female writers have voiced out, albeit vehemently, the need for women everywhere to rise up to the challenge of achieving a reasonable degree of parity with their male counterparts. Their perspective consists of taking interest in the lifestyles, activities and occupation of women both at home and in the society at large. From the foregoing, one can deduce that women desire a situation where they are valued, recognized and counted equal with the men in the society. Left to them, womanism is about valued autonomy for women as individuals and for them as a group. In this regard, they mean to develop in themselves and in their environment, the condition that will enable them control their own political, social, economic and personal destines. To buttress this, Sheila (1980:4) once again declares:

> As feminists, we value and prize the fact of being woman as highly as we value the fact of being human. We do not accept the cultural images of women as incompetent, petty, irresponsible or weak. Rather, we affirm our capacities to be strong, capable, intelligent, successful. ethical human beings.

Womanhood and the Nigerian Society: Ifeoma Okoye's *Behind The Clouds*

Women in Africa and Nigeria in particular have always been presented as scapegoats in the family. Whatever problem that befalls the family is attributed to the woman. Ifeoma Okoye in the novel, *Behind the Clouds*, deals with the theme of childlessness in a typical Nigerian family as it affects the females. The novel chronicles the struggles for honour and respect by the protagonist, Ije Apia, a not-totally infertile woman. Ifeoma Okoye , unlike Bushi Emechata, does not advocate for a total separation between the man and the woman. She, in an attempt to promote social change - a more humane rapport in marital relationships between childless couples, presents a unique perspective of the problem of childlessness.

The novel reveals a plot conceived in irony and which ends in irony. Ije, the good-natured wife of the loving, hard-working and successful architect, Dozie, is presumed barren and a great deal of anxiety and money are expended on her "cure" whereas it is Dozie who is sterile all along. At last, after Dozie "proves" his manhood by supposedly making the rude Virginia, a woman of easy virtue, pregnant, it dawns on Dozie through Virginia's tactless taunts that he cannot impregnate any woman. Dozie consequently goes for a test overseas and regretfully admits to Ije, his wife thus " I am sorry that you've subjected yourself to all kinds of treatments, unpleasant ones and dangerous ones, when I have all along been the cause of our childlessness".

As part of Ifeoma Okoye's aims in this novel to correct the ugly and erroneous portrayal of women in Nigeria in particular, she presents a couple's marital problems in the right perspective. In addition, she sets out to rehabilitate and revaluate female characters from the usual male chauvinist point of view of male writers, to what she considers a fair and objective criticism.

This observation represents the patriarchal setting and attitudes of the Nigerian society which is reflected in the literary works predominantly replete with male writers. Male writers deal almost exclusively with male characters and male concerns that are naturally aimed at an entirely male audience. All these ill-treatments meted out to womanhood are what Ifeoma Okoye sets out to rectify in her novel.

The first page of the novel reveals Ije, the protagonist, in the hospital waiting to be attended to by the supposedly "saviour" doctor, Melie. Ije has been told that he will perform the "magic" which will eventually make her become pregnant and have her own children. The burden of childlessness rocking her family lies almost exclusively on her and she wonders in thought over so many tests she has subjected herself to in her quest for children. The narrator comments thus:

> Ije sat there, her mind plunged deep into the past: a past full of failures that still rankled. She remembered vividly all the doctors who had treated her- the tests, the minor operations, and the major one that had almost killed her. She remembered also the herbalists she had approached for help. (1-2)

It is interesting to note, however, that in all the tests Ije has been receiving (to no avail), the husband was never tested. Ifeoma Okoye is, therefore, suggesting to her reading audience that it is not right to blame all the cases of infertility and childlessness on women alone, drown her with drugs and subject her to all kinds of psychological tortures without also testing the man towards ascertaining his potency. She makes the readers to understand that the patriarchy which puts the blames solely on the shoulders of the woman betrays ignorance and, in some cases, sheer saddism.

In the light of the above, Ifeoma Okoye shows, for instance, how Ije's husband misjudges in viewing their fruitless marriage as a "female concern" and as such, Ije alone is encouraged to seek medical help. Ifeoma Okoye bares her mind in the words of Beatrice thus "I don't know why in this country of ours it is always the women who take all the blame when a couple is childless".

Women, the author points out, are indeed scapegoats of tradition. This is in the sense that the failure of most marriages in the society is always blamed on them. The truth of this reality is evident in the novel as Ije becomes the victim who is condemned for their sterile marriage.

Furthermore, Ifeoma Okoye also draws attention of the readers to the partial, one-sided medical investigations of the medical doctors who are highly patriarchal and biased against women when it comes to the treatment of family problems. The "famous" doctor, Melie, fails to ask Ije to bring along her husband for tests after he found nothing wrong with Ije but proceeds to "treat" her in spite of all indications of the healthy state of her reproductive system. The narrator observes:

> She stopped by the corner of the building to read the reports before taking them to her doctor. She knew it was wrong to read the reports… The reports indicated that her fallopian tubes and

> uterus were normal.

Again, Ije's mother-in-law accuses her that "---- her childlessness was a punishment for her unchaste life as a spinster".

In all these, Ije makes no comment and, at last, when her mother-in-law has nothing more to say, she bursts into tears. Not offended, Ije moves over to her and begins to console her even though she too is on the verge of crying. She consoles thus:

> "Mama," she said putting her hand on her mother-in-law's lap, 'a child comes from God. I still believe that one day God will give you many grand-children through me. I had a pure life as a girl. Only God is my witness.

To neither her mother-in-law who obviously sees no good in her nor to Virginia who intrudes into her family with clear crudity and extreme bad manners, does she give a piece of her mind. In short, she is shown to be nothing less than a saint. She surrenders her salary to her husband whom she educated by holding down two jobs in England and in the long run, when Dozie asks for forgiveness, she readily accepts him back without any pre-condition. Ifeoma Okoye, from this, uses Ije to prove to the society that women are cultured, well-behaved, ethical and understanding set of human beings as opposed to the bias and prejudices against them by most male authors.

Conclusion

Abati (1996:8) commented on the extent to which women have been reduced. He opines:

> Within the last decade, development scholars across the continent have had to tackle the problem of women. Based on concerted research, the conclusion has long been reached that women are a decentred, denatured subspecies of humanity, harassed by culture, intimidated by polities and subsumed under patrilineal and patriarchal structure which pampers male ego.

Despite this, however, we have seen various examples of women like Ije in this study, who have asserted themselves and left behind them monuments of power, glory and deep respect.

In fact, we make bold to state that the message Ifeoma Okoye presents through Ije in *Behind the Clouds* is very clear. She aims at cementing matrimonial ties by presenting the couple's reconciliatory gestures towards the end of the novel. Some feminist plots end with the separation of the man and the woman but her work is committed to the revival and unity of males and

females, and the home. Herein lies the significance of the novel. She has set out in a rather pragmatic way, to bring about the utter destruction of retrogressive Igbo cultural norms in particular and that of the entire Nigerian society in general, which often esteem the male to the detriment of the female. In addition, she has successfully disabused the minds of her readers that marital problems which have to do with childlessness should not only be attributed to women but be seen as a shared affair. This way, the author has succeeded in achieving the redemption of the humiliated image of womanhood in Nigeria in particular and Africa, in general and also elicited in the minds of the readers, the need for social change and re-orientation as it relates to such family problems.

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Impact of Yeast Fermentation on the Organoleptic Quality of Pap

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Abstract

The impact of yeast fermentation on the Organoleptic Quality of pap was investigated. Maize (Zea mays) was fermented using traditional method involving the naturally occurring microflora, and yeast fermented using Saccharomycese cerevisiae. For both procedures, 1 kg of yellow maize grains, submerged in water in a ratio 1:3 (w/v) and allowed to ferment at 28 + 2^{o}C for 72 hr. Microbial enumeration was carried out every 12 hr from start of digestion using a 10 fold serial dilution and pour plate method on nutrient agar and malt extract agar. Sensory evaluation of the Organoleptic Quality of pap prepared from the cornstarch sediments from Traditionally prepared pap (TPP) and Yeast fermented pap (YFP) was carried out using a 9-point Hedonic scale. rating the pap for aroma, texture, appearance, taste, and overall acceptability. Kruskal Wallis non-parametric analysis of variance was performed to calculate mean Ranks and significant levels for aroma, texture, appearance, taste and overall acceptability (P<0.05). The result of the bacteria colony count in the steeped liquor of maize fermented using the traditional method show an initial bacteria count of 1.7x10^{-1} cfu/ml of slurry. This gradually increased to 2.4x10^{-1}, 3.2x10^{-1}, and 4.1x10^{-1} over the next 24, 36 and 48 hours post charging period respectively. Bacteria count for YFP at the start of fermentation was 0.4x10^{-1} cfu/ml of slurry, about 76.47% less than the count for the traditional method. This gradually increased to 1.7x10^{-1} at the 72hr post charging period, representing 55.26% less than the result obtained in the slurry fermented using traditional method. Yeast count also showed an initial low reading of 0.8x10^{-1}, representing a 33.33% less than the count for the traditional method. The result of the sensory evaluation indicate a higher general acceptance for pap produced from TPP. However statistical analysis of the sensory scores indicate no significant difference in the Organoleptic Quality of pap prepared using TPP and that prepared using YFP at 95% confidence level.

Key words: Fermentation, Organoleptic Quality, Microflora.

Introduction

Pap is a fermented semi-solid food product manufactured from cereals (commonly maize, sorghum or millet). It is a staple food in most African countries, with varying preparation methods and names. It is commonly used as weaning food for babies and also for young children and as a standard breakfast cereals in many homes.

Generally, washing, steeping, milling, sieving, fermentation and drying are the processing steps applied in the preparation of pap. During processing, nutrients including protein and minerals are lost from the grains thereby affecting nutritional quality adversely. Fermentation is one of the household food technologies reviewed extensively as means by which the nutritive value of plant foods could be improved (Adepoju, Adekola, Mustapha, and Ogunola, 2010)). Food samples such as maize, sorghum, millet, rice can be fermented to increase the nutrient content, carbohydrate digestibility, and energy densities of gruels, increase the bio-availability of amino acids and also improve their shelf life under controlled environment (FAO, 2011). Fermentation can also reduce the high bulk of the traditional complementary foods by reducing the viscosity of the cereal gruel or porridge (Amandikwa, Iwe, Uzomah, and Olawuni, 2015). Sun-drying of food removes water, reduces moisture content and concentrates nutrients. Sun drying of foods such as fermented maize is a cheap traditional method of food preservation, because solar radiation (free gift of nature from sunlight) does the drying and enhances the shelf life of foods products. However, a greater loss of nutrient has been found associated with wet-milling of maize-ogi. Amandikwa, Iwe, Uzomah, and Olawuni (2015), reported a decrease in protein, fat, ash and crude fibre in wet-milled maize-ogi as compared with maize-ogi that was processed by dry-milling: Dry-Milling of fermented maize has shown that the nutrient content of complementary foods can be improved by conserving the nutrient contents as well as enhancing the shelf life while wet-milling results mostly into nutrient-loss, yield mainly starch and allows contamination from dirty water. It is therefore advisable to dry-mill fermented maize because, it is more hygienic, retains nutrient contents and improves shelf life. (Amandikwa et al., 2015)

Maize (*Zea mays*) is an important cereal crop produced extensively in Nigeria The traditional cereal-based foods that are consumed in West Africa are processed by natural

fermentation of which includes; maize, sorghum and or millet and are particularly important as weaning foods for infants and as dietary staples for adults. In terms of texture, the fermented cereal foods are either liquid (porridge or gruel), stiff gels (solid) or dry (fried or steam-cooked granulated products). The fermentation process is often carried out on small or household scales and are characterized by the use of simple, non-sterile equipment, random or natural inoculums, unregulated conditions, sensory fluctuations, poor durability and unattractive packaging of the processed products crop in the world and ranked the second most important cereal crop in Nigeria (Edema, Sanni and Sanni, 2005).

The convectional traditional method of fermenting pap relies on inherent microflora of the maize grain as well as contaminant for microbial fermentation. This leaves many unanswered questions as to the safety of the resulting food product. The crude form of processing encourages high **microbial contaminations** which at times make some foods undesirable when organisms causing spoilage, food poisoning or food intoxication are present.

Food poisoning and infections can lead to fatal consequences in infected individuals, therefore, efforts should be geared at preparing foods that are free of organisms that can lead to these conditions. The safety of fermented foods has been reviewed (Nout, 1991). Major risk factors include the use of contaminated raw materials, lack of pasteurization and use of poorly controlled fermentation conditions. The objective of this study, therefore, is to investigate the likely impact of Yeast fermentation (a microflora of known origin and safe for human consumption) on the Organoleptic quality of pap.

Materials and method

Collection of Samples

Yellow maize (*Zea mays*) used for this study was bought from a local market in Auchi, Edo State, Nigeria. They were put in clean cellophane bags and taken to the laboratory for processing into pap.

Processing of Maize into Pap

Traditionally processed Pap (TPP). 1 kg of the maize grain, were cleaned by hand picking to remove dirt, stones and unwanted materials and washed in water, after which it was submerged in water in a ratio of 1:3 (w/v) and allowed to ferment at 28 + 2^{o}C for 72 hr. At the end of

fermentation, the grains were drained, and milled. The resulting mash was sieved with adequate water using 70 mm mesh screen. The filtrate (cornstarch sediment) was poured into a muslin bag, tied and pressed to dewater sample. This was then put in plastic container and kept in the freezer.

Yeast fermented pap (YFP). Yeast fermented pap (YFP) was produced by cleaning and washing 1 Kg of the maize, and submerging it in boiling water in a ratio of 1:3 (w/v) for about 5 min. This was to wash and eliminate the normal microbial flora of the maize. When the temperature of the water came to about 45^{o}C, *Saccharomycese cerevisiae* was then introduced (0.3 g/100 g of substrate) and allowed to ferment at 28 + 2^{o}C for 72 hr. At the end of fermentation, the grains were drained, and milled. The resulting mash was sieved with adequate water using 70mm mesh screen. The filtrate (cornstarch sediment) was poured into a muslin bag, tied and pressed to dewater sample. This was then put in plastic container and kept in the freezer to prevent degradation/deterioration.

Microbial count in the steeped liquors

The steep liquor (1 ml) was withdrawn and 10 fold dilutions made for microbiological analysis. Using nutrient agar and malt extract agar, 1 ml of the diluted samples were cultured using pour plated in duplicates. The nutrient agar plates were incubated aerobically at 37°C for 24 h while the malt extract agar plates were incubated at 28±2°C for 72 h. The respective resultant bacterial and yeast colonies, after incubation observed colonies were counted and the counts expressed in cfu ml^{-1} of slurry.

Preparation of Pap for sensory evaluation

The samples; TPP and YFP were used to prepare pap. Dewatered TPP (20 g) was put in a sizable bowl and crushed into small sizes. Cold water (50 ml) was and stirred to required consistency, after which boiling water was then added slowly and steadily in a circular motion, while stirring at the same time. As the mixture started setting, the stirring was stopped and water added until the desired consistency was achieved. The same procedure was repeated for YFP.

Sensory evaluation of pap

The pap was allowed to cool and put into small clean bowls coded with random single-digit codes. A sensory panel consisting of 10 semi-trained graduate students of Hospitality Management Department, Auchi Polytechnic, familiar with sensory attributes of local pap was

employed to evaluate the products. A 9-point Hedonic scale was used to rate the pap for aroma, texture, appearance, taste, and overall acceptability. A score of 1 represented "dislike extremely" and a score of 9 represented "like extremely" (Eriksson, Koch, Tortoe, Akonor, and Oduro-Yeboah, 2014). A sample was evaluated at a time with water and neutral cream crackers given to each panelist to refresh palate.

Statistical analysis

Kruskal Wallis non-parametric analysis of variance was performed to calculate mean Ranks and significant levels for aroma, texture, appearance, taste and overall acceptability. Student t' test was performed to compare the mean values of the proximate composition of the fermented and unfermented cassava flours. Significant levels were determined at $P<0.05$.

Results

Table 1 Microbial counts in the steep liquor of maize fermented using traditional method

Hour	Bacteria (cfu ml^{-1})	Yeast (cfu ml^{-1})
00	1.7×10^{-1}	1.2×10^{-1}
12	2.4×10^{-1}	2.3×10^{-1}
24	2.8×10^{-1}	2.9×10^{-1}
36	3.2×10^{-1}	3.1×10^{-1}
48	4.3×10^{-1}	3.4×10^{-1}
60	4.1×10^{-1}	3.8×10^{-1}
72	3.8×10^{-1}	3.2×10^{-1}

cfu ml^{-1}: colony forming units per ml

The result of the bacteria colony count in the steeped liquor of maize fermented using the traditional method shows the bacteria count was increasing with fermentation period with an initial count of $1.7x10^{-1}$ cfu/ml of slurry to $4.3x10^{-1}$ at 48 hr of digestion time. A gradual decrease in count however commenced after 48 hr fermentation period. Yeast count also showed a steady rise with fermentation time; $1.2x10^{-1}$ at 00hr to $3.8x10^{-1}$ at 60 hr. The result of the 72 hr show a decrease in cfu/ml.

