

## ASSESSMENT OF THE APPLICATION OF ECO-FRIENDLY STRATEGIES IN RESORT BUILDINGS IN NORTH-CENTRAL NIGERIA

**Tsado, S. B.**

Department of Architecture  
Federal University of Technology Minna,  
Niger State, Nigeria

**Akande, K. O.**

Department of Architecture  
Federal University of Technology Minna,  
Niger State, Nigeria

### ABSTRACT

It has been observed that the built environment contributes to the relationship between humanity and nature. To achieve this, researchers suggest that the desires of humans, the integrity of both natural and managed ecosystems, the design of nature, economic sustainability, the ecological economics, various indigenous biodiversity, and the environmental literacy available for sustainable development, resource conservation, and protection of the natural world; all have need to be considered. This paper aims to weigh the use of eco-friendly strategies in resort buildings in Nigeria as it affects the relationship between humans and nature. This would be carried out through the use of questionnaires which were administered to 250 building design team members, visitors and users of resort buildings in North-central Nigeria. Analysis helping software like the SPSS and MS-Excel were used in analysing the data through the Likert-scale and Mann-Whitney U-test while presentations made through charts and figures. This evaluation considered the progress made from previous researches in the identification of eco-friendly strategies as well as the synergy of both ecology and the built-environment. It is recommended that the relationship and the responsiveness of the stakeholders is considered in Biophilic design. This research would help in guiding building designers and landscape specialists in enhancing ecology in resort design in Nigeria.

**Keywords:** Biophilic Design, Built Environment, Ecology, Humans, Nature

### INTRODUCTION

The world has observed some level of major industrial and technological revolution since the medieval ages. Regardless of its commended benefits to humanity, this revolution has resulted in a worrisome low level of interaction with our environment (Emmanuel, Jerry, & Dzigbodi, 2018). An example of this is the absence or low-number of buildings designed to blend with

the site and its features, this not only means gap between man and nature but also makes very little or low room for the exploration of the incentives the original site environment makes for the building from a sustained ecology to improved environmental awareness and human nature relationship. The case of the tourism industry as in the case of holiday resort centres cannot be taken out of this discussion. Given the definition of tourism by the World Tourism Organization (WTO) as an activity involving the travel of people to places outside their usual environment for leisure, it is indicative of how such activities may benefit host and local economies and communities. However, Yozcu & Cetin (2009) proved that the tourism industry is very susceptible to crises of different origins. Examples include natural disasters, political crises, epidemics, economic crises, and terror.

However, the need for an eco-friendly design cannot be over-emphasized. Going further, it is important to define the term eco-friendly. Eco-friendly is formed from two terms with the first being "eco", which is described by the Macmillan dictionary, is an abbreviation for ecology, and defined as the system of relationships between living things and their environment. While, the term "Friendly" implies beneficial, or at least not harmful. Knowing resort is a place frequented for relaxation, usually a place which has natural and cultural features, with other relevant services. According to Yusuf (2019), the use of conventional strategies in the design of resorts over time has created an adverse effect on the environment and, ultimately, on human health. It is in line with this that this paper attempts to weigh the use of eco-friendly strategies in resort buildings in Nigeria as it affects the relationship between humans and nature.

### **ECO-FRIENDLY STRATEGIES**

The eco-friendly strategy is adopted to make a place more attractive while sustaining and improving the existing ecosystem. In Nigeria, eco-friendliness and other green concepts that consider both sustainability and environmental issues are rarely put into consideration when designing a new building or renovating an old one (Otegbulu & RSV, 2011). From literature reviewed, this paper grouped the application of eco-friendly strategies into five (5) based on the emphasis in their application in the different parts and components of the building;

#### **Emphasis on the topography**

This is seen in the arrangement of the spaces in the building, the topography is highlighted in the exposure of landscape views to multiple interior spaces, while making room for solar exposure and facilitating natural ventilation (Scott, 2006). This integrates the land on the site to the building form (Scott, 2006). Equipe ArchDaily Brasil (2021) wrote of buildings which have been identified for using the eco-friendly strategy with emphasis on the topography by bringing the experience of the external environment into the building.

**Emphasis on microclimate and space**

This deals with majorly the severe parts of the prevailing climate on the site by making the building to fit it through the use of passive techniques (Scott, 2006; Fazlic, 2008). Insulating the building envelope is important as a well-insulated building can reduce energy consumption by 50% due to the low heat loss or gain and its effects on the occupants (Akadiri *et al.*, 2012). This strategy adopts techniques like daylighting, porosity, shading and passive cooling (Maleki, 2011; Scott, 2006). Use of passive energy design techniques can aid in the comfort of the occupants and users of the built space and hence, making them at-home in it (Akadiri *et al.*, 2012).