Table 2 Microbial counts in the steep liquor of maize fermentation using controlled method

Hour	Bacteria (log cfu ml^{-1})	Yeast (cfu ml^{-1})
00	0.4×10^{-1}	0.8×10^{-1}
12	0.5×10^{-1}	2.4×10^{-1}
24	0.8×10^{-1}	3.2×10^{-1}
36	0.9×10^{-1}	4.1×10^{-1}
48	1.1×10^{-1}	5.8×10^{-1}
60	1.4×10^{-1}	6.4×10^{-1}
72	1.7×10^{-1}	6.2×10^{-1}

cfu ml^{-1}: colony forming units per ml

The result of the microbial colony count in the steeped liquor of maize fermented using *Saccharomyces cerevisiae* is shown in table 2.The result indicates that Bacteria count increased with fermentation time in both sample. The increase observed at 72 hr post charging period, representing 55.26% less than the result obtained in the slurry fermented using traditional method. Yeast count also showed an initial low count of $0.8x10^{-1}$ cfu/ml, representing a 33.33% less than the count for the traditional method. A steady rise by the periodic count from $0.8x10^{-1}$ cfu/ml at 00hr to $6.4x10^{-1}$ cfu/ml at 60 hr was observed followed by a decrease at 72 hr in cfu/ml.

Table 3: Mean scores of the sensory evaluation of pap prepared using TPP and YFP

Pap Sample	Aroma	Texture	Appearance	Taste	General Acceptability
TPP	8.8	8.6	8.2	8.4	8.6
YFP	7.4	8.4	8.7	6.9	7.2

Table 3 shows the mean scores of the sensory evaluation of the Organoleptic quality of pap prepared using traditional fermentation method (TPP) and controlled method (YFP). The scores for aroma, texture, taste were highest for TPP; 8.8, 8.6, and 8.4 respectively. While 7.4, 8.4 and 6.9 was recorded for YFP respectively. YFP, however had the highest score for appearance; 8.7 as against 8.2 recorded for TPP. Pap prepared from TPP had an overall general acceptability score of 8.6, while pap from YFP had 7.6.

Discussion

The occurrence of microbial growth in the steeped liquor of maize prepared using the controlled method indicate possible contamination of the slurry after the initial boiling to remove the inherent microflora. This is consistent with the work of Akharaiyi and Omoya (2008), who reported that the **microbial load** observed during pap fermentation was due to contaminations from different sources, majorly from the corn kernels, human and the environment during processing. It could also be due to the contaminants from the grinding engine which was only washed before use. Higher initial bacteria count in the TPP is consistent with the expectation of the researcher, whose intention in YFP was to eliminate other organisms for a controlled

fermentation using *Saccharomycese cerevisieai.* The gradually increased in the colony counts during the fermentation periods is consistent with the growth pattern of microorganisms. This corroborated by the work of who reported that the sequential increase of **microbial load** from beginning of fermentation to the 48 hr of fermentation could be linked to the nutrients being released from the corn kernels to the steeping liquor, and the low **lactic acid** concentration and the absent of other inhibitory substances in the steep liquor. The reduction of growth after the exponential face may not be unconnected to accumulation of acid and other by-products with impairing growth factors.

The result of the sensory evaluation indicate a higher general acceptance for pap produced from TPP, this may be associated to the fact that the presence of other microorganism; bacteria and other yeasts in the slurry whose by-products have flavours and taste that enhances the pap's Organoleptic quality. However statistical analysis of the sensory scores indicate no significant difference in the organoleptic quality of pap prepared using TPP and that prepared using YFP at 95% confidence level.

Conclusion

From this study, it has been deduced that pap can be prepared by fermentation using *Saccharomycece cerevisiae*. The use of the yeast fermentation method did not, however, improved the Organoleptic quality of the product relative to the traditional method, but it reduced the microbial load of unidentified microorganisms associated with the traditional method, and hence improve the safety of the product.

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Developing Knowledge Driven Economy (KDE) In Nigeria: Implications for Economic Performance beyond the 21st Century

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Abstract
The global financial crisis has shown that countries can no longer rely on narrow and static paradigms of growth, such as Nigeria and its natural resource endowments. The era when natural resources dominated trade has given way to an era in which knowledge resources are paramount. Although economic progress has always been knowledge-driven, the scope and role of knowledge to economic processes/performance has fundamentally changed over the last years. Nigeria needs to move beyond the stop-start development patterns of an oil-based economy to create a stable and prosperous base for a 21st century society built on a critical mass of knowledge workers. To be competitive in a 21st century context, Nigeria must develop a new economy based on knowledge, productivity and innovation. 21st century economy work tackles the need for a new social contract that regulates contemporary business practices, provides economic security to a larger populace, and invests in long-term prosperity for communities across the country. It is on these grounds, this paper provides a strategy for assessing the knowledge driven economy in Nigeria.
Keywords: Knowledge Driven Economy; Economic Performance; 21st Century

1.0 Introduction

Not since the beginning of the Industrial Revolution has there been a more urgent time to rethink outdated development paradigms. The global financial crisis has shown that countries can no longer rely on narrow and static paradigms of growth, such as in Nigeria and its natural resource endowments. The impacts of this paradigm shift are all around us. The era when natural resources dominated trade has given way to an era in which knowledge resources are paramount. Knowledge and innovations are now central to development. Wealth creation is now based on Knowledge and innovation (Ismail & Giulia, 2010). Our world is changing rapidly and those who will be able to acquire, adapt, and utilize new ideas and innovations, regardless of who has invented them, will create tremendous wealth in the process.

Traditionally, cultures that knew more than others were better able to adapt to their environments, survive, and thrive. Knowledge is becoming truly global, accessible, and democratic. Countries such as the Republic of Korea, India, and the United States of America that can harness the power of new technologies nurture a cadre of knowledge workers that can push the productivity and innovation frontiers. Others that fail to do so remain mired in poverty (Ismail & Giulia, 2010). Nigeria has a bold vision of becoming one of the top 20 economies in the world by 2020, as outlined in its "Nigeria Vision 20:2020" strategy. Although currently eighth in the world in terms of population, the country ranks 41st in terms of GDP and 161st in terms of GDP per capita (Ismail & Giulia, 2010). Despite being one of the poorest countries in the world, Nigeria is a powerhouse on the African continent by virtue of its size. Its vast oil wealth also promises much in the way of potential finance for development.

To achieve Vision 20:2020, Nigeria needs to move beyond the stop-start development patterns of an oil-based economy to create a stable and prosperous base for a 21st century society built on a critical mass of knowledge workers. To be competitive in a 21st century context, Nigeria must make transition to a new economy based on knowledge, productivity, and innovation. 21st century economy work tackles the need for a new social contract that regulates contemporary business practices, provides economic security to a larger populace, and invests in long-term prosperity for communities across the country. Epping (1992), has created the beginner's guide to fundamental economic terms and concepts to help the average person understand and navigate the rapidly changing twenty-first-century economy. In this guide economic literacy is a survival imperative in a fusion economy, where what happens in one corner of the globe can have unprecedented impact on the rest of the world. Here, workforce will need technical expertise in areas such as design and computing, plus skills which robots cannot replace – flexibility, empathy, creativity and enterprise. While the twin forces of technology and globalization are powerful and transformative, their impacts are not predestined.

Is it not a known fact that physicians today do not rely on the medical wisdom of the early 19th century, nor do architects defer to the design principles of that period? But much of the influential economic "wisdom" that dominates contemporary policy debates—what we call market

fundamentalism-- was developed by theorists who wrote during the Industrial Revolution when farming was still the most common occupation (Radwan & Pellegrinii, 2013). If we refuse to revise our economic thinking to meet the challenges of the 21st century, the consequences will be disastrous. How can Nigeria prepare for this century? What areas must its leaders focus on to achieve the vision of a new Nigeria? These and many others are the focus of this paper.

2.0 Conceptual Issues

2.1.1 The concept of knowledge driven economy

The Competitiveness White Paper (1998) cited in Romesh (1991) defines knowledge driven economy as one in which the generation and the exploitation of knowledge has come to play the predominant part in the creation of wealth. It is not simply about pushing back the frontiers of knowledge; it is also about the more effective use and exploitation of all types of knowledge in all manner of economic activity. Knowledge itself, consists not only of information or ideas that can be written down and transmitted in one medium or another, so-called "codified" knowledge. It also incorporates understanding of a more tacit nature, which is more difficult to acquire and slower to diffuse. By its very nature, tacit knowledge is often the basis of competitive advantage.

According to Ariyo (2000), knowledge-driven economy (KDE) or "the new economy" describes an economy in which the generation and the exploitation of knowledge has come to play the predominant part in the creation of wealth. It is about the more effective use of all types of knowledge and creativity in all manner of economic activity. It is about the more effective use of all types of knowledge and creativity in all manner of economic activity. In the advanced economies, "knowledge" is fast becoming a strategic asset for economic development. The knowledge economy is not just about establishing high-tech industries and creating an innovative and entrepreneurial culture. An economy that effectively acquires, creates, disseminates and uses knowledge as the main engine for long-term economic growth is referred to as Knowledge driven economy. In a sense, knowledge becomes its prime source of competitive advantage.

2.1.2 The concept of economic performance

The concept of economic performance is usually used to assess the achievement of economic objectives. These objectives can be long term, such as sustainable growth and development, or short term, such as the stabilisation of the economy in response to sudden and unpredictable events, called economic shocks. To know how well an economy is performing against these objectives, economists employ a wide range of economic *indicators (Economics Online)*. Economic indicators measure macro-economic variables that directly or indirectly enable economists to judge whether economic performance has improved or deteriorated.

Tracking these indicators is especially valuable to policy makers, both in terms of assessing whether to intervene and whether the intervention has worked or not. These indicators include: levels of real national income, spending, and output; growth in real national income; investment levels and the relationship between capital investment and national output; levels of savings and

savings ratios; price levels and inflation; competitiveness of exports; levels and types of unemployment; employment levels and patterns of employment; the productivity of labour, which influences other economic variables, including an economy's competitiveness in international markets; trade deficits and surpluses with specific countries or the rest of the world; debt levels with other countries; the proportion of debt to national income; the terms of trade of a country; the purchasing power of a country's currency; wider measures of human development, including literacy rates and health care provision; measure of Human Development Index (HDI) and measures of human poverty including the Human Poverty Index (HPI).

2.1.3 The concept of the 21st century

According to *United States Naval Observatory (2013), t*he 21st century is the current century of the Anno Domini era, in accordance with the Gregorian calendar. It began on January 1, 2001 and will end on December 31, 2100. It is the first century of the 3rd millennium. It is distinct from the century known as the 2000s which began on January 1, 2000 and will end on December 31, 2099. The first years of the 21st century have been marked by the rise of a global economy and Third World consumerism, mistrust in government, deepening global concern over terrorism and an increase in the power of private enterprise (*David, 2015*). The Digital Revolution which began around the 1980s also continues into the present (*Satell, 2015)*. In contemporary history, the 21st century essentially began in 1991 (the end of Short Twentieth Century) with the United States as the sole superpower in the absence of the Soviet Union, while China began its rise and the BRICS countries aimed to create more balance in the global political and economic spectrum.

2.2 Theoretical framework

Neoclassical growth theory developed by Solow (1956) is an economic theory that outlines how a steady economic growth rate can be accomplished with the proper amounts of the three driving forces: labor, capital and technology. The theory states that by varying the amounts of labor and capital in the production function, an equilibrium state can be accomplished. The theory also argues that technological change has a major influence on an economy, and that economic growth cannot continue without advances in technology (Solow 1956). The neoclassical growth theory is based on the understanding that the accumulation of capital within an economy, and the ways in which people use that capital, is important for economic growth.

The weakness of the neoclassical growth theory gave rise to the endogenous growth theory. The endogenous growth theory argues that economic growth is generated from within a system as a direct result of internal processes. The theory notes that the enhancement of a nation's human capital will lead to economic growth by means of the development of new forms of technology, efficient and effective means of production. This led to the incorporation of Research and Development (R&D) variables into the growth framework. Technological advances result from R&D activity; technological progress and knowledge accumulation. Grossman & Helpman (1991) also indentify investment as important determinant in the growth theory. This is because it allows improvement in productive capacity and increase profits that lead to growth.

Since the last decade of the twentieth century, advanced economies have been experiencing radical structural change, with a marked decline of mass production in manufacturing industries and an increasing specialization in knowledge intensive business services (KIBSs) and knowledge intensive manufacturing (KIM). This has been accompanied by a rapid pace of introduction of new technologies, coupled with Total Factor Productivity (TFP) growth. A large literature has analyzed the characteristics, the effects, and some of the causes of these twin processes of structural and technological change (Bonatti & Felice, 2008; Buera & Kaboski, 2012). The Schumpeterian notion of creative response enriched by the new economics of knowledge and Kuznets's view that technological innovation and structural changes are endogenous and strictly intertwined to develop and empirically test an articulated explanatory framework. According to this framework, the shift to the knowledge economy was driven by the search for a new source of competitive advantage, stirred by globalization, and based on the strong and unique knowledge base of advanced economies with positive effects in terms of TFP growth (Kuznets, 1965; Schumpeter, 1947).

3.0 The need for knowledge driven economy in Nigeria

From independence in 1960, in the pursuit to increase the material welfare and well-being of the citizens, the state took up the direction and planning of economic growth and development. Various governments have, over time, embarked upon numerous developmental policies, plans, programmes and projects. Notable among these was the First National Development Plan (1962-1968), which was designed to put the economy on the path of accelerated growth by prioritizing agricultural and industrial development as well as training of high-level and intermediate manpower (Onuah, 2006). The Second National Development Plan (1970-1974), through to the Third National Development Plan (1975-1980), were devoted primarily to reconstruct and rehabilitate infrastructure that were destroyed during the civil war years. This period witnessed massive investment of resources in the rehabilitation and construction of new infrastructural facilities (Sanusi, 2012). The Fourth National Development Plan, like the previous plans, is a deliberate instrument for harnessing the country's national resources for the benefit of her people.
Nigeria's Vision 2010 was aimed at "transforming the country and focusing it firmly on the path to becoming a developed nation by the year 2010". According to the document, the private sector was expected to be very active, within a market-oriented, highly competitive, broad-based, private sector-driven development process. In addition, the return of democratic governance in the country in 1999, brought along with it the introduction of a series of reforms, aimed at redressing the distortions in the economy and restoring economic growth. The National Economic Empowerment and Development Strategy (NEEDS) of 2004 were a home-grown poverty reduction, value-reorientation and socio-economic development strategy for the country.

All plans, programmes and visions enumerated above, were to guarantee Nigeria's economic development by altering the model of economic structure of production and consumption pattern, reduce dependence on oil, diversify the economic base, generate employment, and create a globally competitive and stable economy (Sanusi, 2012). In spite of these plans, policies and

reforms, Nigeria is still classified as a mixed economy emerging market (Onuah, 2006). Nigeria is presently grouped among the 20 poorest countries in the world, and among the 30 least developed countries in Sub Saharan Africa. Poverty headcount of Nigeria is 62.6 percent, which constitutes about 63 million people and life expectancy is 52 percent, which is relatively low (World Bank; 2014). Poverty is a problem of both rural and urban Nigeria, but it is more severe in rural areas, where 53 percent of citizens have incomes below the national poverty line (World Bank; 2014).

On human development index, Nigeria is still ranked as 152nd out of 175 poor countries in the global community, notwithstanding government expenditure on the abundant human and material resources (Eboh, 2006; Torty 2004; World Bank, 2012). Life expectancy is just 54 years, eight years lower than in Ghana and 20 years lower than in Brazil (World Bank, 2012). The rate of childhood malnutrition is 24 percent, more than eight times the rate in Mexico. Basic literacy among 15- to 24-year-olds, a crucial indicator for potential economic success, is just 66 percent, compared with 99 percent in South Africa (World Bank, 2012). Inflation and unemployment rates are swaggering high every day. Nigeria has a bold vision of becoming one of the top 20 economies in the world by 2020, as outlined in its "Nigeria Vision 2020" strategy. The goal of becoming a top-20 economy can only be achieved if Nigeria makes the transition to a new economy based on knowledge, productivity, and innovation that will enable it to be competitive in a 21st century context. According to the World Bank (2014), there are common factors that are associated with successful development. No country has attained development outside these common denominators. These are: economic growth; vibrant private sector; empowerment; good governance; ownership; state collaborations and knowledge development.