**Emphasis on typology and assemblies**

This works with specificity of particular forms and physical architectural style or language to arrange public and private zones, indoor and outdoor zones and all the spaces that make up the architecture of the building while considering the volume and the experience of the occupant in it (Scott, 2006). This considers the thermal mass, solar shading devices, roof overhangs, forms, verandas, courtyards, and other interior and exterior spaces (Fazlic, 2008; Scott, 2006) A well-insulated building envelope can help in mitigating heat loss and heat gain (Amaral *et al.*, 2020). Using photovoltaics for passive heating of indoor spaces is also advantageous (Amaral *et al.*, 2020). The implementation of night-time ventilation, earth-air heat exchange is beneficial alternatives (Amaral *et al.*, 2020; Akadiri *et al.*, 2012). Energy conservation can also be achieved with; Materials that require less energy during construction like precast slabs, Products that conserve energy like CFL lamps, Materials that help reduce the cooling loads like aerated concrete blocks, and Fixtures & equipment that help conserve water like Dual flush cisterns.

**Emphasis on ecology and resources**

This works with materials available and resource in the ecology into the design of the building. This works on using reuse, recycling and recyclable materials while eliminating toxic, volatile organics and carcinogenic compounds (Fazlic, 2008; Scott, 2006). This also ensures the planting of trees and the creation of green spaces in the built space both in the interior and the exterior (Scott, 2006). Choosing materials with low embodied energy will help reduce activities that dampen the ecosystem like mining, and the other processes that are involved in their production (Akadiri *et al.*, 2012). This also considers the proximity of the building and the materials used for it to its location, anything other than this can lead to a high level of energy and financial cost (Akadiri *et al.*, 2012). Recyclable materials can be chosen because; they can be Reused or recycled as different product like Steel, aluminium, or they are biodegradable (meaning they decompose easily) like Wood or earthen materials. Some of these also add Performance to the building structure, like; reducing material use showing

energy efficiency as well as helping in reducing the dead load of a building, an example is Ferrocement. Some materials are exceptionally durable, or require low maintenance like PVC pipes.

### **Emphasis on effective implementation of waste management**

This involves the engagement of reusable and recyclable building materials (Akadiri *et al.*, 2012), use of nature based building materials as alternatives like mycelium-biomass and mycofilters, placement of waste systems into the building by design such as water recycling (Akadiri *et al.*, 2012; Amaral *et al.*, 2020 Elgizawy *et al.*, 2016). Reduced energy use, reduced pollution, reduced water use, and reduced waste all cause for a green environment and lead to healthy living (Fazlic, 2008). Pollution reduction for Air pollution can be mitigated with the use of materials with low VOC emissions like Cement paints, while Water pollution can be achieved with materials that prevent leaching, and Land pollution through the use of materials that reuse waste that would otherwise have resulted in landfill like FlyAsh bricks.

There are seven principles for ecological design that were brought forward: (Shu-Yang, Freedman, & Cote, 2004; Lak, Hasankhan, & Garakani, 2020):

1. The need to meet the inherent needs of humans and their economies;
2. The requirement to sustain the integrity of the structure and function of both natural and managed ecosystems.
3. The appropriateness of emulating the inherent designs of nature in anthropogenic management systems is discussed.
4. The need to make progress towards a sustainable economy through greater reliance on renewable resources and more focus on recycling, reusing, and efficient use of materials and energy;
5. The use of ecological economics (or full-cost accounting) to comprehensively take resource depletion and environmental damage into consideration and thereby address issues of natural debt;
6. The need to conserve natural ecosystems and indigenous biodiversity at viable levels; and
7. The desirability of increasing environmental literacy to build social support for sustainable development, resource conservation, and protection of the natural world.

Recent samples of the application of these principles of ecological design to the planning and management of human surroundings, industrial spaces and networks, architectural practice, and products have shown how much this idea has to give to the immediate need for quick physical advancement towards a sustainable human economy.

### **METHODOLOGY**

Applying eco-friendly strategies in resort buildings as found from literatures reviewed can be directly influenced by the; location, climate, topography and available building materials.

These features also influence the nature of the buildings constructed in the area due to; embodied energy that would be necessary for the application of the eco-friendly strategies, available man-power with the skill-set for the eco-friendly strategies, and knowledge of the eco-friendly strategies. The north central region of Nigeria is blessed with beautiful terrains and in it are found some resorts namely; the Jos wildlife park, Plateau state, Wonderland amusement park and resort, Abuja (Federal Capital Territory), Millennium park, Abuja (Federal Capital Territory) and the Murtala park in Minna Niger state.

The instruments that were used for this research were questionnaires. This instrument was applied for the assessment of the eco-friendly strategies applied in resort buildings. The sample size for the distribution of questionnaire in this study area is two hundred and fifty (250) as administered to the stakeholders of resort buildings, which includes owners, visitors, workers, and built environment professionals who are also the designers and builders. Their se are data obtained directly onsite by the researcher of this thesis, they include; Professional opinion on eco-friendly strategies. The method of data analysis that was adopted for this study was the quantitative data analysis methods as the Likert-scale and Mann Whitney-U were used with the aid of SPSS and Microsoft office excel package in making the assessment for this paper. Figures, tables, and charts were used for the presentation and interpretation of the results from the analysis.