Knowledge has always been central to development. Knowledge-driven economy is about the more effective use of all types of knowledge and creativity in all manner of economic activity. Traditionally, cultures that knew more than others were better able to adapt to their environments, survive, and thrive. Knowledge is becoming truly global, accessible, and democratic. The impacts of this paradigm shift are all around us. Countries such as the Republic of Korea, India, and the United States of America that can harness the power of new technologies nurture a cadre of knowledge workers that can push the productivity and innovation frontiers. Others that fail to do so remain mired in poverty. The global financial crisis has shown that countries can no longer rely on narrow and static paradigms of growth, such as Nigeria and its natural resource endowments. The era when natural resources dominated trade has given way to an era in which knowledge resources are paramount. Our world is changing rapidly and those who will be able to acquire, adapt, and utilize new ideas and innovations, regardless of who has invented them, will create tremendous wealth in the process.

To bring lasting peace, economic freedom and prosperity to its people and help tackle the long term problems posed by ethnic rivalry and tribal clashes, Nigeria needs a change of direction. The forces of change outside Nigeria are driving the need for change within it. Therefore, to maintain itself on a par with the rest of the world, and to be able to compete successfully in the fast moving world economy, Nigeria has to radically reform itself. Most of Nigeria's wealth and power comes from the control of physical assets - land, oil, iron and steel, coal. But in the 21st century, this cannot continue to happen. The main source of value and competitive advantage in the new economy is human and intellectual capital. With a population of about 180 million people, Nigeria, in theory has the capacity to make a successful transition into a truly knowledge-driven economy.

Chen & Dahlman (2005.), indicate that a successful knowledge economy involves ingredients such as long-term investments in education, sufficient innovation capacity, adequate information infrastructure and an advantageous economic environment. Paschalis & George (2011), on their part argue that knowledge-driven economic dynamism embodies four building blocks. These are: Human capital; Innovation ability; Information access and Economic performance. Human capital as explained by Paschalis & George (2011) refered to a well educated and skilled workforce. Such workforce is essential to the creation, acquisition, distribution and utilisation of relevant knowledge, which enhances total factor productivity and economic growth. Here, both basic and higher education are essential because they improve peoples' capacity to learn, use information as well as the production of new knowledge, efficient adaptation and innovative use of established knowledge. Moreover, an educated population tends to be technologically sophisticated. This gives rise to local quality-sensitive demand for advanced goods, encouraging local firms to innovate and develop technologically sophisticated products and production techniques.

Paschalis & George (2011), also explain that innovation ability refers to the development of an effective system of firms, research centres, institutions and other relevant organisations that nurture research and development (R&D) which results in new goods, new processes and new knowledge. Such a system is expected to sustain the knowledge economy not only by producing new knowledge, but also by drawing on the growing stock of global knowledge and assimilating it to local needs. To them, information access has to do with the usage of information and communication technologies (ICTs). With relatively low usage costs and the ability to overcome distances, ICTs have revolutionised the transmission of information around the globe. The provision of a modern and adequate infrastructure is deemed to facilitate the effective communication, distribution, assimilation and development of ideas and knowledge. The final element of knowledge-driven economic dynamism is economic performance. The idea behind this is that existing economic knowledge enhances total factor productivity and economic growth.

4.0 Has Nigeria anything to learn from other Countries?

The US and the UK are typical examples of economies that are knowledge-driven. It is necessary to assess the growing importance of knowledge in both countries so that Nigeria can learn from them. In both countries, the progress made in Information and Communication Technology (ICT)

has made it possible for information to become more easily available, to travel faster, in greater quantities and much more cheaply. Entirely new products like digital TV, mobile video phones and services like e-commerce, e-banking have been created and more sophisticated production processes have been developed. The increased global competition facilitated by reduced communication costs has opened up markets that never existed. The costs of international transports have fallen while goods and services can be delivered via a telephone call.

The size of market available to such businesses has increased correspondingly. With this market size products and services become quickly out-of-date. This means that a business needs to innovate more quickly and make more use of its "knowledge" and creativity in order to survive. This makes increased speed of scientific and technological advance imperative. Increases in basic scientific research and business R&D have led to acceleration in the growth of the stock of scientific and technological knowledge. At the same time, the potential scope and productivity of R&D has increased as equipment has improved. Better communication technology has facilitated the widespread diffusion of research findings. A case in point here is the fundamental advances made in the field of genetical engineering and the recent claims of a cure for aids and various forms of cancer.

Knowledge is also transforming other sectors, both in their processes and the nature of their final product. Branding, packaging and design account for an ever higher proportion of the value of the goods and services consumed in both the US and the UK as a result of knowledge and innovation. The resultant effect is that about 70 percent of the production cost of a new product such as car can be attributed to knowledge-based elements such as styling, design and software. The changing demand brought about by rising income, changes in tastes and attitudes that come with greater prosperity is unprecedented. The booming US high-technology sector has created more than 1 million high-paying jobs over the past five years alone. Increasingly, well paid, sophisticated and demanding consumers are driving changes in traditional corporate values and behaviour due to their demand for more innovative and better quality products. All these are made possible because of the educational attainment of USA.

According to **Paul (2012);**

> ***E****ducation in the United States will continue to be a high social and political priority. Everybody will not need or achieve a four-year degree, but many people must be educated to a higher. The growing importance of educational attainment will require more robust relationships between elementary, secondary, and postsecondary education. Stronger, more meaningful P–20 relationships in standards, professional development, and data systems are essential….. Even though many countries have erased the advantages previously enjoyed by the United States workforce, the educational attainment of U.S. workers has grown dramatically.*

Statistics revealed that in 1973, USA had a labour force of 91 million. High school dropouts held 32 percent of those jobs, and high school graduates held 40 percent. Workers with no college education accounted for 65.5 million jobs in the 91-million workforce. The other 25.5 million jobs

(28 percent of the total) were held by college graduates (16 percent) and people with some college education (12 percent) (US Census Bureau, 1973 cited Anthony, 2009). In 2009, the United States had a labour force of 155 million employees. Only 14 percent of those jobs were held by high school dropouts, and 31 percent were held by high school graduates. Their share of the workforce dropped from 72 percent to 45 percent in 36 years. Workers with no college education held 69.8 million jobs in 2009 (US Census Bureau, 2009 cited in Anthony, 2009). Success in the knowledge driven economies of both the UK and US has been due largely to the skilled workforce. Workers everywhere are more highly educated. In most hi-tech companies like computer software the value of a company or its intangible assets resides almost entirely in the knowledge and creativity embodied in its patents and its staff.

5.0 Strategy for developing a knowledge driven economy in Nigeria

Godswill (2011) remark that the difference between rich (developed) and poor (developing) countries is not found in abundance of natural resources, for if it were, Japan would have been very poor and Nigeria very rich. But the reverse is the case. While Japan with virtually no natural resources is the second best economy of the world, countries such as Gabon, Nigeria and Venezuela are debt-ridden. It is not also found in agricultural endowment, for even though virtually nothing grows in Switzerland, it is the "safe" of the world with a strong economy. The age of the country does not matter. It is known that Egypt as the oldest civilisation of the world, is a poor country while the economies of emerging countries such as the Asian tigers are developing at a very fast rate. The difference can be found in respect for the rule of law, strict protection of human rights, positive value orientation, strategic knowledge management and good governance. Rich countries strive to not only acquire and sustain these values and virtues but systematically use education to bring these about.

In another development, Drucker (2001.), writes that the next society will be a knowledge society. Knowledge will be its key resource, and knowledge workers will be the dominant group in its workforce. Its three main characteristics will be borderless, because knowledge travels even more effortlessly than money; upward mobility, available to everyone through easily acquired formal education and the potential for failure as well as success. Anyone can acquire the "means of production," i.e., the knowledge required for the job, but not everyone can win. Four years later, Friedman (2005) essentially announced that Drucker's "next society" has arrived. Friedman argued that knowledge and innovations have rapidly and dramatically redistributed economic advantage around the globe. This is the knowledge driven economy.

For Nigeria to strategically develop the knowledge-driven economy mass, higher education is imperative. Murray (2008.), once stated that everybody doesn't need to go to college. He elaborated this caution at length, but with a fundamentally tautological argument. Murray maintains that a college education is "real" only when it results in the knowledge and skill traditionally achieved by the most intellectually gifted people who also have enjoyed extraordinary opportunities to develop their talents. If "real education" is defined in elitist terms, quite naturally,

only a few people will attain it. Murray's definition of "real education" is far too narrow for the twenty-first century. All people must have more knowledge and skill in a knowledge economy. Moreover, while wisdom and education are far from perfectly correlated, wisdom *requires* knowledge. Better-educated citizens are essential for the world to cope with the political and environmental issues of our era. Nothing in history or current experience suggests we have exhausted the capacity of human beings to learn or their need to benefit from more teaching (Murray, 2008).

As noted before, success in the knowledge-driven economies of both the UK and US has been due largely to the skilled workforce. Workers everywhere are more highly educated. In the 21st century, therefore, investing in knowledge, skills and learning for all should be a top priority. In this wise, the government will have to ensure that the right policy is put together so that its entire people can have access to good quality education. At present, there are pertinent problems in the sector such as cultism, the perpetual strikes by teachers and university lecturers, due, in part, to the non-regular payment or underpayment of salaries and a lack of adequate funding (**Ariyo, 2000)**. There is the need to completely overhaul the higher education system and a serious injection of resources is necessary to ensure Nigerian universities can produce high quality and well trained-graduates who are able to drive the knowledge economy. Such top quality graduates should be knowledgeable, highly skilled, IT literate, innovative and entrepreneurial. They should be able to collaborate, compete, solve complex problems, generate ideas and take risks.

The curricula need to be restructured and reformed. There should be a working curriculum to further collaboration between business and education, especially our universities. Businesses should have more direct role to play in education since the bulk of their workforce will need to have the necessary skills and knowledge to make the business more competitive and more prosperous. Young people should be exposed to the world of business at an early age. This will help to foster and develop the enterprise culture making more and more young people go into business. With the right business support, good macro-economic conditions and good quality education behind them, the potential for success is unique.

The need to develop basic science and technology and ICT infrastructure to help the growth of the new economy is also crucial. Government has a key role in establishing the right environment and setting technical standards in ensuring Nigeria becomes a producer of high technology, not just an importer of it. Our universities need to be adequately financed and encouraged to harness and develop the local technology clusters that abound in the Eastern part of the country so that they can become the true abode of scientific research and development. This will help in fostering growth of science and technology sector. Again, it should be pointed out that the competitiveness of the country in today's information rich world will depend on its ability to access and exchange information both locally and globally. Government, through appropriate regulations, private and international funding, telecommunications network can be designed and implemented to suit the needs of the country. More important is for the government to ensure that access to a working

telephone and fax line for the average individual and business does not remain a privilege but is seen as a necessity. Access to communication in a knowledge economy, however, cannot be a privilege. It is a great necessity.

Closely related to the point above is the need to catapult Nigeria from an IT end -user country into a serious producer of high technology. Just like in Bangalore, India and in Barbados in the Caribbean where off-shore information processing is thriving, the building of information industries will in no small way help Nigeria participate in the information economy (**Ariyo, 2000)**. Not only that, there are enough Nigerians in the field of computer technology, both outside and within the country, to collaborate and develop a customised system that will open up the use of computers to all Nigerians – both young and old, both educated and illiterate. At present, the biggest Black-owned software company in the UK- Openlink Software - is owned by Nigerian brothers Kingsley and Kevin Idehen. In Scotland Godwin Osigwe and his software company Sigtronics, are also making waves (**Ariyo, 2000)**. Efforts should be made to encourage such highly successful Nigerian owned high-technology companies to transfer their skills back to the country to help the growth and development of the industry.

The place of physical and social infrastructure expansion in knowledge-driven economy cannot be overemphasized. The provision of constant, non-stop electricity, good transport system, including good network of roads linking the different parts of the country, a functioning, efficient and effective railway system and developed and trustworthy air transport service should be pursued vigorously. This will encourage the easy transportation of goods and services and the movement of labour to and from one part of the country to another. To achieve this, there is the need for attitudinal change in government budgeting and expenditure. For Nigeria to partake in the new global economy, Nigerians need to cultivate the spirit of openness and transparency. According to Transparency International (2013), Nigeria sits top of the scale as the second most corrupt country in the world. No country, no matter the amount of knowledge embodied in its people can prosper if corruption rules as king.

Lastly, Nigeria should foster the spirit of enterprise. All over the world, the private sector is at the forefront of wealth creation and employment generation. As Nigeria's main wealth creator and job generator, small businesses will form the bedrock of a knowledge driven economy. It is, therefore, the government's paramount role and responsibility to enable the right macro-economic conditions to make them prosper. According to Ariyo (2000), to foster the spirit of enterprise and creativity among the people is by encouraging business start-up and growth. For the man and woman on the street, this translates into the positive encouragement to turn good ideas into successful business ventures, via the provision of good business support and the enabling of the right macro-economic conditions. An important strategy will be to set up a Small Business Office (SBO) which will have responsibility for the nation-wide provision of business support activities for small businesses.

Just like the Small Business Administration in the US and the Small Business Service in the UK, the SBO will have local offices (one-stop-shops) in all the states and local government areas where businesses can have direct access to the help and support they need. Services provided by SBOs should include advice on starting up in business, exporting, use of ICT for business growth, business research and development, information on government regulations, training for business managers, organising conferences and other fora to help collaboration and create awareness among small businesses, and taxation (Ariyo, 2000).

The role of banks, on the other hand, should be re-evaluated. This is because banks are the highest providers of external finance for small businesses. Their role should be re-evaluated to fit in with the new agenda. The current practice whereby banks charge too high interest rates for business debts does not augur well for business success and is not in the best interest of a knowledge economy. Banks need to seriously consider how they can help Nigerian small businesses take more part in the global market. They should also consider the best use of e-commerce to boost their sales by the introduction of business credit cards and similar finance products acceptable in other countries of the world.

6.0 Conclusion and Recommendations

Various governments have, over time, embarked upon numerous developmental policies, plans, programmes and projects in the pursuit to increase the material welfare and well-being of the citizens. All plans, programmes and visions have not yielded Nigeria's economic development. Nigeria needs a change of direction. The era when natural resources dominated should give way to an era in which knowledge resources are paramount – the knowledge driven economy just as it is in USA, UK, Japan, Switzerland, Asian etc. To key into this new global economy, this paper recommends that:

i) There is the need to completely overhaul the higher education system and a serious injection of resources is necessary to ensure Nigerian universities can produce high quality and well trained graduates who are able to drive the knowledge economy.

ii) The curricula need to be restructured and reformed. There should be a working curriculum to further collaboration between business and education, especially our universities.

iii) The need to develop basic science and technology and ICT infrastructure to help the growth of the new economy is also crucial.

iv) The place of physical and social infrastructure expansion in knowledge-driven economy cannot be overemphasized. Therefore, there is the need to catapult Nigeria from an IT end -user country into a serious producer of high technology.

v) Nigeria should foster the spirit of enterprise by encouraging business start-up and growth. An important strategy will be to set up a Small Business Office (SBO) which will have responsibility for the nation-wide provision of business support activities for small businesses.

vi) The role of banks on the other hand, should be re-evaluated. The current practice whereby banks charge too high interest rates for business debts does not augur well for business success and is not in the best interest of a knowledge economy.

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CHANGING PATTERNS OF SOCIAL REFORM PROGRAMMES IN THE NIGERIAN STATE AS A RESPONSE TO POOR POLITICAL CULTURE

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ABSTRACT

The roots of the present Nigerian culture of divisiveness, ethnicity, lack of patriotism/commitment to the Nigerian project, kleptocracy and corruption which have led to a poor image of the country both within and outside, have been traced to the structural flaws of colonialism and exacerbated by insensitive leadership and poor integrative efforts since the British founded Nigeria in 1914. Various administrations in the country have made conscious efforts towards changing and improving the people's conception and attitude towards government, towards public property and towards the nation. But how have they fared in this crusade? By utilizing existing literature on the subject as primary source of information, this paper sets out to investigate the issues on ground namely, the resilience and implication of the citizens' negative attitudes towards government policies and programmes as well as the variety of ways in which the various regimes have tried to respond to the situation through social reform programmes. It concludes with some useful suggestions and/or recommendations.

INTRODUCTION

Prior to colonialism, what later came to be called Nigeria was a group or rather groups of scattered states and empires with various cultural traits and geographical locations. For imperial and hegemonic interests, the British colonialists brought these various groups together under the aegis of colonial authority using strategies of trade monopoly, military conquests and divide and rule.

This bringing together was, therefore, a forced unity and the implications have been far-reaching and pervasive on the Nigerian political landscape since pre-colonial times. It has resulted in the difficulty of the colonial and subsequent leaders to weld the various units together as a nation. It has also resulted in ethnic politics, in North-South separation and in the concept of minorities.