## RESULTS AND DISCUSSION

Questionnaires were administered to about two hundred and fifty (250) from which 52 was valid from a response rate of 27% (Table 1 and 2) leading to 92% of the calculated sum was given to respondents in the different groups that and other stakeholders in the use, administration, design and construction of holiday resort buildings. These personnel were people of different cadre of experience in their particular experience as stakeholders in the hospitality industry. The data obtained with a very high reliability of 0.943 (Table 2) were analysed in this study.

Table 1: Results of questionnaires on collection

	<i>Frequency</i>	<i>Percentage administered (%)</i>	<i>Percentage response (%)</i>	<i>Percentage response (%)</i>
<b>Total administered</b>	250	100	-	-
<b>Total response</b>	68	27	100	-
<b>Valid response</b>	55	22	81	100

Table 2: Case Processing Summary for all variables

		<i>N</i>	<i>%</i>
Cases	Valid	52	98.1
	Excluded <sup>a</sup>	1	1.9

Total	53	100.0
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a. Listwise deletion based on all variables in the procedure.

Table 3: Reliability Statistics for all variables

<i>Cronbach's Alpha</i>	<i>Cronbach's Alpha Based on Standardized Items</i>	<i>N of Items</i>
.950	.943	31

The opinion of the stakeholders from tables 4, 5 and 6 showed that there was disagreement that Electricity(Energy) supply was basically from renewable sources while they were neutral on the statements that the holiday Resorts adopts eco-friendly design strategies as a way to reduce the negative impacts of buildings on their natural environment, Resort provides adequate and proper waste management, Efficient Landscaping and responsible environmental activities, and Efficient Water supply & management.

To help in the assessment, and in testing the results to see the agreement of built environment professionals and other holiday resort stakeholders on the experience of users to the eco-friendly strategies as applied by holiday resorts in the Northern Nigeria, the **hypothesis** below was made;

H<sub>0</sub>: There is a significant difference in the opinion between the opinion of the built environment professionals and the other stakeholders in the holiday resorts on the experience of users to the eco-friendly strategies as applied by holiday resorts in the Northern Nigeria.

Table 4: Number of respondents per opinion on eco-friendly strategies for a holiday resort

	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>	<i>Total</i>
<b>A</b>	7	9	16	13	8	53
<b>B</b>	11	29	6	4	3	53
<b>C</b>	11	14	14	11	4	54
<b>D</b>	6	13	13	12	9	53
<b>E</b>	10	13	10	15	5	53

The holiday Resorts adopts eco-friendly design strategies as a way to reduce the negative impacts of buildings on their natural environment	A
Electricity(Energy) supply is basically from renewable sources	B
Resort provides adequate and proper waste management	C
Efficient Landscaping and responsible environmental activities	D
Efficient Water supply & management	E

Table 5: Sum of respondents on eco-friendly strategies for a holiday resort

	<i>Strongly Disagree X1</i>	<i>Disagree X2</i>	<i>Neutral X3</i>	<i>Agree X4</i>	<i>Strongly Agree X5</i>	<i>Total</i>
<b>A</b>	7	18	48	52	40	165
<b>B</b>	11	58	18	16	15	118
<b>C</b>	11	28	42	44	20	145
<b>D</b>	6	26	39	48	45	164
<b>E</b>	10	26	30	60	25	151
The holiday Resorts adopts eco-friendly design strategies as a way to reduce the negative impacts of buildings on their natural environment						A
Electricity(Energy) supply is basically from renewable sources						B
Resort provides adequate and proper waste management						C
Efficient Landscaping and responsible environmental activities						D
Efficient Water supply & management						E

Table 6: Relevance of eco-friendly strategies for a holiday resort

<i>Measured Variable</i>	<i>Number</i>	<i>Standard Deviation</i>	<i>Mean</i>	<i>Interpretation</i>
<b>The holiday Resorts adopts eco-friendly design strategies as a way to reduce the negative impacts of buildings on their natural environment</b>	53	16.5	3	<i>Neutral</i>
<b>Electricity(Energy) supply is basically from renewable sources</b>	53	11.8	2	<i>Disagree</i>
<b>Resort provides adequate and proper waste management</b>	54	14.5	3	<i>Neutral</i>
<b>Efficient Landscaping and responsible environmental activities</b>	53	16.4	3	<i>Neutral</i>
<b>Efficient Water supply &amp; management</b>	53	15.1	3	<i>Neutral</i>

From the Mann-Whitney U-test, it was found that there is a significant difference in the opinion of the built environment professionals (standard deviation=0.8794, mean=2.6833, median=3, n=36) and the other stakeholders in the holiday resorts by a small effect (standard deviation=1.2487, mean=3.0235, median=3, n=17), U=261, z=-0.860, p=0.390, r=0.118 (Table 7 and 8). Hence, the hypothesis H<sub>0</sub>, which states that there is a significant difference in

the opinion between the opinion of the built environment professionals and the other stakeholders in the holiday resorts on the experience of users to the eco-friendly strategies as applied by holiday resorts in the Northern Nigeria, is true (figure 1).