As has been noted, the above cited defects of Nigerian colonial past resulted naturally in poor/negative political culture among the citizenry. Not surprisingly, therefore, successful administrations in Nigeria have evolved various strategies aimed at changing the people's mindset and attitudes towards government and towards its policies. Thus, General Obasanjo, as Military Head of State (1976-1979), introduced 'Jaji Declaration' in 1977. Alhaji Shehu Shagari had the 'Ethical Revolution' during the Second Republic (1979-1983). President Babangida (1985-1993) introduced MAMSER – Mass Mobilization for Self- Reliance, Economic Recovery and Social Justice, while President Muhammadu Buhari, in the Fourth Republic invented the 'Change Agenda – Change Begins with Me' campaign. Also, not forgetting President Goodluck Jonathan, (2010-2015), there was the 'Transformation Agenda' which the then amiable Minister of Information, Late Prof. Dora Akunyili elevated into a doctrine in the Nigerian polity through the 'Rebranding Campaign' with the slogan 'Nigeria – Good People, Great Nation'.

Generally considered, the central theme of all these efforts is the drive towards reconstructing and redefining Nigerian political culture with a view to evolving a more positive mindset and attitudinal disposition towards the state. In the words of former President Good luck

Jonathan, the Rebranding Campaign was a 'genuine way to reorient Nigerians toward believing in themselves again and to change the perception of the country both locally and internationally.

Theoritical framework

It is pertinent to capture here a theoretical platform which can serve as an analytical tool with which the phenomenon of poor political culture vis – a- vis government reform programmes, can be discussed.

The theory that seems most apt here is the systems theory of David Easton. The systems theory is otherwise referred to as input – output analysis. The approach sees the political system as a processor of policy inputs fed into the system. These inputs are then processed within the political system and later released into the environment as policy output. These policy outputs are recycled or fed back into the system as support and demands, and the process continues systematically (Oronsaye, 1997).

The political system comprises all the constitutional structures and political authorities who exercise powers as agents of the state at any given time. To be specific, the government in power, whether civilian or military, constitutes the core structure of the political system responsible for governance and the making of major decisions affecting the socio – economic and political lives of the people concerned.

It has been posited in the foregoing essay that the average Nigerian is ethnocentric. He does not believe in the Nigerian project or political system; he does not trust it; he does not love it and he sees public projects and property as 'government thing' which should not be preserved or taken seriously. He rather looks for an opportunity to corner it to himself or to his own community. The apex political leadership would view this phenomenon as inputs from the population and so devises social programmes in the form of outputs from the political system. The leaders believe that this process could go on repeatedly until a significant percentage of the populace would begin to regard the leaders and public property and activities as their own. That is 'Systems Theory' at work.

Implications of nigerian political culture

Not surprisingly, the poor attitudinal disposition of majority of the citizenry toward the state as well as their ethnic consciousness, has trailed the country through colonialism to the present era. Osaghae (2002:19) and Meyer et al (1996:361) have summarized the elements of Nigerian politics since independence as resulting in political instability, low level of national cohesion and low level of system affect/ lack of patriotism (as well as the prevalence of corruption).

Political Instability: The main indices of political instability include the high turnover of governments (regime structures, institution and personnel) occasioned by military coups, inconclusive and contested electoral outcomes, frequent changes in policy, political violence, and the crisis of legitimacy. Between 1960 and 1996, there were no less than ten officially known coups; out of these, two in 1966 and one each in 1975, 1983, 1985, and 1993 – were successful and involved the government being overthrown. Two were unsuccessful but bloody (1976, 1990), and two were nipped in the bud and the officers involved were jailed or executed (1986, 1995). These were in addition to rumours of unreported coup plots and executions of convicted officers.

It is noteworthy that within the same period, the country had three civilian Heads of State (Tafawa Balewa, Shehu Shagari, Ernest Shonekan) and seven Military Heads of State – an average of one head of state every three and half years (General Ironsi in 1966 and Ernest Shonekan, who headed the Interim National Government of 1993, held the position for six months and less). The situation in the states and local governments, whose numbers increased respectively, from three to thirty-six, and 301 to over 750 in the same period, was even more unstable.

The corollary of regime change at the federal, state, and local levels have been massive structural, institutional and policy changes. Government ministries, departments, agencies, parastatals, and other institutions were in an almost permanent state of restructuring with their executive heads constantly changed. For instance, the Nigerian National Petroleum Company (NNPC) which supervises oil exploration and production in the country had eight chief executives between 1985

and 1996. Accordingly, this instability in tenure of officers resulted in policies being in flux, as each regime and chief executive saw new beginnings and discontinued with previous dispensations as part of the legitimization process.

Low level of national cohesion: Lack of harmony, cooperation, and unity has been identified as index of low level of national cohesion, and this has manifestly characterized social and political life in post-independence Nigeria. No effective formular has been found to bridge ethnic competition, class conflict, social diversity and the like into a higher or desirable productive synthesis. Politics in the country, especially contestation for state power and resources, has tended to be organized around regional, ethnic and religious interests. The centrifugal (disintegration) pulls emanating from this pattern of politics have made resolution of the 'national question' difficult. Fundamental issues of minority rights, resource distribution and power-sharing remain volatile and even became greater in the late 1980s and 1990s. The result is that even in the fifth decade after independence, and after a civil war provoked by unresolvable issues of the national question, the country's continued existence as one unit has not been assured and could not be taken for granted.

Low level of system affect among public officials

This term was first used by Huntington (1991:51) to refer to a low sense of belonging to and having a stake in the well-being of the political system. Specifically applied to Nigeria, and arising from the prevalence of ethnic politics, it means a lack of development of a sense of a Nigerian community. In this connection, it has often been posited that the nation's economic problems were exacerbated by official corruption by Nigerians in the public service and by the functionaries of government.

Taking the case of utilization of oil revenue in Nigeria, one can see through some analysis of the situation that the nation has failed woefully in the area of management of its oil revenue because of low level of patriotism among public officials and government functionaries. At a time in the mid – 1970s, the oil income of Nigeria boomed, rising at the rate of around 30 percent per year – from $400 million to nearly $25 billion per year by 1980 (Mayer, 1996:372). After that, oil production and oil revenue declined steadily throughout the 1980s. By 1989, oil revenue was only $4.22 billion. By the mid 1990s, Nigeria was using 44 percent of its foreign exchange earnings to service debts.

Aside the lack of patriotism or low level of system affect among public officers in Nigeria, there was a variant of the low level of system affect – this time coming from the subjects or the people. This is referring to the negative attitude to government and its operations which blossomed out in the post-colonial state with deep roots in the colonial past. Largely because the colonial state was imported from Europe, grew apart from the society and was made to serve the interest of the colonizer, the nationalists who led the anti-colonial movements mobilized support on the strength of an interest-begotten idea that the state was 'alien'. This perception became ingrained in the popular consciousness, with the result that society at large refused to develop any serious stake or interest in the state's well-being and sustenance, such as would have emphasized accountability, transparency, responsiveness and other aspects of a moral ethos. Rather, the state and government which animated it were approached as alien institution which belonged to the Oyibo (white man), and as such was not deserving of the citizen's obligations or duties, could be plundered to feather private nests, and whose survival only the few who benefited from it were prepared to fight for (Osaghae 2002:21).

There was the popular perception which took root under colonial rule that 'government's business is no man's business'. There was, thus nothing seriously wrong with stealing state funds, especially if they were used to benefit not only the individual but members of his community. Those who had the opportunity to be in government were expected to use the power and resources at their disposal to advance private and communal interests. It is noteworthy that such concept of the state and attitudes have in turn given birth to other problems which afflicted and disabled the post colonial state. These problems (also known as the 'soft state' variables) include corruption, scant regard for constitutional rule or rule of law, the absence of a national society governed by common moral, cultural and behavioural norms and, indeed, political stability.

Responses of the nigerian state to negative political culture and associated constraints

It has been posited that the poor attitudes of Nigerians towards the political system which had its roots in colonialism has, in turn, led to some socio-political deformities. As a corollary, attention has naturally turned to ways and means of tackling these deformities and correcting the negative political culture of Nigerians.

The current 'Change Begins With Me' campaign is just one of such efforts by the Nigerian state to change the image of the country both in the minds of the people and in the impressions of the country being sold to the outside world. It has to be said that the potency or efficacy of the Change Agenda pill must be judged by juxtaposing the crusade with the outcome of similar campaigns in the past.

It is important to emphasize that operators of the post-colonial state tried to change these perceptions and attitudes with little success. Among the notable efforts to this end, which were basically admonitory and mobilizatory, were the famous 'Jaji Declaration by General Obasanjo in 1977; the 'Ethical Revolution' launched by the Shagari administration in the Second Republic, the 'War Against Indiscipline' (WAI) of General Buhari in 1984; Mass Mobilization for Economic Recovery, Self Reliance and Social Justice (MAMSER) launched in 1985/86 by General Ibrahim Babangida, and the War Against Indiscipline and Corruption (WAIC) under General Sanni Abacha in 1994. During General Obasanjo's second coming as democratically elected president of Nigeria (1999 - 2007), a lot of conscious and determined efforts were made in the direction of stemming the tide of corruption and lack of patriotism which had become very debilitating to the survival of the Nigerian nation. Accordingly, the administration introduced a Reform Agenda which brought in some anti-graft commissions such as the dreaded Economic and Financial Crime Commission (EFCC), and the Independent Corrupt Practices Commission (ICPC). After President Obasanjo came President Jonathan's Rebranding Crusade which was, so to speak, the baby of the then Minister of Information, late Prof. (Mrs.) Dora Akunyili.

It is, however, saddening that with all these efforts, including the current 'Change Begins With Me' project being propagated by the Minister of Information – Alhaji Lai Mohammed, it has not been possible for the successive governments put together to achieve a thirty percent reformation of the political attitudes and culture of the country's 150 million people. Perhaps, more success would have been recorded if the elite majority were not stubbornly disposed towards the reforms. Recently, they have accused the EFCC of engaging in selective punishment of the culprits of official corruption.

Another reason for the little success in stemming corruption and changing the political attitudes of the people is that the state operators themselves, who are supposed to be guided by the same codes, reap huge benefits of political legitimacy from them. Thus, attempts to entrench a moral code for public service through agencies like the Code of Conduct Burea provided for in the 1979 constitution, have not helped. As a consequence, the state continues to exist in an amoral and disabling milieu which permits actions which would otherwise be reprehensible to society, hence the demands for accountability, probity, and transparency on the part of public officials by elements of the fledgling civil society have served to contract this amorality.

Furthermore, government has been found to be guilty of encouraging, though unwittingly, the counter-productive perception of the state in terms of allocative and distributive roles, rather than the productive roles of the citizens. Nnoli (1978:285) refers to this phenomenon as a product of the social relations of production in which production relations (which is wealth creation) should have superseded the relations of distribution. The latter sees the national wealth as a national cake from which all must get a share, irrespective of their inputs into the baking or production of the cake. Thus, the state is presented by the vast majority of the citizens as a benevolent 'Father Christmas' who distributes the national cake. This perception which was encouraged by the anti – colonial nationalists frustrates efforts directed towards developing the necessary social and political

correlates of public finance. Most people not only believe that government is a reservoir of 'free money', but also fail to realize that a significant part of the country's wealth comes from the taxes and levies they pay. Since the entry of oil as the main revenue earner, this notion of free money has become even more pronounced and problematic. This failure of most citizens to realize that government revenue and public funds are collectively owned and that all citizens have contributed or have to contribute to it by one way or the other, largely explains the virtual absence of demands for accountability in the political culture of public finance until the emergence of President Buhari's administration.

Conclusion and recommendations

It has been posited in the foregoing analysis that the political culture of ethnicity, tribalism cum statism, political instability, absence of commitment to the Nigerian project, poor political culture of public finance and accountability, politics of violence and political apathy among some members of the citizenry are all attributable to the fact that the peoples that constitute Nigeria were not homogenous in any way but were forced to 'unite' by colonial conquest for British hegemonic and imperial interests. They were later 'disintegrated' through colonial administrative policies of divide and rule, north/south separation, regionalization, and federalism. If that is the diagnosis of the problem bedevilling Nigerian political culture, what are the pills that should or can be prescribed for the treatment of the ailment? Naturally, the suggestions or recommendations should flow from the analysis of the problem and should be such that would not produce ephemeral results or serve as mere palliatives.

In his study of the ethnic phenomenon in Nigeria, Nnoli (1978:110) remarked that in addition to the historical colonial circumstance that encouraged ethnicity, tribalism and the like, the country's leaders do not help the situation by their attitude towards governance and public administration. He notes, with disappointment, that Nigerians are made to celebrate the things that separate them rather than the ones that unite them as is evident in the former National Anthem of Nigeria and in the design of forms to be filled by Nigerians for various purposes. The stress or demand for one's state of origin, tribe, religion, are unnecessary for a country that wishes to stay together and work together.

In his words:

> …Nigerians have merely followed in the footsteps of their erstwhile colonial masters without fully appreciating the latter's motives, or have appropriated the colonial heritage for their own personal and class interests. It is pertinent to note that Tanzania consists of at least 150 cultural linguistic units but no one hears Tanzania talking of their heterogeneity, diversity, or federal character. Tanzania is a unitary state, so are Cote D'voir, Mozambique, Zambia and many other African states which consist of a multiplicity of cultural linguistic groups.

Similarly, it is the opinion of this paper that in order to dislodge the phenomenon of tribalism and deal a blow to the attendant negative political culture, there should be a public policy mandating every Nigerian family to make or regard wherever they are residing as their home with equal rights and privileges with the original natives of the area. The idea is that in the long run, there would have been substantial mixing up and diffusion of cultures to such a level of unnoticeable differences.

It is also suggested that any programme for the creation or promotion of national unity should be judged by its effectiveness in eliminating or at least ameliorating the impact of factors such as colonial type socio-economic scarcity and inequality, intraclass competition for the division of national wealth rather than its production or creation, the internalization of ethnic sentiments, the use of the ethnic base for political competition, and the use of state governmental apparatus

for ethnic competition. The other factors are political, social and economic policy differences which run along communal lines, differences in the traditional ways of life, and the emergence of a section of the population which benefits from the allocation of resources along ethnic lines. All these deserve to be erased from the polity in favour of national unity.

In order to achieve a drastic reduction of colonial-type scarcity and inequality, there is need to evolve a revolutionary development programme which, among other things, satisfies the demands of each citizen for a minimum of biologically and socially reasonable standards of nutrition, drinking water, free education, free health service, employment, housing, clothing, care of the old, and a revolutionary onslaught on the structure of private ownership in the country.

In line with the aforementioned socialist approaches to the ethnic phenomenon by Nnoli, there is need to consider the social distance between the leaders and the followers because it is this factor that is at the root of the present political culture of apathy towards government and its activities which has its roots in colonialism. The leadership must change their adoption of the Elite mode or model of policy making which assumes that public policy must flow from the elite downwards to the masses rather than vice versa because they perceive the masses as apathetic and willing to accept passively any situation that comes their way. The same reason explains why there is low level of patriotism amongst public officials which results in the negative political culture of public finance and accountability. To stem this tide, there should be re-orientation on the part of the leadership in favour of bridging the gap between leaders and followers, between politicians and voters (the electorate). The leader ought to be seen by the followers as one of their own and hence identify with his aspirations and goals. For instance, it is no gainsaying that the leader-followers closeness model is playing out in the present day Anambra State of Nigeria under the populist leadership of Mr. Willie Obiano. The Governor is spearheading a progressive and revolutionary regime of cultivating and strengthening of alliance between the state and the rural and urban poor majority.

To sum up, we need urgently the implementation of the above mentioned strategies for improved political culture in Nigeria, for political stability and for resounding success in the current 'Change Begins With Me' campaign.

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VOCATIONAL AND TECHNICAL EDUCATION IN NIGERIA: CHALLENGES AND PROSPECTS FOR NATIONAL DEVELOPMENT

BY

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Abstract
In recent times, desire for economic growth has drawn attention of individuals, parents, youths, and government to vocational and technical education programme in Nigerian universities, polytechnics, and colleges of education. This paper looks at the concept of vocational and technical education programme in Nigeria tertiary institutions, its historical development, its importance to national development, to the society and the individuals and as well as the challenges . It recommends among others that the federal, state and local governments should create more awareness of vocational and technical education in Nigerian universities and other tertiary institutions to educate the public on the significance and potential role it plays in national development .Besides ,it recommends that adequate funds should be provided for planning, implementing and coordinating vocational and technical education programmes in tertiary institutions in Nigeria.

Keywords:
Vocational, Technical, Development, Planning, Economic, Efforts.

Introduction

Technical and vocational education has been an integral part of national development strategies in many societies because of its impact on productivity and economic development .In other words, it is a form of education designed to develop occupational skill. For this reason, governments willingly set up some Institutions of learning for citizen to acquire the skills needed for vocational and occupational skills development .These institutions include Uromi Technical school ,Technical college at Igarra , Technical college at Agbor, Technical college in Benin city, Physical and Health Education college at Afuze, to name a few. Teachers employed to teach learners have not been adequately catered for, they are not encouraged to impact on the learners. The schools lack infrastructural materials while the few that are provided are not maintained. The Governments of Nigeria have not given this aspect of education the needed attention it deserves. For this reason and many others the Nigerians is under-developed and technological stunted .Nigerian leads have always paid lip services to the desires of the citizens. If the foundation of a program is not adequately catered for, all effort in the program will end up on complete waste. The various technical colleges that emerged in the 6-3-3-4 educational system in Nigeria have not had positive impact on the learners. The result is that national development is retarded. Unemployment is having a very high rate among the youths in Nigeria. The big question is: Are there students in these colleges with the desires and intensions to acquire vocational and technical skills so that they can contribute positively to the development of their Country? Nigerian cannot neglect this aspect of education otherwise that it will be worse than what it is now. According to Atchoarena (2004), in recent years, concern for the knowledge of economic growth has drawn more attention of the citizenry and governments of south Africa and Philippines to reshape their vocational institutions in order to make them more efficient and effective (Holmes 2004). This was done by merging technical and vocational education together as means of rationalizing resources and concentrating management capacity with the intention of improving institutional efficiency and effectiveness. This was also done in the spirit of developing appropriate skills and competencies to

eradicate youth unemployment, poverty and furthermore to contribute to social transformation, reformation, national values, security and peace.

Vocational and technical education, according to Danko (2006.), is the major core of both the individual's and the societies` economy. He emphasizes further that through acquisition of skills, individuals could explore their environment and harness the resource within it, which could serve them and the society since the wealth of the society determines to a large extent, the development of that society. Okoro (1991) said that vocational and technical education is basic for rapid technological advancement.

In Nigeria, emphasis in recent times on improving vocational and technical education in tertiary institutions basically is for combating unemployment and poverty, as well as improving the economic performance of the nation. According to Usioboh (2007), successive governments have priotised university education programmes above the more important technical and vocational education. He said further that, what is needed is for the government to give adequate and equal attention to all the various levels of education of our citizenry, in the over- all best interest of the country and the growth of our national economy, but unfortunately, government emphasis on vocational and technical education programme in Nigerian universities is merely on the pages of news- papers and television. Successive Nigerian governments have not found it necessary to promote and adequately finance both the planning and implementing befitting vocational and technical education programme in Nigerian tertiary institution so as to get the desired result. Society which should have been on the neck of government to finance the planning and implementation of vocational and technical education programme in Nigerian universities has a misconception that vocational and technical education is education that is meant for the drop- out, unintelligent and under- achievers. This misconception has, in no small measure, frustrated the enrolment of candidates into vocational and technical education programmes in tertiary institutions. This paper examines the concept of vocational and technical education, brief historical development and the challenges it faces to make visible impact on national development.

The Concept of Vocational Education

Vocational and technical education is an aspect of education designed to prepare students for industry, agriculture, commerce, home economics, which is usually provided at the senior secondary school or lower level of tertiary level of education. According to the National Policy on Education (NPE) ,it is that aspect of education that leads to the acquisition of practical and applied skills, as well as basic scientific knowledge. In this sense, it forms a practical segment of education that involves skill acquisition. Therefore, technical education is a subset of vocational education. It holds the key to the National development. However, vocational education can also be seen as that education designed to prepare individuals for gainful employment as semi-skilled workers or technicians or sub-professionals in recognized occupations and in new and emerging occupations, or to prepare individuals for enrolment in advanced technical education programmes.

Vocational education can be explained in terms of training designed to advance an individuals` proficiency in relation to his or her present or future occupation, training or re-training which is given in schools or classes under public supervision and control, provision of systematic training experiences which are designed to fit individuals in recognized occupations. Thus, vocational education is that part of total educational system which offers courses leading to the acquisition of specific skills to enable one to perform certain jobs. Sometimes, vocational education offers re training to upgrade workers already in employment. It is directed towards the preparation for occupational life since its recipients are equipped to face the challenges of the world of work. Vocational education preparation can be equated to the acquisition of a training experience that culminates in an industrial experience within a work -oriented society. It entails the transmission of knowledge and acquisition of skills that are related to various occupations.

Vocational education, according to Danko (2006) is an education programme that prepares students mainly for occupations that require manipulative skills or non -technical occupations in such fields as Agriculture, Business Education, Home economics, Music, Theatre Arts, Painting, Decorating and others, organized to secure confidence and experience by the individual students. It is also designed to develop skills, abilities, understanding, attitudes, work habits and appreciation encompassing knowledge and information needed by a worker to enter and make progress in employment on a useful and productive basis . Technical education, on the

other hand, is designed to prepare the learner to enter an understanding of the laws of science and technology as applied to modern design and production. It also stresses the engineering aspects of vocational education such as electrical/electronics, mechanical and automobile trade. It involves understanding and practical application of the basic principle of mathematics and science. Olaitan et all (1999) said that the task of technical education is the transmission of ideas, skills, values of work and environment and what an individual can do with his or her life

Development of Vocational And Technical Education.

In the course of history, according to Hernes (2004), " most education came about through participation, preparation for work life happened by interaction, and not through training in separate specific institutions." The reason, according to him, was that young people took on the task of their parents when production remained stable over generations. All they needed to know was what their parents knew, i.e how to fill and irrigate the soil, how to stitch a dress, where to fish and hunt, how to feed the herd. He stressed further that in every society, knowledge is power, but as long as the knowledge needed remained local and specific, it could be transferred directly from parents to child. In many countries, the so called "on the job" training is still the predominant method for educating the young. The fundamental change in mode of education has come about as a result of fundamental change in modes of production. As population diversity increased, division of labor became beneficial. Rather than inheriting skills, it became more valuable to specialize and learn a particular trade. Such skills could only be learned from masters of that trade, who were not always parents.

Craftsmen and artisans gained professional control through their mastery of their trade, which they could then translate into a form of social control. Hernes (2004) stated that in Europe, guilds were the results of such re organization. They also provide the modes for academic institutions- schools and later university. In this process, training for work became increasingly separated from work and often took place in institutions specialized in vocational and technical education. The instruction began to take the form of preparation rather than of participation.

Objectives of Vocational and Technical Education

According to Danko (2006),

1. the objectives of vocational education are to prepare the learner for entry into employment in his or her chosen carrier for the society,
2. Increase the option available to each student

3. Enhance all types of learning and enable the learner to wisely select a career.
4 Develop manual skills, coordination of both hands and eyes .

Challenges of Vocational and Technical Education Programme

Vocational and technical education programme in Nigerian universities would have been the bedrock of social, academic, scientific, technical and economic progress if only the governments had nipped in the bud the challenges that it has faced. Because of these challenges , it has not attained the height it desired as compared to what happens in other countries of the world. Among the challenges it faces are:

1. Federal Government Lukewarm attitude towards vocational and technical education programme in Nigerian Universities:

   Federal government of Nigerian has come to appreciate the contribution of vocational and technical education programme to national economic development as it is a tool to combat unemployment and poverty in our societies. This is because successive governments have not adequately funded and financed both the planning and implementation of standard and sustainable vocational and technical education programme in Nigerian universities. In support of this statement, Okoro (1991) said that insufficient finance is a realistic and practical factor hindering and inhibiting the implementation of vocational and technical education programme in Nigeria. The priority of the Federal Government of Nigerian in education sector is purely on social science education. Encouragement of government and corporate bodies/and agencies on the page of newspaper are nothing if radical approach is not taken to improve the teaching and learning of vocational and technical education programme in Nigeria institutions of learning

2. The perception of the society towards vocational and technical education: The society does not accord respect or recognition to the graduation of vocational and technical education.

   The impression is that this type of education is meant for the unintelligent and under achievers. Consequently, many parents do not encourage or guide their ward to take a

course in vocational and technical education programme in Nigerian universities; this is because the society does not place any significant value or dignity on the programme. This, subsequently, affects the enrolemt of candidates into vocational and technical education programmes in Nigerian universities

3. Lack of interest by candidates:

   Many candidates aspiring to acquire university education do not have interest in vocational and technical education programme. An interaction with prospective university candidates revealed that the nomenclature of the degree (B.Ed) in most of the Nigerian universities that offer vocational and technical education programme accounts for their indifference since most of them do not want to end up in the class room as teachers.

. **Recommendations**

To effectively revamp vocational and technical education, the Federal, State and Local governments must unanimously agree that without the vocational and technical education, the nation cannot progress. Therefore,

1. Government should provide employment to graduates of vocational and technical course. They should also offer scholarships in this area. There is need to improve the economic status of the vocational and technical teachers so as to increase the public awareness of the importance of vocational and technical teacher education. Incentives should be given the vocational and technical teachers to discourage them from drifting to industries.
2. Government should increase numbers of vocational and technical teachers: Government should increase the number of vocational and technical teachers in post primary institutions to enhance effective pre-vocational service training for the vocational and technical teachers. In order to upgrade their quality and prepare the students for vocational education.
3. Government to create awareness: The federal government through National Universities Commission(NUC) should create more awareness on the television, Newspapers, organize conferences and seminars to educate the public on the significance and potential role vocational and technical education plays in national economic development. Adequate funds for planning, implementing and coordinating vocational and technical education

program in tertiary institutions should be made available by the Federal Government and Philanthropists should be contacted by the university management to sponsor programmes of vocational and technical education right from secondary schools.

4. Government should give scholarship to candidates: Government should give scholarship to candidates wishing to take a career in vocational and technical education as a bait to attract more candidates.
5. Uniform curriculum for institutions: The curriculum designers should harmonize the course content of vocational and technical education in Nigeria. The nomenclature of the degree offered (B.Ed) should be changed to (B.Sc Ed). This will standardize the programme and make the teachers more efficient and effective in their jobs.

Conclusion

Vocational and technical education programmes in Nigerian Universities have not attained the maximum level of performance in its role in national economic development. It has grossly failed to meet its objectives. This is due to neglect by the Federal, State and Local Governments.. Scholarship should be given to those who have the zeal and interest for vocational and technical education . These variables if well harnessed can facilitate the actualization of technological development of the country.

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EMPIRICAL INTERACTION OF EXCHANGE AND INFLATION FLUNCTUATION RATES ON EXTERNAL RESERVES IN NIGERIA: 1985-2016

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Abstract

Over the years, Nigeria has not been able to attract adequate foreign investment inflows due to poor economic conditions and low external reserves. This is not unconnected to some economic variables not limited to inflation, exchange rates and its interaction with external reserves. This paper is aimed at the interactive effect of economic volatility of exchange and inflation rates on external reserves in Nigeria from 1985-2016. The data were sourced from Central Bank Statistical Bulletin, 2017. Various econometric techniques were employed to analyse the data. The results show that the variables were stationary at level and order 1 but were not co integrated. Inflation and exchange rates impacted on external reserves negatively. However, inflation rate indicated significant impact on external reserves. Both external reserves and inflation were found not to have granger caused each other. The study concluded that inflation significantly affected reserves in the short run. The interactions of exchange and inflation rates do not impact significantly on external reserves. The study recommended that Nigeria Monetary Committee (MPC) should device a suitable inflation rate that can directly impact on the country's foreign reserves in future. There should be relative stable exchange rate regime that can attract investments which will in turn boost the foreign reserve of the country. Current international image of Nigeria should be maintained and sustained to further enhance direct foreign investment and donor agencies to address critical infrastructure deficit to enable stable reserves management.

***Keywords**: Interactive model, rate, fluctuation, causality, reserves*

Introduction

Over the years, African countries have not been able to attract adequate foreign investment inflows due to poor economic conditions. In the statement of Okongwu (1989), Africa had no strategic financial investment policies or coherent guidelines to attract adequate foreign investment inflows. Treisman (2007), Chung and Lin (2004.), advanced more reasons that African countries are vulnerable to volatile weather situations, poor infrastructural conditions and political instability. The countries have also faced difficulties in reducing high rates of poverty. In addition, domestic market demands are not large enough to attract large foreign investments which ultimately culminate in dwindling foreign reserves over the years. Poor articulated trade liberalization policy, high premium on currencies, conversion price instability, underdeveloped capital market, unstable investment policies and high collateral demand by banks coupled with exchange and inflation rates fluctuation effected Nigeria's current structure of external reserves she is facing today.

Interestingly, there has been several observed upsurge in the foreign investment inflows in Nigeria putting the records of her foreign reserves high, reflecting the introduction of financial reforms, investment incentive policies, fiscal and economic measures, political stability, competitions and confidence in the financial market. This paper focuses on the interactive effects of economic volatility of exchange and inflation rates on external reserves in Nigeria from 1985 to 2016. The study specifically examined the effects of external reserves on macroeconomic variables such as exchange rate, inflation rate, and interactive effect of exchange and inflation rates in Nigeria.

Objective of study:

i. To examine the trend of economic volatility of exchange rate and inflation rate in Nigeria
ii. To evaluate the effects of exchange and inflation fluctuation rates on external reserves in Nigeria
iii. To investigate the impact of interaction of economic volatility of exchange and inflation rate on external reserves in Nigeria.
iv. To find out significant relationship among exchange, inflation rates and interactive effect on external reserves in Nigeria.

To find answers to the study objectives, the following hypothetical assumptions are made:

i. H01:There is no unit root among external reserves, economic volatility of exchange and inflation rates interaction in Nigeria
ii. H02:There is no co-integration among external reserves, economic volatility of exchange and inflation rates interaction in Nigeria

iii. H03: There is no significant relationship among external reserves, exchange, inflation and interactive effect of economic volatility of exchange and inflation rates in Nigeria
iv. H04: There is no causal effect of economic volatility of exchange, inflation rates and the interaction of rates on external reserves in Nigeria

Literature review

Various authorities have advanced some theories on the accumulation of foreign exchange reserves. This paper looks at few of theories of foreign reserves. There is the international financial integration theory which advocates that international integration should cause capital to flow from high income countries characterized by high capital labour ratios to low-income countries with lower capital-labour ratios (Prasad and Rajan, 2008). By This approach, the process would improve the levels of investment through the access to foreign capital. It would also boost growth in poor countries and support higher returns to foreign investors who will be induced to make capital flows abroad. The process of capital flows will facilitate foreign exchange liberalization. There are the Micro and Macro Theories based on the controversies of monetarists and fiscalists (Keynesians). The monetarists are of the opinion that accumulation of reserves is as a result of excess demand for domestic currency and growth of world trade. For the Keynesians, accumulation of foreign reserves is to improve current account and positively impact on aggregate input. This impact is in the short run and will affect nominal exchange rates (Fukuda and Kon, 2008). In the long run, real exchange rates are used to adjust the equilibrium balance of payment. There is the self-insurance theory which explains the holding of buffer stock of reserves to deal with the unforeseen shocks in the international financial system (Elhiraika, 2007; Fukuda and Kon, 2008). There is the mercantilist theory which is related to the expansion of trade and other international transactions that have necessitated the increase in accumulation of reserves (Gupta and Agarwal, 2004 and Aizenman and Lee 2005). Another theory is the elasticity approach which examines the effect of an appreciation or depreciation of the exchange rate on resource flows of a country (Nzotta, 2004). The approach states that if there is downward adjustment of exchange rates, a nation experiencing balance of payment disequilibrium has to raise exports and reduce imports and thus accumulate more external reserves.

Osuji and Ebiringa (2012) examined analysis of effect of external reserves management on macroeconomic stability of Nigeria from 1981-2010. Secondary data were sourced and analyzed using multiple regressions, granger casualty test, VAR model and unit test. The study revealed a direct relationship between external reserves and explanatory variables; and external reserves was observed to be inversely related to macroeconomic instability. Ibrahim (2011) investigated the impact of change in external reserves position of Nigeria on domestic investment, inflation and exchange rate between 1986 and 2006. He used a combination of ordinary least square and vector error correction models. The results show that changes in reserves influence only foreign direct investment and inflation rates. Fapetu and Oloyede (2014) examined foreign exchange management and the Nigeria economic growth between 1970-2012. Umeora (2013) carried out a

study on foreign exchange reserves accumulation and macroeconomic stability in Nigeria. The study used time series figures from the period of 1986-2011. Unit root test was employed to test whether the time series data being used are stationary or not. Co-integration test was employed to know if there is any correlation between the variables while multiple regression analysis was also employed to know the level of significance of variables. The results of the tests show that exchange rate and GDP have positive and significant relationship with FER accumulation while inflation has negative and insignificant relationship with FER. Alasan and Shaib (2011) examined the management of external reserves and economic growth in Nigeria between 1980 and 2008. The study employed ordinary least square (OLS) estimation technique. The empirical result of the data analysis revealed that there is statistically significant relationship in the management of Nigerian external reserves. However, interaction effect of exchange and inflation rates on external reserves in Nigeria remain very salient in most studies on management of reserves and impact of macroeconomic variables on external reserves. Hence, this study investigates the effect of external reserves on exchange and inflation rates and its interaction using two different models.