Table 7: Mann-Whitney Test Ranks

		Category of respondents	N	Mean Rank	Sum of Ranks
<b>Applied Eco-Friendly Strategies</b>	built environment professionals	built environment	36	25.75	927.00
		Others	17	29.65	504.00
	Total		53		

Table 8: Mann-Whitney U Test Statistics with Grouping Variable: Category of respondents

Applied Eco-Friendly Strategies	
<b>Mann-Whitney U</b>	261.000
<b>Wilcoxon W</b>	927.000
<b>Z</b>	-.860
<b>Asymptotic Significance (2-tailed)</b>	.390

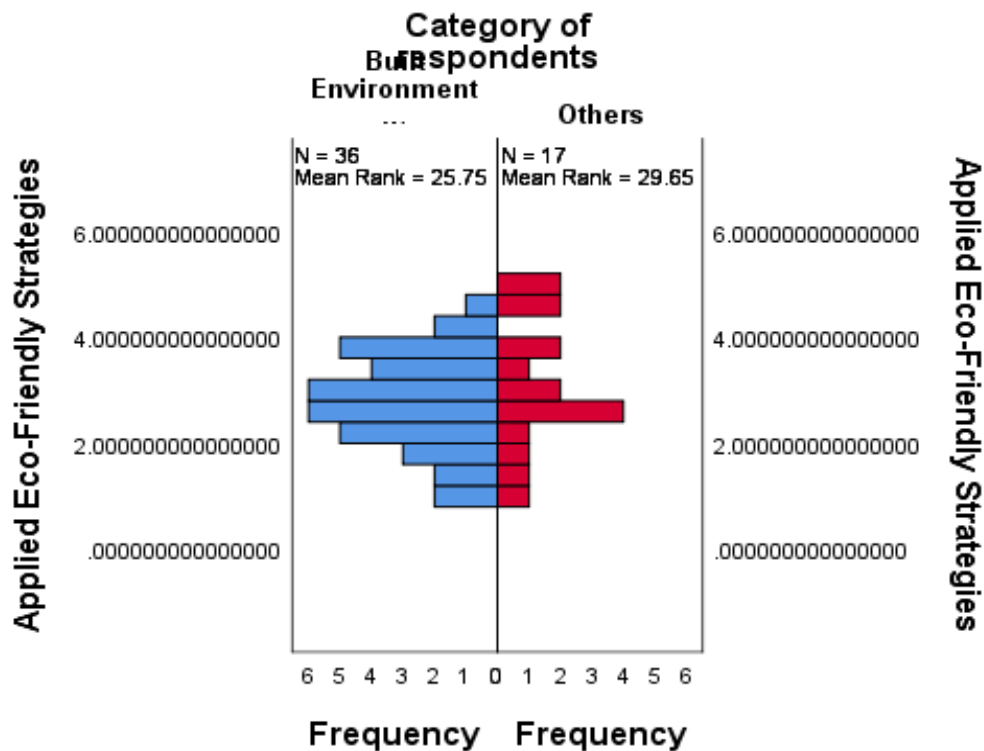


Figure 1: Independent-Samples Mann-Whitney U Test for Applied Eco-Friendly Strategies



## CONCLUSION

From the results above, due to the neutrality and disagreement of the respondents to the application of Eco-friendly strategies in resort buildings applied. It is therefore, safe to assert that in north central Nigeria, it is either that Eco-friendly strategies are not in use or are sparingly used. There is a lot of things that can cause this outcome. It could be that the concept is not well known by the populace or the built environment is not fully aware of them or it is challenged by the absence of sufficient knowledge, skills and resources.

In Nigeria, rarely are there buildings with a holistic approach to sustainable design, the operating climate for construction remarkably differs from what is obtained in Western Europe for instance where there is a strong sustainability drive in the construction sector and a lot of the sources of information helping to shape the practice of sustainable construction originate from outside of Nigeria (Dania, 2017). As asserted by Olagunju et al. (2017), there is also a need for education of energy efficiency and resource capacity among built environment professional to ensure sustainability in the application of Eco-friendly techniques in resort buildings design. Dauda and Akande (2018), Zhiri & Akande (2018) and Zhiri & Akande (2020) also added that the education should include the addition of ecological features to reduce ecological degradation and an inclusion of passive design techniques to reduce energy consumption which can lead to environmental pollution. From Nwishienyi and Akande (2018) the concept of eco-efficiency also can be considered in the design and construction of eco-friendly resort buildings as it encourages innovation and sustainability.

## RECOMMENDATION

There is a gap between empirical knowledge of eco-friendly principles adapted to buildings in Western Europe and the principles adapted to buildings in Nigeria. Further research and education should be made on built environment professionals in encouraging the adoption of eco-friendly strategies.

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## INTEGRATION OF CULTURAL FEATURES IN THE DESIGN OF MULTIMEDIA STUDIOS IN NIGERIA.

**Jiya John Ninma**

Department of Architecture,  
School of Environmental Technology,  
Federal University of Technology Minna,  
Niger State, Nigeria.

**Charles Makun**

Department of Architecture,  
School of Environmental Technology,  
Federal University of Technology Minna,  
Niger State, Nigeria.