Several studies have been conducted by many researchers and critics of economic models and policy analysts on the reasons for the causes of dwindling external reserves of many nations in the world. These approaches are not different from the developing and the underdeveloped worlds. However, studies have really looked at the empirical interaction effects of exchange and inflation rates on external reserves in Nigeria. As a result, this paper focuses on the empirical impact of exchange and inflation fluctuation rates interaction on external reserves in Nigeria from 1985-2016.

3.0 Material and methods

3.1 Model specification

The model for this paper assumes an underlying interaction effect between fluctuation of exchange and inflation rate on external reserves in Nigeria. Based on the theoretical foundation on foreign reserves, the nature of exchange and inflation fluctuation rates can be brought in.

$$EXTR_t = f\left(EXCHR_t, INFLR_t, EXIFR_t, U\right) \quad 1$$

The explicit form of Equation 1 is represented as follows:

$$EXTR_t = \alpha_0 + \alpha_1 EXCHR_t + \alpha_2 INFLR_t + \alpha_{12} EXIFR_t + \varepsilon_t \quad 2$$

where $EXTR_t$ is external reserves at period t; $EXCHR_t$ is the exchange rate (naira to US dollar) at period t; $INFLR_t$ is the inflation rate at period t; $EXIFR_t = EXCHR_t * INFLR_t$ is the interaction effect of exchange and inflation rates fluctuation at period t; α_s are parameters, while e is an error term. The transformed variables lead to the workable model for the seminar for empirical analysis. From Equation 2, VAR model can be expressed as in equations 3 and 4 below:

$$\Delta LNEXTR_{t+1} = \alpha_0 + \alpha_1 \Delta LNEXCHR_t + \alpha_2 \Delta LNINFLR_t + \delta_t Var(-1) + \varepsilon_t \quad 3$$

$$\Delta LNEXTR_{t+1} = \alpha_0 + \alpha_{12}\Delta LNEXIFR_t + \delta_t Var(-1) + \varepsilon_t \quad 4$$

The $Var(\delta_t)$ part of equation 3 and 4 shows the long-run equilibrium dynamics of the model variables. The sign Δ is time series difference operator; ε_t is a white noise disturbance term. The equation points out that foreign reserve tends to be influenced and explained by its previous level, thus it involves other disturbances or shocks (Pesaran et al., 2000; Narayan, 2005). The apriori expectations of the model suggests that inflation rate impacts negatively on external reserves while exchange rate would impact on external reserves positively (i.e $\alpha_1 < 0$ and $\alpha_2 > 0$). The interaction of the economic volatility model would impact on external reserves negatively ($\alpha_{12} < 0.$).

3.2 Estimation technique

To achieve the objective of this paper, the researchers employ diagnostic check and unit root test using augmented Dickey Fuller to investigate time series data and to test the stationarity of the time series of the variables. Johansen co-integration analysis and Vector Autoregressive Model (VAR) are employed to test for relationship. Granger Causality test measures the impact of fluctuation of exchange and inflation rate on External Reserves in Nigeria (Engle and Granger, 1987; Newbold, 1987). Basically, variable Y is said to be 'Granger caused' by variable X if X helps in the prediction of Y, that is, if the coefficients on the lagged X's are statistically significant at a given level. More so, the VAR method has merit of yielding consistent estimates of the long-run parameters that are asymptotically normal irrespective of the order of integration, i.e. whether variables are I(0), I(1), I(2) or mutually integrated. However, it is very necessary to complement the estimation process. Additionally, the stationarity tests can yield different conclusions due to their different power. As VAR method can distinguish between dependent and explanatory variables therefore, when using the VAR method it is possible to estimate even when the explanatory variables are endogenous (Alam and Quazi, 2003). In this wise, VAR provides robust results in large sample size such as greater than 30 observations (Narayan, 2005).

3.3 Method of Data analysis

Data used in the estimation were sourced from CBN Statistical Bulletin for the period 1985-2016. The paper used econometric tools in the analyses of the variables shown in the model specification. E-views package was used in the estimation process and results are presented in tables. The variables were taken in their log form to bring them to particular comparative levels in terms of unit of measurements of various variables.

4.0 Result of data analysis

It is usually conventional to examine the stationarity pattern of the economic variables under investigation. Table 4.1 below shows the results of the trend pattern of the variables used in this paper.

4.1 Test of stationarity and Co integration of variables

In examining stationarity of the chosen variables and to obtain a reliable result, the paper carried out a stationarity test of the variables using augmented Dickey Fuller (ADF) tests at intercept with and without trend, which is presented in Table 4.1. It is apparent from the table that two of the variables were stationary at first difference, I(1) series.

Table 4.1 Unit Root Test results

Variable	Order	ADF	Critical Value at 5%	Prob.<0.05	Decision	Conclusion
LNEXCHR	I(1)	-6.8330	-2.9677	0.0000	No unit root	Stationary
LNEXTR	I(1)	-10.1941	-2.6939	0.0000	No unit root	Stationary
LNINFLR	I(0)	-3.3911	-2.9640	0.0194	No unit root	Stationary
LNEXIFR	I(0)	-3.6962	-2.9604	0.0092	No unit root	Stationary

Source: E-views 7.0 Extracts

Inflation rate (LNINFLR) and the interacting variables (LNEXIFR) were stationary at level, I(0) using ADF value greater than critical value at 5%. In addition, the associated probability values were all less than 0.05 at 5%. When variables that are known to be I(1) produce a stationary series, then there is possibility of co integration among them: existence of a long-run relationship between them. To establish the existence (or otherwise) of a long-run relationship among the variables (series), a co integration test was performed using Johansen's multivariate approach. The result is in table 4.2A and B.

Table 4.2A: Johansen Co integration results

Date: 03/16/18 Time: 06:57
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments
Trend assumption: Linear deterministic trend
Series: LNEXTR LNEXCHR LNINFLR
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.443140	22.40080	29.79707	0.2768
At most 1	0.147131	4.837578	15.49471	0.8258
At most 2	0.002101	0.063111	3.841466	0.8016

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

Table 4.2B: Johansen Co integration Results

Date: 03/16/18 Time: 06:58
Sample (adjusted): 1987 2016
Included observations: 30 after adjustments
Trend assumption: Linear deterministic trend

Series: LNEXTR LNEXIFR
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.204279	7.809450	15.49471	0.4860
At most 1	0.031308	0.954259	3.841466	0.3286

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

Source: E-views 7.0 Extracts

Table 4.2B shows that the variables are not co integrated. VAR model estimate can be used to estimate the model. This is not possible in case of VEC model (Johansen, 1988; Johansen and Juselius, 1990). From Table 4.2A and B, the trace statistic, Max-eigenvalue and MacKinnon-Haug-Michelis p values reveal that there is co integration at most three with no co integrating equations among the variables. There is no co integration and co integrating equation among the variables, hence Ho is accepted in favour of the alternative hypotheses at 5 per cent. This is because their values do not exceed the critical values at the 0.05 level. This implies that a long-run relationship does not exist among the variables. It can equally be seen from Table 4.2A that there is at most one 1 co integrating equations in the series. Therefore, there is report of normalized co integrating equation, which was at LNEXTR and LNEXCHR.

Table 4.3A VAR Estimation Results

Vector Autoregression Estimates
Date: 03/16/18 Time: 06:58
Sample (adjusted): 1987 2016
Included observations: 30 after Adjustments
Standard errors in ( ) & t-statistics in [ ]

	LNEXTR
LNEXTR(-1)	0.549238 (0.17463) [3.14517]
LNEXTR(-2)	0.185048 (0.17297) [1.06984]
C	3.831273 (1.30559)

	[2.93452]
LNEXCHR	-0.006918
	(0.05404)
	[-0.12802]
LNINFLR	-0.462507
	(0.16746)
	[-2.76188]

R-squared	0.790039
Adj. R-squared	0.756445
Sum sq. resids	7.803116
S.E. equation	0.558681
F-statistic	23.51741
Log likelihood	-22.36804
Akaike AIC	1.824536
Schwarz SC	2.058069
Mean dependent	9.340494
S.D. dependent	1.132050

Estimation Proc:
==========
LS 1 2 LNEXTR @ C LNEXCHR LNINFLR

VAR Model:
==========
LNEXTR = C(1,1)*LNEXTR(-1) + C(1,2)*LNEXTR(-2) + C(1,3) + C(1,4)*LNEXCHR + C(1,5)*LNINFLR

VAR Model - Substituted Coefficients:
==========
LNEXTR = 0.549238385448*LNEXTR(-1) + 0.185048452035*LNEXTR(-2) + 3.83127275361 - 0.00691813572961*LNEXCHR - 0.462506982871*LNINFLR

Source: E-views 7.0 Extracts

The results from the VAR equations in Table 4.3A above suggest that inflation rate fluctuation in the variables of the model equation is significant at 0.05 level. However, exchange rate volatility is not statistically significant at 5% level. With respect to the sign and magnitude of the variables, which is of inflation and exchange rates, it reveals that the key factors that influence the level of foreign reserves in Nigeria include inflation, but in negative form. The levels of exchange and inflation rates exert negative impacts on foreign reserves. This implies that the size of the economy and trade openness would induce accumulation of foreign reserves. This is in line with the self-insurance theoretical base of foreign reserves. The values indicate that about a dollar increase in billions of exchange rate and inflation would bring about a 0.0069 billion and 0.046 billion decrease in the level of foreign reserves respectively.

On the other hand, the equation points out that the level of Exchange rate and Inflation rate had a negative relationship with foreign reserves, while the sign of inflation conforms to the aprori expectation, implying that an inflationary trend will reduce the level of foreign reserves. This is

because as domestic goods become costly, there would be lower demand for Nigerian exports, which will lower net exports and ultimately reduce the level of foreign reserves. However, the negative sign of foreign capital is not unexpected. In addition, the model is highly fitted at 79%. The total variation in the Nigerian external reserves can be explained by exchange and inflation rates volatility by 75.64% while 24.36% variation in external reserves is not accountable for due to some factors ranging from economic, social and political instability.

Table 4.3B VAR Estimation Results

Vector Autoregression Estimates
Date: 03/16/18 Time: 06:59
Sample (adjusted): 1987 2016
Included observations: 30 after Adjustments
Standard errors in ( ) & t-statistics in [ ]

	LNEXTR
LNEXTR(-1)	0.644400 (0.18906) [3.40850]
LNEXTR(-2)	0.262620 (0.18862) [1.39231]
C	1.284244 (0.96369) [1.33264]
LNEXIFR	-0.045740 (0.05752) [-0.79525]
R-squared	0.732478
Adj. R-squared	0.701610
Sum sq. resids	9.942352
S.E. equation	0.618384
F-statistic	23.72938
Log likelihood	-26.00225
Akaike AIC	2.000150
Schwarz SC	2.186976
Mean dependent	9.340494
S.D. dependent	1.132050

Estimation Proc:
==========
LS 1 2 LNEXTR @ C LNEXIFR

VAR Model:
==========
LNEXTR = C(1,1)*LNEXTR(-1) + C(1,2)*LNEXTR(-2) + C(1,3) + C(1,4)*LNEXIFR

VAR Model - Substituted Coefficients:

==========
LNEXTR = 0.644400233396*LNEXTR(-1) + 0.262620242526*LNEXTR(-2) + 1.28424403558 - 0.0457400306797*LNEXIFR

Source: E-views 7.0 Extracts

The results from the VAR model equations of exchange and inflation rates interaction with external reserves in Table 4.3B above indicate that exchange and inflation rate fluctuations interaction influenced external reserves negatively by 0.0457 and it is not significant at 0.05 level. However, interaction of economic volatility variables (exchange and inflation rates) and external reserve is not statistically significant at 5% level. In terms of sign and magnitude of variable in the equation, inflation and exchange rates interactions show negative impact on external reserve. The values indicate that about a dollar increase in billions of exchange rate and inflation interaction would bring about a 0.0457 billion decrease in the level of foreign reserves. Indeed, the result is expected as the interaction of such volatility in any economy remains unhealthy for the management of reserves. Interaction between exchange and inflation rates fit the model of external reserves at 73.3%. The total variation in the Nigerian external reserves can be explained by exchange and inflation rates volatility interaction by 70.16% while 24.36% variation in external reserves is not accountable for due to some factors not limited to monetary policies and the political atmosphere

Table 4.3B VAR Estimation Results

Pairwise Granger Causality Tests
Date: 03/16/18 Time: 07:01
Sample: 1985 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNEXCHR does not Granger Cause LNEXTR	30	1.05028	0.3648
LNEXTR does not Granger Cause LNEXCHR		0.60736	0.5526
LNINFLR does not Granger Cause LNEXTR	30	1.74920	0.1945
LNEXTR does not Granger Cause LNINFLR		3.11776	0.0618
LNINFLR does not Granger Cause LNEXCHR	30	0.70514	0.5036
LNEXCHR does not Granger Cause LNINFLR		1.53741	0.2346

Table 4.3B VAR Estimation Results

Pairwise Granger Causality Tests
Date: 03/16/18 Time: 07:01
Sample: 1985 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNEXIFR does not Granger Cause LNEXTR	30	0.77962	0.4694
LNEXTR does not Granger Cause LNEXIFR		1.45984	0.2514

Source: E-views 7.0 Extracts

Granger causality test results indicate that the level of causal effect of Exchange rate and Inflation on external reserves based on the two proposed specifications models of evaluating external reserves in Nigeria. In table 4.4A, inflation rate volatility does not granger cause external reserves and external reserves does not granger cause inflation rate in Nigeria as the probability value is less than 0.05 at 5%. In the model of exchange and inflation rates interaction with external reserves, there is no causal evidence.

Conclusion

The research paper on the empirical interaction of exchange and inflation rates on external reserves in Nigeria concludes from the findings that the variables for this study have patterns that are stationary at either level or order 1. There is no long run equilibrium relationship among the variables because of lack of co-integration. Estimated models show that inflation, exchange rates and its interaction impacted on external reserves, negatively. However, inflation volatility is statistically significant to external reserves indicating that inflation fluctuation drives external reserves more than the exchange rate and interaction of inflation and exchange rates in Nigeria. Inflation and external reserves have no causality relationship in Nigeria.

Recommendations

Based on the findings and conclusion, the paper recommends that:

1. Nigeria Monetary policy committee (MPC) should device a suitable inflation rate that can directly impact on the country's foreign reserves in future.
2. Effort must be put in place towards designing a relatively stable exchange rate regime that can attract domestic and international investments which will in turn boost the foreign reserve of the country.
3. Current international image of Nigeria should be maintained and sustained to further enhance direct foreign investment and donor agencies to address critical infrastructure deficit to enable stable reserves management.

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THE TRADITIONAL ELEMENT IN AFRICAN DRAMA

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Abstract

Africans believe so much in the gods, spirits, witchcraft, fetish, amulets, will power, incantation etc as a way by which we relate with what we want either by imposing our will on it or by using force through incantation by appeal through ritual. Whichever form the magical phenomenon takes, it has a propelling force, which is our belief system, which is also subject to our psychological orientation. In the traditional African society, there are laws guiding human condition or actions and a deviation from them could invite the wrath of the gods who control human affairs. The aim of this work is to examine which sacrifice that can then be performed so as to cleanse the affected individual community of society from such a sinful act. It is also the supposition of the writers that such ritual is seen as an ideal way of resolving man's conflict with the gods.

Keywords: Tradition, ritual sacrifices, the gods, spirits, supernatural element, sacrifices, magic, African beliefs, divination, conflict.

Introduction

Africa has a rich tradition and cultural heritage. No matter the influence and conflict of the Western religion and culture, there is no way we can obliterate the past from the present and totally efface those vital aspects of our African religion, culture and traditional norms.

Tradition as a concept has been defined in several ways. The Oxford Advanced Learners Dictionary simply refers to it as a belief custom or way of doing something that has existed for a long time among a particular group of people… (1271).