### Abstract

The constant evolution of culture has created new hybrids between art, film, media, advertising, journalism, architecture, and many other spheres that have an impact on human culture. These hybrids sometimes call for a paradigm shift or at least challenge our cultural philosophies or ideologies. As a result of technological transformation through industrialization, most public buildings in Nigeria are beginning to lack its indigenous Architecture within their cultural context. In addition, Studies have shown that most public buildings in Nigeria are lacking indigenous people's spatial needs and cultural values and they are profound among the minority ethnic groups. As such, a public building such as a media house ought to reflect the culture of its location. This study focuses on evaluating the application of Nupe cultural features in the design of a multimedia studio in Bida. Media houses were selected randomly in Bida, Niger state to know how modernization has influenced the rich culture of the Nupe people. The research method employed in this study is the qualitative research method and the process of observation has been employed for gathering data. An observation schedule was used as an instrument for data collection and these data were sampled using the non-random sampling method. These data were analyzed through content analysis and the findings showed that the cultural feature has not been properly adopted in multimedia designs. The study concludes that a public building such as a media house should reflect the culture of its location and this can be achieved by prioritizing cultural artistic inputs on building by professionals and by extension, promoting the culture and art of its people.

**KEYWORDS:** *Nupe cultural features, Hybrids, Public building, Multimedia.*

## INTRODUCTION

Cities like Barcelona, Prague, Timbuktu, and Cairo are home to magnificent architectural masterpieces steeped in culture and history (Alitheia capital, 2011). In these cities as with many others, a connection exists between building form and art from the classical tradition to the energetic and spontaneous modern art. Each movement is interpreted through paintings, sculptures, and works of architecture (Arts or The Western World, n.d.). These works of architecture, often more visible in public buildings (temples, courthouses, palaces, and civic centres), reflect the connection between the traditional architecture of centuries past and today's postmodern forms, enhancing the character and heritage of these cities and making their indigenous architecture a national symbol. Culture symbolises the structures and understanding of a specific group of people, integrating linguistic similarities, beliefs, food, collective habits, songs, and arts. (Zimmerman, 2017)

Generally, Media provides an outlet for the discussion of important issues, acts as a watchdog for government, business, and other institutions, and acts as an entertainment outlet, education, and information (University of Minnesota library, 2016). The platforms available for mass media includes newspapers, radio, newspaper, magazines, books, video games, and internet media which includes blogs, podcasts, and video sharing (university of Minnesota library, 2016). All the platforms are being used by every sector of an economy all over the globe. Over time, media has affected the way we relate socially, economically and politically. In other words, we can say that the media affects our cultural values because they affect how we live and interact. It is therefore of interest to investigate and understand why indigenous architecture recognized through architectural styles, elements and building techniques which once existed from cultural and historical influences is almost extinct in Nigeria. The majority of today's building stock, especially in urban areas, are merely "functional" buildings with no reflection of the socio-cultural past. Before the coming of colonialism throughout African countries, the indigenous building forms and styles were largely a product of their environment and socio-cultural activities (Osasona, 2019). We adopted the building forms and styles and neglected our cultural values. There is a need for strategies on how cultural values can be restored through the media by architecture. Thus, the study seeks to examine the cultural features of media houses in Nigeria.

## LITERATURE REVIEW

### Concept and Definitions of Culture

Liman (2016) defined culture as the total of everything that contributes to the formation of practical, physical, and mental dimensions of a people's way of life. Muhammad (2015) on the hand believes culture encompasses social relations, and an unending past of shared relationships of individuals living within a communal environment. Atik *et.al* (2017) went further to state that culture is an intricate factor that includes awareness, trust, arts, ethics customs, and somewhat other competencies and conducts acquired by man as an associate of

the social order. When all these definitions are analysed one, begins to see those cultural considerations do not stop at social gatherings, dancing, and singing but a conscious way to shape the environment within a society for the use of man to achieve comfort while enjoying these activities therefore leading to a need to plan these places of comfort for optimum enjoyment.

### **Elements of Culture**

Lee (2016) states that language, Signs, symbols, values, norms, and social control within a society are those elements that make up culture, agreeing with this while exploring further, Franke *et.al* (2017) further posited that elements of culture refer to apparatuses, artifacts, skill, semantic, faith, learning, outlooks, ethics and social organization that make up a group. Brown (2018) on the other hand views elements of culture as beliefs, attitudes, artifacts, design, storytelling, rites, and symbolic actions. John (2016), Lee (2016), and Franke *et.al* (2017) all agree that elements of culture can be categorically grouped into Material / Non-material and primary and minor elements.

### **Material and non-material elements of culture**

Scarpaci (2016) enthused that material culture refers to the human items, possessions, and places that individuals adopt to explain preferences from others in a cultured way. They may comprise homes, localities, capitals, colleges, cathedrals, local communes, sanctuaries, masjids, places of work, workshops and plants, tools, means of production, goods, and products. Visible sides of a culture expose its members' behaviours and view it elaborates on the ways that individuals within a certain society view and interact with that society (John, 2016). Idang, (2015), Teles da-Silva, and Farbiaz (2017) further postulate that certain things can be recognized as cultural elements only when those items have successfully given relevance to an aspect widely believed to affect the lives of individuals within a community. For example, when a rock situated in a field has no worth when converted into materials that can build a home, office, or fence. Material culture plays a significant role in architecture as it helps the architect to define, regulate and shape the design process according to the influences of the material elements within his disposal.