In Africa, the universe is regarded entirely as a religious one as it is being guided and regulated by supernatural forces who influence our actions whether good or bad. In agreement to this, Roger Fowler in Dictionary of Modern Critical Terms (1973) postulates that what is essential is:

> *The idea of the place of man in the social order of his own fortunes, the extent to which he assumed to dominate his own life and motives or be dominated by forces outside himself (26).*

This is where the search-light falls on divination as a preliminary stage of communicating with the supernatural and thereby finding out the type of ritual sacrifices to be offered to achieve a harmonious existence. These supernatural beings have laws guiding human conduct and any deviation causes doom. Buttressing this, Dennis Ayejina, in a lecture titled "The Supernatural in African Drama: The Structuralist Approach" (1993) says, ill health is the result of a departure from a healthy living or not living in harmony with environmental traditional regulation (2). From the above, it becomes clear that the responsibility of the dramatist is to create effective way of resolving man's conflict with the gods. Through a careful study of myth, legend and the supernatural, the writer is able to give explanation and practical solutions to fundamental questions bordering on human existence.

In Africa, the extent of the black man's belief in the existence of gods is very tremendous. The belief in this world of the supernatural has been explored to a great extent as a means of explaining the African religious universe. In traditional Africa, there is a strong connection between the supernatural element and man. Besides, man also communes with ancestral spirits who also occupy a vital position in the supernatural hierarchy. There is no doubt, therefore, that the beliefs in spirits, sacrifices, rituals and magic are African phenomenon. This belief is an indispensable element in the continuous and harmonious existence of man and his community.

Main discussion

What we witnessed in Zulu Sofola's play, The Wedlock of the Gods is a superfluous play of spiritual elements and a vision of the supernatural in the sense that every move and action performed by the characters is motivated and influenced by the gods. What would naturally have become the wedlock of Ogwoma and Uloko dramatically metamorphosed into wedlock of the gods. This dramatic change in the course of the people's history and wellbeing is facilitated by the hastiness of the actions of the lovers. This notion of hastiness can be exemplified through some cultural codes or statements made by Udo.

Udo: *Would you not have waited much longer if God had planned for Adigwu to live with his wife for six more years? (No reply from Uloko) What often destroys you young men is rash and hasty action. A woman who loses her husband must not be visited by any other man until she has been cleansed. Any action against this is an abomination and our gods deal very severely with such offenders (36).*

From the above, we can quickly decipher that it is the cultural tradition of the people that when a husband dies, he is to be mourned in sackclothes. As a result, Ogwoma is in a solitary condition and kept in a poor sanitary condition in the mourning tradition of her clan. This ritual is expected to cleanse, purify and release her from the bonds uniting her with her husband. But surprisingly, Uloko sleeps with her under this condition in her black mourning clothes in her ash-covered body.

The dominant symbol that goes along with cleansing and mourning is black, which evokes fear, evil and death. By sleeping with the widow, Uloko has, therefore, deviated from a healthy living while he naturally embraces death. In line with this, Ogoli said:

Ogwoma was his wife and is still his wife. Any other man who touches her is inviting the anger of the gods. I told you this many times, I cried enough to your ears about it, you did not listen. Now you have done an abomination. You have planted a foul seed in the womb of a woman in mourning. You planted a poisonous snake in the womb that has not been purified. You have touched what belongs to a man whose spirit is still finding its way back to the world of the gods (42).

This is now the genesis of the conflict and tension which grip the community. The act of impatience demonstrated by both lovers is a clear exhibition that they have long decided to walk on a blood-stricken path. Buttressing this, Odibei has this to say:

My God, the worst is done!
Ogwoma walks on the path
That reeks with blood (52)

In African society, the path that reeks with blood is essentially the pathway to the ancestral world of spirits. Our actions therefore, either good or bad, influence the reactions of the goods. J.S. Mbiti in African Religion and Philosophy (1990) puts it more succinctly when he said:

We find a vast range of occasion for offences by one or more individuals against others in their corporate community. The environment of intense relationship favours strongly the growth of the belief in magic, sorcery, witchcraft and all years' practices and concepts that go with this belief (209).

Rituals and sacrifices, as we have said, are central to African religion. By disturbing the traditional solemnity of the people, Ogwoma and Uloko became the sacrificial lamb to atone for the burden of their sins. This is also in line with the crucifixion of Jesus Christ in atonement for the sins of mankind.

This ritual sacrifices is what is also dominant in Wole Soyinka's play, The Strong Breed. After breaking the tradition of his people, Eman left his village for another town in order to avoid disgrace and punishment. While in this strange land, he interferes with the custom of the people by protecting an idiot child (Ifada) from being used as a sacrifice to atone for the sins of the community. Eman, therefore, becomes the sacrificial goat that is hunted and killed by a corrupt society to carry the burden of its sins. The effigy used in this play is symbolic in the sense that it serves as a carrier of one's sickness or as a means of making someone who is afflicted with a particular disease get well.

This superstitions belief is synonymous with the African society. Also, Zulu Sofola and Wole Soyinka both demonstrated in their plays the belief in predestination as shared by the African society. In Africa, it is a traditional belief that when one's life is terminated abruptly, the soul of the dead will not rest until the life circle is complete. This belief in the spirit of the dead is evident in Martin Owusu's play, The Sudden Return. This play portray the African belief in the power of spiritual forces that can take human blood and give wealth in return.

In his introductory note, Martin Owusu said:

The dramatist does not only challenge the idea for instance that a son becomes rich as a result of sacrificing his wife and children, but he is also saying that such selfishness and violence cannot be concealed (XI).

This idea conforms with the general belief in Africa that if someone kills another person secretly, thereby preventing the murdered individuals from completing is or her destined assignment, the ghost of the diseased will keep hunting the killer and make him confess what he has done secretly because the ghost will not have a resting place as he has been destabilized.

This idea of ghost hunting is the central theme of The Sudden Return. After sacrificing his wife and children, Kojo Tobi is hunted by the ghosts of his family whose spirits could not rest because they see him as the only link through which their relationship with the world can be maintained. This is the reason for the strange behavior exhibited by Tobi. To further buttress this, he said:

The moment I close my eyes to sleep I hear strange sounds in my room as if someone was there (13)

Another play in which African beliefs have been brilliantly demonstrated is Sam Ukala's play, The Slave Wife. In The Slave Wife, we noticed how the quest for a heir leads Oba Ogiso into some kind of divination to discover the possible solution to the problem. Among other African beliefs embellished in this play is the preference Africans, especially the men, have for male children and the beliefs in the gods and the ancestors. In Africa, the importance of a heir to the traditional stool cannot be over-emphasized. To demonstrate this, Iyase, a prime minister and a chief in the village of Idu where the play is set, reechoed the importance of the heir when he asks:

> *… And by the way, what would it profit us if we conquer all the world and possessed away without an heir to consolidate our victory (19).*

Apart from the above belief in a successor to the throne which is held in all parts of Africa, Ukala also infused in his work an element of praise singing which is synonymous with African culture. The praise singers are also made to perform the same functions as the chorus in the classical tradition by giving the audience an insight into the play through a speech rendered by a eunuch in Oba Ogiso's palace.

The use of mythology is another vital element that has been extensively used by Wole Soyinka in his major works. To the Yorubas, Ogun is the god of creativity, destruction, war and resolution. Commenting on the myth, origin and relevance of Ogun to the Yorubas, James Gibb in his article, "The Origins of A Dance of the Forest" in Eldred Jones' African literature today, he said:

> *… of all the gods only Ogun, the hunter who had visited earth before and who knew how to smelt iron, was able to make an axe and cut a path through the growth. His action united gods and men and he was rewarded by being given the title chief among divinations. But he was too restless and violent to dwell in the human community and preferred to live apart on the top of a hill, whence he hunted and fought. One occasion, he became drunk and slew friends and foes indiscriminately. Eventually, he decided to live a settled life among men but his appearance of fire and blood so terrified the people that they fled from him. Ogun then covered himself in palm-fronts, entered ire and was made king (69).*

In A Dance of The Forest, Soyinka uses Ogun as a kind of instrument of protection of the oppressed. In the carving of the symbol of the great reunion, Demoke, the carrier is unanimously chosen for the assignment and being possessed by Ogun, Demoke chooses to carve Oro's tree called "aroba" which was the will of the people.

Conclusion

Through our discussion above, it is crystal clear that we cannot divorce ritual sacrifices from the activities of man in an African environment. A violation of any of these traditional norms could spell doom for the violator. Besides, we have also seen that rituals create harmony instead of confrontation in order to achieve a peaceful existence. Therefore, we can say that a knowledge of the tradition and custom of a people is a necessary guide for a harmonious existence.

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AN ANALYSIS OF SOURCES OF INFORMATION ON REPRODUCTIVE HEALTH BY ADOLESCENTS IN EDO STATE

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Abstract
This study examines the sources of information and perception of adolescents about reproductive health in Edo State, South-South Nigeria. The survey research technique was adopted for the study It was observed that adolescents in the State rely more on mass mediated sources of information than other sources of information like parents, teachers and health institutions; and that adolescents in the State also prefer to receive information on reproductive health institutions, radio, television and from medical personnel respectively. Similarly, adolescents in Edo state perceive information on reproductive health generally in positive light. The study recommends the adoption and a speedy implementation of an Adolescent Reproductive Health Policy in Nigeria, and also the need to combine mediated sources of information and other interpersonal sources so as to effectively reach more young people especially in rural arrears.

Key Words: Perception, Adolescents, Reproductive Health, and Mediated Sources.

Introduction

Occurring between the ages of 10 and 19 years, adolescence marks a critical phase in human's physiological and psychological development. This phase of life usually have strong influence on a person's later years. During adolescence, young people experience a number of biological and social changes that sometimes prove quite challenging to their lives. One of such challenges relates to their health, which can sometimes have adverse effects on their health. In addition to that, adolescence is also a period of bodily experimentation which often times exposes young persons to high risk activities like drug and alcohol abuses, indiscriminate Tabaco consumption, unregulated sexual behavior, and so on with their attendant negative effects. It is on account of these negative consequences that adolescent's sexual behavior have continued to attract the attention of programme planners and researchers (AHI, 2003, p. 7).

It has been suggested that one of the major reasons behind the common adolescent reproductive health problems is the absence of relevant information to address the challenges facing them. Even where the information is available, it is often inadequate, not credible and in many cases poor. In Nigeria for instance, adolescents engage in sexual activities with little information. Thus, because sexuality is hardly taught in schools and because there are very limited formal ways of receiving reliable and relevant information, adolescents rely on weak sources like their peers. Such information is often inaccurate and does not provide the needed basis for informed decision (Sai, p. 1995).

Perception, on the part of young, is concerned with the psychological activities through which individuals organize meaningful interpretations of sensory stimuli that they receive from their environment (Defelur and Ball-Rokeach, 1989, p. 6). Because of the inherent differences in cognitive factors (needs, interest, beliefs, prior knowledge, attitudes, values, etc) affect the manner in which individuals or groups behave. It follows then that the manner in which adolescents view reproductive health information and the sources of such information is likely to differ from say that of adults. In addition, adolescents like other age groups in the society undergo or undertake the selective process. That is they selectively expose themselves, perceive and recall media and non-mediated information (Defleur and Ball-Rokeach, 1989, p. 5).

Information is no doubt a very crucial resource not only to adolescents but to everybody. However, it is a more serious issue to adolescents because it has a fundamental impact on their life and that of the society in which adolescents live. Thus, for communication practitioners it is more important not only to look at the content of the information provided to adolescents on reproductive health but also its channels, sources, uses, perceptions, etc. This study therefore examines the sources of information and perception of adolescent about reproductive health in Edo State. The reason for this study stems from the "fact that information plays a very crucial role in reducing the health risks associated with adolescent sexual and reproductive behavior" (AHI, 2003). Central to this study is a thesis that assumes that when young people's information seeking/acquisition behavior are better understood, appropriate and effective content could be tailored to such needs.

In this connection, studies have shown that adolescents do have problems with their sources of information on reproductive health. For instance, it is reported that adolescents are often scolded, refused information, or turned away by parents and sometimes by health workers when they adolescents try to seek help on reproductive health issues (Population Council, 1991). However, in recent times, there appears to be a proliferation of information on reproductive health, especially about HIV/AIDS and Sexually Transmitted Infections (STIs), all aimed at

checking the spread of these disease. But it is worrisome to note that these diseases seem to be spreading at an "alarming" proportion.

It is against this backdrop that this study examines the sources of information through which adolescents seek / receive reproductive health information as well how they perceive these sources. This is important because it will impact on the life the adolescents especially help in mitigating the impacts of unwanted pregnancies and unsafe abortion; sexually transmitted diseases including HIV/AIDS; reproductive and sexual health, self-esteem and social participation (UNFPA, 2006). Apart from exposing adolescents to the risks of pregnancy, abortion, STDs and HIV/AIDS, lack of reproductive health information also often limits a young person's education, employment opportunities due to early marriage or unwanted pregnancy.

The International Conference on Population and Development (ICPD) held in the Egyptian Capital, Cairo, 1994 define reproductive health as: "*… as of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in matters relating to the reproductive system and to its functions and processes'*. Reproductive health therefore implies that people are able to have a satisfying safe sex life and that they have the capability to reproduce and the freedom to decide, when and how often to do so. Implicit in this last condition are the rights of men and women to be informed and to have access to safe, effective, affordable and acceptable methods of their choice for regulation of fertility, which are not against the law, and the right of access, to appropriate health care services that will enable women go safely through pregnancy and child birth and provide couples with the best chance of having a healthy infant (ICPD, 1994).

The ICPD comprehensive definition encapsulates the concept of reproductive health as used in the study. More importantly for this study it talks in terms of access which does refer to operational services as well as information. Information is a key factor because without knowledge and awareness one cannot know of his/her right to the reproductive health services.

Statement of the problem

Adolescent Reproductive Health appears to have moved up higher on the government's list of public priorities in Nigeria in recent years. The subject has also become the preoccupation of many civil society groups. The renewed multi-sectorial interest in reproductive health is hardly misplaced. The AHI (2006) "notes that the high incidence of sexual activity, among adolescents; has serious implications for the spread of Sexually Transmitted Infections (STIs) and HIV/AIDS". This was further reinforced by the National AIDS and STDs Control Programme (1999), which reported that in 1998 alone, 60 percent of the 20,334 AIDS cases in Nigeria were within the age group of 15-24. The 2003 National Sentinel Survey also reported a similar finding.

Similarly, the Federal Ministry of Health, in the report (2001), said young people of age 15 – 24 contributed approximately 29.3 percent of deliveries in Nigeria. However, about two-fifths of teenage pregnancies in Nigeria are believed to end up in illegally induced abortions, with the majority being carried out by unqualified medical personnel in unsafe environments.

These increases are often blamed on a number of factors including the sheer lack of reliable sources of information on Adolescent Reproductive Health (ARH) issues for younger persons. This is sometimes attributed to the failure of parents and guardians to discuss reproductive health issues with their children and wards freely, often due to restrictions and religious leaders who view themselves as the repository and transmitters of community values, morals and beliefs are often in the forefront of opposition to adolescent reproductive health programmes. Religious group have strongly opposition to adolescent reproductive health issues with their children and wards freely, often due to restrictions by religious and tradition. For instance, Rosen (2000) said traditional and religious leaders who view themselves as the repository and transmitters of community values, morals and beliefs are often in the forefront of opposition to adolescent reproductive health programmes. Religious groups have strongly opposed sexuality education in the United States, Nigeria, Mexico and Kenya. The tendency is for the adolescents to resort to other non-moralist of information, which, sometimes, leave them vulnerable to risks associated with unwanted teenage pregnancy, abortion, STDs and HIV/AIDS.

The question that readily comes to mind is what is adolescents' reproductive health? While those in the urban areas claim to have a limited knowledge of reproductive health issues, the same cannot be said of their counterparts in rural areas (AHI, 2003).

Objectives of the study

The aim of this study is to examine the sources of information and perception of adolescents about reproductive health in Edo State. The general objective is to study the sources of information and the perception of adolescents about reproductive health in Nigeria with particular reference to Edo State. Specifically, the study seeks to:

1. Find out the adolescent sources of information on Adolescent Reproductive Health in Edo State.
2. Identify the sources of information most preferred by Adolescents in Edo State.
3. Examine the perception of reproductive health by adolescents in Edo State.

Research Questions

To guide this investigation, the following research questions were posed:

1. What are the sources of information for adolescents on reproductive health in Edo State.
2. Which source of information on reproductive health by adolescents in Edo State prefer most?
3. What is the perception of reproductive health by adolescents in Edo State.

Literature Review

Contemporary challenges in reproductive health in the developed world have made adolescent reproductive health a very attractive area for researchers seeking to unpack the wide range of issues around the subject. As the thrust of this study is sources of information and perception of reproductive health among adolescents, the literature review shall open with an analytical overview of information aspect of reproductive health.

Information is often seen as a measure of uncertainty or entropy in a situation. According to Littlejohn (1992), when a situation completely predictable, no information is present. Granovetter (1973) and Watt and Strongatz (1998), however, add that much of our most useful information comes from people with whom we have "weak" links (i.e. people we interact with less often). This is because the people with most likely to know the same thing like us. It is the people we interact with less often who bring new information into groups of strongly linked people.