Non-material culture refers to items, which are divine ideas that people have about their culture, including beliefs, values, rules, norms, morals, language, organizations, and institutions (Kaur and Kaur, 2016). Most times the non-material cultural concept goads toward religion, which consists of a set of ideas and beliefs about God, worship, morals, and ethics (Hicks and Beaudry, 2010). These beliefs would normally determine how people and the cultural practices within that society respond to its religious topics, issues, and events.

### **Concept of Cultural Identity**

Identity comprehensively explains how other people within a social space can view someone. Hence, identity is all the qualities, beliefs, and ideas, which differentiate someone from another in a particular group (Madan, 2006). Some definitions of cultural identity have placed the burden of identification on the state but (Hyenen, 2009, Hyett, 2011, Rapaport and Duncan 2012) all agree that to appropriately define cultural identity the condition for identification should be the common factors within the community that binds these group of people making

them recognizable as one group or another. Koivunen and Marsio, (2007) view cultural identity as the link between an individual and the public. Hayrynen (2007) agreeing with this definition elaborated further that cultural identity encompasses evident, unseen, and anticipated cultural behaviors characteristic to a particular group, which might spur a person's sensitive capabilities and behavior.

### **Role of architecture in cultural identity**

There has to be an equilibrium between stability and break such as to permit the people to engross new advances and new demands without suffering from identity diffusion (Vale, 2012). While Bloom (2010), Rapoport and Duncan (2012) believe the made surroundings, can act as a tool to reflect cultural identity by adopting new technologies and developments Hetherington, (2017) prefers the society to have a fluid changing structure that is less impacted by the advent of new technologies and developments.

### **Integrating cultural identity in architecture**

Building patterns, settlement arrangements, and social gathering activities are major considerations, which shape elements used in integrating cultural identity in architecture (Mangena, 2010). Likewise, a variety of factors are known to influence that contribute to the architecture of cultures such as weather, food, and language, these factors have undergone variations creating a heritage that continue to give a more developed architectural system. Dana, (2012) rightly opined that; design has become the essence to portray ideas, and driving origination and originality to achieve cultural identity.

Architecture on the other hand is one of the means of cultural integration, achieved through designing buildings that have cultural elements reflected on them. Architecture as a means of cultural integration has adjusted more openly and speedily to variations in the world around, (Ozorhon, 2016).



Figure 1: Hengdian world studio

Source: Mrwan

Integrating cultural identity in contemporary architecture can be achieved in multifaceted ways but a prominent method is utilizing elements from traditional architecture such as the forms

prominent within the people in constructing individual buildings, building materials used in such construction, and the method or pattern of roof adopted in covering the building (Asfour, 2016). Boussa, (2017) also highlights that other means include borrowing from traditional architecture in the form of bringing to prominence historical events such as wars and arts and telling the story by painting it or making motifs of these events on the walls of the cultural centres.

### Nupe Cultural Features

According to isa et. al; (2015), The basic structure of the Nupe compounds is made up of several small individual courtyard units which are linked up together by alleys. A typical compound is made up entrance hut (*katamba*), sleeping rooms (*kata*), the courtyard, (*zhempa*), the animal pen (*ega*), the granaries (*edo*), the kitchen (*katagi*), the hearth (*yekun*) and the toilets and baths (*shikpata*). However, each culture has what it emphasizes as the basic requirement for fulfilling their daily spatial transaction.

The Nupe are prolific decorators, indeed! Not only does the scope of what engages their creative attention include structures not normally classified as “architecture” (e.g. granaries), it also encompasses wall openings, structural posts, and accessories like doors and windows. The door and window openings are reinforced with earth moldings. These are further embellished with terracotta platelets – *giama tetengi* (Dmochowski [7]). The elaborate, generally unpainted, relief mural (both geometric and zoomorphic in motif, despite Islam being the predominant religion here, too) is hardened by the use of an infusion from locust-bean pods. (Denyer 1978). This sculptural treatment of walls is not limited to exteriors, alone: interiors – particularly wives' rooms and inner walls of encircling verandas – are similarly treated. Rooms invariably have the added dimension of enamel and porcelain plates and dishes being embedded in them.



Figure 2: the bedroom and shegi blind

Source: Muhammad, I. B et, al.

According to Osasona (2007), a particular house at Zanchita, near Bida, sports such embedded crockery around the entrance to its *katamba* (the reception-hut). Apart from the aspect of masonry sporting artwork, Nupe houses on a circular floor-plan could also display artistic ingenuity, within their formal configuration: the roof junction – an area of potential structural stress – in the process of being secured against structural failure, is usually also imbued with some form of ornamentation. Where a wooden plug is used to stabilize the junction, it could be carved – and used in conjunction with interesting weave-patterns of the thatch brought together at that point; alternatively, a terracotta pot – with surface incisions and other beautifying engravings – could be placed upside-down over the junction, to prevent rain-water seepage.

Complementing all other artistic endeavors already discussed, the Nupe also have recourse to the use of colour, the prevalent ones being black, red, and, more lately, white (Dmochowski 1990).

These pigments are traditionally sourced from various plant extracts, earth, and animal deposits.

## METHODOLOGY

### Research method

The research method employed in this research is the qualitative research method. A descriptive research design is employed which is a scientific method that can be used in observing and describing the nature of a subject.

The first phase included a desk study of relevant materials on cultural development. Thereafter, the research adopted a primary source of data collection for the case study stage. This includes the derivation of first-hand information with data obtained through physical observation. The researcher for the physical observation and extraction of data developed an observation guide. This was structured to enable the researcher to collect relevant information for analysis. Desk study for the research covers the review of relevant literature, reports, journals, and manuals from experts on culture. Elements considered in structuring the observation guide are shown below.

Table 1: Variables used in assessing the Case Studies

S/N	PARAMETERS
1	Form of building.
2	Concept adopted.
3	Methods adopted in exhibiting the culture of the place



4	Building materials used.
5	Accessibility to the cultural centre.

Source: Author, (2022)

A non-random sampling technique was adopted in this study, which involves the intentional selection of specific samples relevant to the subject of judgement. These samples were selected to be subjected to observation by the researcher in line with the drafted observation schedule in order to extract information relevant to this study. The following are the listed samples selected to be observed as shown in table 2 below.

Table 2: list of sample media houses

S/N	PARAMETERS
1	Newsline printing press, minna
2	New Nigeria newspaper, kaduna
3	Nigeria television authority minna
4	Search fm 92.3 minna
5	Softcom head office, lagos
6	Heigdain world studio, Zhejiang china.

Source: Author, (2022)

## DATA ANALYSIS BUILDING FORM

The building forms involve the shape and configuration of a building on site. The media centers observed showed that the building forms used in the designs were all rectangular as shown in Table 1 and Figure 1 respectively.

Table 3: list of sample media houses

Names	Present	Absent
Newsline printing press	<input type="checkbox"/>	
New Nigeria newspaper	<input type="checkbox"/>	
Heigdain world studio	<input type="checkbox"/>	
Nigeria television authority	<input type="checkbox"/>	
Search fm 92.3 minna	<input type="checkbox"/>	
Softcom head office	<input type="checkbox"/>	

Source: Author, (2022)

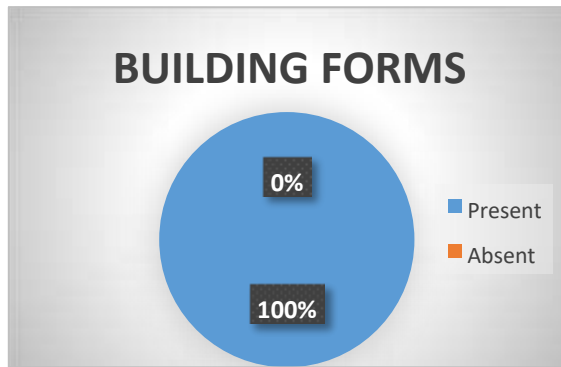


Figure 3: building form within the observed media houses.

Source: Author, (2022)

**CONCEPT ADOPTED.**

Zeyather and Mansour, (2017) on their part postulate that concept involves the presentation of an idea in a simple and logical order. The table and figure below shows that there were no defined concept used in the designs

Table 4: list of sample media houses

Names	Present	Absent
Newsline printing press		<input type="checkbox"/>
New Nigeria newspaper		<input type="checkbox"/>
Heigdain world studio	<input type="checkbox"/>	
Nigeria television authority		<input type="checkbox"/>
Search fm 92.3 minna		<input type="checkbox"/>
Softcom head office	<input type="checkbox"/>	

Source: Author’s fieldwork

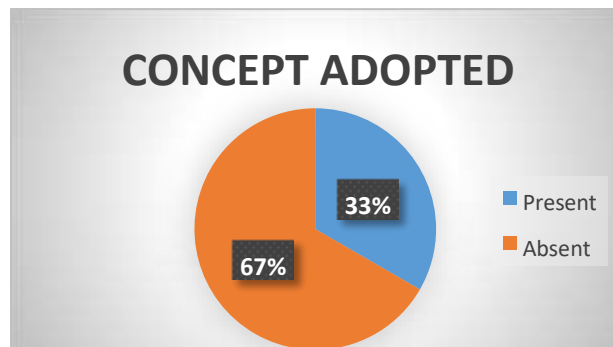


Figure 4 : Building concept within the observed media houses.