In many cultures, adolescents are considered as being sexually active before marriage, even though they may not be expected. As a result, information and services relating to reproduction may be withheld from them on the wrong assumption and services relating to reproduction may be withheld from them on the wrong assumption that they are least likely to need them. Health providers, teachers and other potential sources of support, may discourage adolescents from asking questions or deny them adequate training to deal with reproductive health issues appropriately (UNFPA, 2006). This may be partly because of what appears to be a culture of silence which surrounds reproductive health issues especially in Sub-Saharan Africa as sex related topics are generally regarded as taboo and not openly discussed (UNFPA, 1997 and Senderowitz, 1997). Young people are faced with many barriers to obtaining both family planning and reproductive health information and services. These barriers could be traced to a variety of sources, including the breakdown of traditional information systems, negative or ambiguous governmental policies, service providers' biases, poorly designed youth programmes, and young people' own reluctance to make use of adult oriented reproductive health services.

In this respect it is very important to understand health attitude of youth on reproductive health matters. For instance, Bhuiya and Rob (2000) in their study on adolescent's reproductive health in Bangladesh pointed out that only very few adolescents discuss reproductive issues with their parents. On the contrary most of the adolescents discuss the issues with relatives other than parent like aunties, uncles, neighbours, and other alternative sources although girls are more susceptible to discuss with parents more than boys.

This seems to have been reinforced by the report of the State of World's Population (UNFPA, 2000), which said inter alia girls talk with their mothers about menstruation and pregnancy but rarely do so with their sexual partners. Boys receive even less information from their parents, certainly not as much as they would like. Fathers are often silent or absent and thus

provide an uncaring male role model. A study from Zimbabwe showed that father are "frequently absent the home environment and were usually viewed as remote, fearsome, moody and from unpredictable people whom it is safest to avoid (UNFPA, 2000). However, the state of World Population Report (2000) says parents are not the only stakeholder who should be left alone with responsibility.

Peers are also important sources of information on reproductive health issues as the level of interaction among them in intimate. In this regard it is reported by Edelstein and Gonyer (1993) that youth turn to their peers as their most important and credible source of information especially in areas such as human sexuality, drugs and alcohol. While Osowole and Oladepo (2000) in their study on deaf adolescents found out that the level of awareness of AIDS was high among the respondents, with the major source of information being deaf peers. However, it was clear that part of this information provided by peers is incomplete and technically inaccurate. This finding implies that, even while the peers may be the major source of information, not all the information from them in accurate. This cast doubts on the reliability of the peer group as authentic source of information.

Studies by authorities have shown that parents and peers groups are not the only stakeholders in the business of providing information on (2002) in a study on reproductive, sexual and contraceptive behavior of adolescents in Nigeria found that the majority of the respondents obtained sexually related information from people outside their immediate family for example teachers (25.6%), friends (13.3%) and medical personnel (21.9%) only (8.4%) obtained such information from their parents. The implication of this is the fact that interpersonal stakeholders like teacher are important source of information for adolescents. Also, Koster et al (2001) reported a similar trend, pointing out that adolescent in Nigeria and other African countries hardly discuss sexuality issues with their parents. Parents, they say, rarely disseminate sex education to their children. This make these children to obtained the wrong source.

On the other hand mediated sources are also important as source of reproductive health information. This is because responses by adolescents in various studies indicates that apart from interpersonal source like parents, peers, and teachers, media institutions like radio, newspapers, magazine, televisions, as well as organizations and groups like mosques and churches to provide health related information to adolescent in Nigeria (Pate and Umar, 2002). Similarly, in a study carried out on emergency contraception in Nigeria, the Society for Family Health, a non-governmental organization engaged in reproductive Health, a non-governmental organization engaged in reproductive health education, found that respondents prefer receiving information from one-to-one private talks, radio and small group settings of their age (Society for Family Health, SFH, 1998).

Similarly, Mehrel et al (2002), in a study on awareness of HIV/AIDS among selected target groups in Addis Ababa, stated that the respondents' major source of information is the mass media which account for 86.5% followed by community members 9.2% and health professional, 46.7%/ majority of farmers indicated that they hear more about HIV/AIDS over the radio in the in the form of drama and sons. In addition to radio, they said the get information about the disease from television, newspapers and magazines. Many studies report the significance of the mass media in disseminating health information (see Okpani and Okpani, 2000;Ladipo et al 2001, Kumar, 1997). This show the primacy of mediated sources of information and that if effectively utilized the media can serve as a primary source of general health information as well as serve target group like adolescents. However, it is important to note here that acquiring information from the mass media depends on factors like literacy, availability of media infrastructure, income, etc which vary from location to location. This obviously may be what Vaughan et al (2000) had in mind when they stated that social norms in conservative societies often preclude the use of mass media to communicate reproductive health information to youths.

Closely related to the above, Parker et al (1989) have said that the print media, radio and television have all contributed to the provision of background information, which has been crucial in shaping both attitudes and practices related to HIV and AIDS. The position of Parker seems to endorse the view that the media are "Indispensable" in the provision of crucial information for shaping attitudes. The mass media have been key elements in helping public health professionals to bring their messages about AIDS to the general public. Few in AIDS related professions today would contest the idea that information about AIDS in the past decade has made some

contribution to public health efforts, which have had some effect in preventing the transmission of HIV (Neither, 2000).

On perception, as in many other countries, policy makers, administrators and many health care providers suggest that the concept of reproductive health is not widely understood. In many parts of the country, reproductive health is perceived simply as a new name for the sum of what are formerly vertical programmes for addressing material and child health, sexually transmitted diseass or even just family planning (WHO, 1998). This perception fails to recognize any synergy amongst reproductive health services. Among those who see reproductive health as synonymous with family planning, the importance they assign to it ultimately depends on how the issue of family itself is perceived. Obviously, the consequences of this association have proven most detrimental in areas where "control" over the number or spacing of births is seen as a political or social status quo. As noted above the reproductive concept assumes that the ability to address one set of reproductive health needs has a direct impact on the health and well being of individuals throughout their lives (WHO, 1998).

Men, who are more likely than women to be literate and to have better access to information in most developing countries, are often in a better position than women to inform themselves about reproductive health. However, they lack interest because reproductive health, including everything to do with contraception, pregnancy, child birth and STDs considered a woman's concern and that 'real men' do not concern themselves with such matters (UNFPA, 2000). In other words, men tend to consider productive health to be the exclusive preserve of women.

According to AHI (2003), adolescents in most communities did not appear to have adequate understanding of what sexual and reproductive health issues are. It adds that without prompting most of the adolescents could not explain what they understood as sexual and reproductive health issues.

It is clear from the above that sources of information available to adolescents differ from one area to the other. While in some areas peer groups seem to be widely preferred, in other areas, the focus is on health personnel, teachers, books, mass media, films, video and friends.

Theoretical framework

This study is hinged on the uses and gratifications theory. The theory states that social and psychological origins of need generate expectations of the mass media or other sources which lead to differential exposure resulting in need gratifications and consequences (Kartz, 1974). The theory suggests that media users play an active role in choosing and using the media. Users take active part in the communication process and are goal-oriented in their media use. The theorists say that a media user seeks out a media source that best fulfills the needs of the users. The uses and gratifications theory assumes that the users have alternate choices to satisfy their need.

Uses and gratification theory takes a more humanistic approach to looking at media uses. Blumler and Kartz (1974) believe that the populace uses media in various ways. Instead, they believe there are as many reasons for using the media as there are media users. According to the theory, media consumers have a free will to decide how they will use the media and even non-mediated channels.

Accordingly, adolescents in Edo are likely, therefore, to rely on various sources of channels, especially the media for information on adolescent reproductive health in order to satisfy some needs related to communication. This, therefore, makes the use of this theory relevant, because by attending to information sources, the adolescents are trying to satisfy some information needs particularly on reproductive health.

Methodology

This study relies on survey techniques for generating data and is considered most appropriate for this kind of study because of the large population of adolescents in Edo State. The total population of Edo State according to the 2006 Census Analytical Report is 3,218,332 (population.gov.ng :). The population for this study is all adolescents from the age of 14 to 18 who are in school and out-of-school in six purposively selected local government areas located in three geopolitical zones in Edo State.

As it is very difficult to sample all adolescents in Edo State, respondents were therefore selected from six purposively selected local government areas out of the three senatorial districts in the state (two each from Northern, southern and central Senatorial districts). The senatorial districts being political arrangement and geographically convenient do not necessarily represent

the stratification in the adolescent population. But this system offers itself as a spatially convenient framework upon which this study could easily be mounted. And since a sample is a subset of a population that is taken to be representative of the entire population (Wimmer and Dominick 1987), it is assumed that using the samples chosen from the Northern, central and southern parts of the State might provide a good degree of representativeness of the study population.

To generate data for the study, a combination of cluster and accidental sampling techniques were used because of the vast spatial composition of the state on one hand and the relative large size of the respondents which make sampling frame difficult on the other hand. Through accidental sampling, the specific respondents for this survey were identified. Two local government areas are therefore chosen, each from Edo central, north and South senatorial districts, thus making a total of six local governments which are sampled. To ensure balance representation between relatively urbanized and relatively rural areas, one urban and one rural local government areas of Oredo and Uhunmwonde Local Government from Edo South, Esan West and Igueben from Edo Central and Etsako West and Akoko Edo from Edo North. In each local government, a ward is selected and in the ward a street or a cluster of houses (in cases where settlements are not organized into streets) were selected.

In each of the local government areas 50 adolescents in school and 50 adolescents out of school were sampled. Thus giving us a total number of 100 in each local government thus a total of 600 adolescents are sampled in all. The number of the sample is assumed adequate to provide information on information acquisition behavior of adolescents in Adamawa State.

Questionnaire/interviews method was used for data collection. The questionnaire comprised both open-ended and close-ended questions. The questionnaire was self administered in the case of literate respondents and two research assistants were hired each of the zones to administer the questionnaire on respondents who could read or write. They were first trained on how to administer the questionnaire before being deployed to the field.

Result

Out of the 600 questionnaire administered 590 were returned useful thus yielding 98.3% return rate. Out of this number, 304 (54%) are female respondents while 296 (46%) are male.

The first objective of the study is to find out the sources of information on reproductive health by adolescents in Edo state. Result show that 127 (21.5%) respondents indicated that Radio is their source; 119 (20.2%) television; 92 (15.6%) places of worship; 63 (10.7%) Newspapers; 52 (8.8%) peers; 50 (8.5%) friends who are not peers; 41 (6.9%) Aunt/Uncles; 20(3.3%) Health centres; 7 (1.2%) mother; 5 (0.8%) father; and 14 (2.3%) others.

Table 1: Sources of Reproductive Health Information by Adolescents

Source	Number of Respondents	Percentage (%)
Television	119	20.2
Places of worship	92	15.6
Newspapers	63	10.7
Peers	52	8.8
Friends other than peers	50	8.5
Aunt/uncles	41	6.9
Health centers	20	3.3
Mother	7	1.2
Father	5	0.8
Other	14	2.3
Total	**590**	**100**

The second objective is to find out the sources of reproductive health information most preferred by adolescents in Edo State. Result show that 104 (17.6%) prefer rado; 89 (15.1%) television, 61

(10.3%) & Health centres; 56 (9.5%) place of worship; 51 (8.6%) mothers; 35 (6.0%) friends 34(5.0%) fathers; 29 (4.9%) aunts; internet; 10(1.7%) preference and 6(1.0%) others.

Table 3: source Preference by Adolescents

Source	Number of Respondents	Percentage (%)
Television	**89**	20.2
Places of worship	**61**	15.6
Newspapers	**56**	10.7
Peers	**51**	8.8
Friends other than peers	**35**	8.5
Aunt/uncles	**63**	6.9
Health centers	**52**	3.3
Mother	**41**	1.2
Father	**5**	0.8
Other	**14**	2.3
Total	**590**	**100**

The third objectives is to find out the perception of reproductive health. Data show that 321 (54.4%) of the respondents perceive reproductive health positively, 260 (44.1%) perceive reproductive health negatively; while 9 (1.5%) are neutral on their perception as shown graphically on table 3, below. Most of those who perceive reproductive health as positive said it afford the youth to:

- Guard against unwanted pregnancy
- Protect them against sexually transmitted infections like HIV/AIDS
- Save them from pains of illegal abortion

While those who perceive reproductive health negatively indicated among others that:

- It is against their religious/cultural beliefs and teachings, which forbid open discussion of sexual issues.
- Encourages illicit issues
- Against their culture
- Lead to increase in the spread of sexually transmitted diseases and HIV/AIDS
- It is a taboo

Table 3: on the perception of reproductive health by respondents

Response	No of response	Percentage %
Positive	321	54.4
Negative	260	44.1
Neutral	9	1.5
Total	590	100%

Discussion

The first research question is "What are the sources of information for adolescents on reproductive health in Edo State? The result show that adolescents rely on variety of sources. However, the finding show a heavy reliance on mediated source, chiefly radio, television, places of worship and newspapers.

Majority of the respondents mentioned radio perhaps because if its low cost reception and ubiquity. This finding conforms to numerous other which show the primacy of mass media in disseminating health information to all strata of the society (see Federal Ministry of Health, 2003;

Pate and Umar, 2003, Mehrel et al, 2002). The mediated sources of reproductive health information in total account for 54.4% of the respondents which by all account is very high. By implication, the mass media programmes should be given more support because of the large number of respondent who rely on them for health information most especially adolescents. If such heavy reliance is adequately utilized, a number of adolescent health problems in the state and similar states can be reduced. This brings to fore issues like the reliability of the mediated messages, the quality and the quantity of the information. The media regulators, media organizations and health practitioners need to partner in producing health programmes.

Another significant aspect of the finding is the issue of places of reproductive health. In most of the literature reviewed the places of worship did not feature as prominent source of information of reproductive health. However, places of worship is the third most significant source of information in this study. This is a good indicator of the need to mobilize religious leaders in educating adolescent on reproductive health perhaps because of the relative high believability of religious leaders. The finding also confirms the assertion that most useful information is acquired from people whom the respondents have weak links (Watzand stogatz, 1998).

The second research question is "which source of information on reproductive health to adolescents in Edo State most prefer? The respondents indicated preferring on mostly and mediated sources of information on reproductive health (see Table 2) although that account for 38.6% of the respondents although mediated sources in actual sources is higher (54.4%). Also, there is high response on preference for health centres on reproductive health. This is also good and encouraging as health practitioners are among the most reliable and encouraging as health practitioner are among the most reliable and credible source of health information. The finding which shows less preference to parent, relatives and peer is also a strong pointer to the argument that the youth prefer acquiring sensitive information from largely anonymous group (Manning and Balson, 1989). Radio is indeed a good anonymous source but televisions can provide additional information to the latter.

The third research question is "What is the perception of reproduction health by adolescents in Edo State? The positive perception of reproductive health (54.4%) is a positive sign in that studies have indicated that in some communities there are negative perceptions of reproductive health because of it is being equated with family planning which is abhorred by the people (WHO, 1998).

This finding reaffirms the strength of the uses and gratifications approach in that the respondents strongly affirmed their strong reliance as well as preference for largely mediated sources of information on reproductive health. However, the weak showings of the close source like parents, peers, uncles/aunts, need to be seriously looked into. This is also important because close people need to be involved in the exchange of information on reproductive health as they have more capacity in recapitulating, customizing and understanding the respondents that distant source like the mass media.

Conclusion

The aim of the study is to examine the sources of information and perception of adolescents on reproductive health. It is found that adolescents in Edo state rely more and prefer mediated sources of information on reproductive health. Also, it is found that adolescents in the state perceive reproductive health information positively. The impact of these findings is that mediated channel is the most effective channel for reaching adolescents in Edo State. If one adds that fact that reproductive health is viewed positively, a powerful instrument is there for programme planners and implementers to assist adolescent in Edo and similar state tackle issues like unwanted pregnancies, aborting, HIV/AIDS and other STIs, as well as improved mental and environmental conditions. However, as the study is limited to one state, it cannot be generalized to all states in the federation.

Recommendations

1. The Revised National Policy (2004) has enumerated a number of strategies and interventions targeted particularly to adolescents in the country. Such strategies includes: the inclusion of reproductive health in the curricula, the establishment of adolescent reproductive health, etc. however, experience indicate that in Edo State like many other states show that the policy is not being put into practice. Various governments need to therefore collaborate to implement the good policy, which will no doubt, helpadolescents.

2. Adolescent health programme planners and scholars need to re-strategize in combining the use of mediated and non-mediated channels appropriately so as to achieve better impacts.
3. More collaborative research need to be carried out on the quality of information received by adolescents so as to verify their reliabi

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