Source: Author’s fieldwork

### METHODS ADOPTED IN EXHIBITING THE CULTURE OF THE PLACE

The cultural method adopted entails the cultural identity adopted. The table and chart below show that 67% of the buildings observed adopted the cultural identity of their location. Table 5: list of sample media houses

Names	Present	Absent
Newsline printing press		<input type="checkbox"/>
New Nigeria newspaper	<input type="checkbox"/>	
Heigdain world studio		<input type="checkbox"/>
Nigeria television authority	<input type="checkbox"/>	
Search fm 92.3 minna	<input type="checkbox"/>	
Softcom head office	<input type="checkbox"/>	

Source: Author's fieldwork

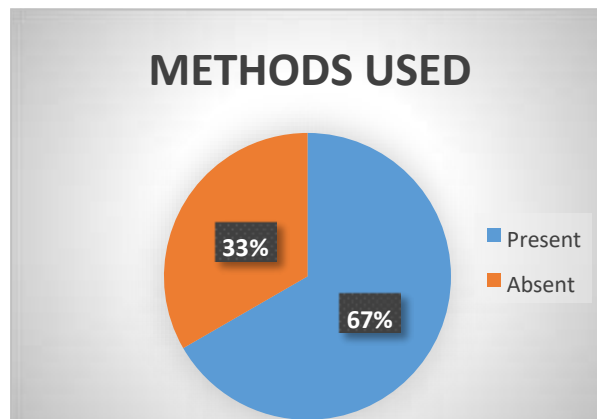


Figure 5: Building concept within the observed media houses.

Source: Author's fieldwork

### BUILDING MATERIALS USED.

Building materials are the materials used in the construction of a building. The media house observed showed that 67% of buildings lack the usage of building material of the location. Contemporary building materials were used for construction.

Table 6: list of sample media houses

Names	Present	Absent
Newsline printing press		<input type="checkbox"/>
New Nigeria newspaper		<input type="checkbox"/>

Heigdain world studio		<input type="checkbox"/>
Nigeria television authority	<input type="checkbox"/>	
Search fm 92.3 minna		<input type="checkbox"/>
Softcom head office	<input type="checkbox"/>	

Source: Author's fieldwork

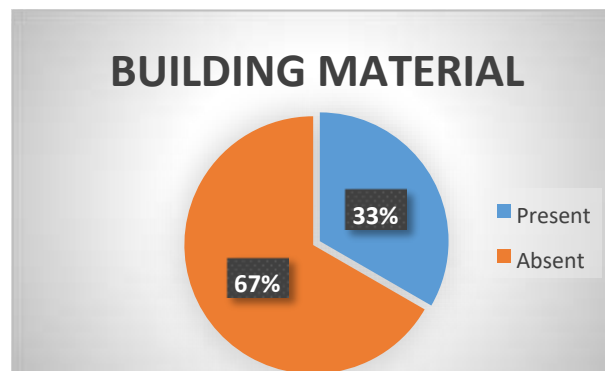


Figure 6 : building materials used.

Source: Author's fieldwork

### **ACCESSIBILITY TO THE CULTURAL CENTRE.**

Accessibility involves the proximity of the building to people and how they can easily gain access it. It is noticed that the buildings shown in the table and chart below are quite accessible.

Table 7: list of sample media houses

Names	Present	Absent
Newsline printing press	<input type="checkbox"/>	
New Nigeria newspaper	<input type="checkbox"/>	
Heigdain world studio	<input type="checkbox"/>	
Nigeria television authority	<input type="checkbox"/>	
Search fm 92.3 minna	<input type="checkbox"/>	
Softcom head office	<input type="checkbox"/>	

Source: Author, (2022)

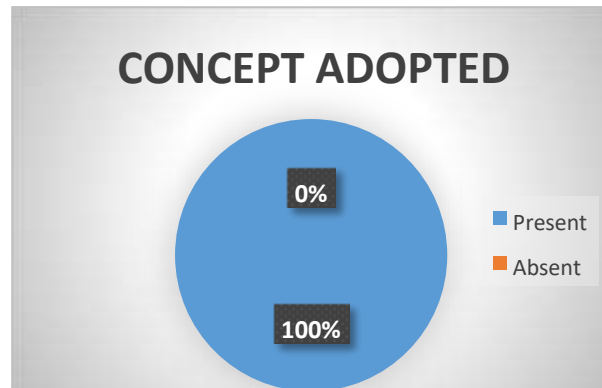


Figure 5: building materials used.

Source: Author's fieldwork

## FINDINGS

Case studies undertaken within Nigeria and other countries showed that cultural identity can be achieved in architectural proposals by adopting cultural elements such as decorations on walls i.e. motifs, symbols in the form of conceptual adoption, and building materials from the area's traditional architecture and methods of construction.

The study concluded that strategies, which can be adopted by architects to express cultural identity in their work, include integrating popular elements of the place under study. For the Nupe people, these include the circular and rectangular house form, the use of local building materials and construction techniques, the masks popular amongst the local traditions, the tribal masks and murals, and paintings on walls seen in one of the gates to the entrance of a traditional ruler.

## CONCLUSION AND RECOMMENDATIONS

It is the view of this research that the following recommendations if properly adhered to can help to develop a cultural center with a properly infused identity of the place they are to be located. I) Architects should as the case of professionalism investigate and explore the cultural elements of the place in which they intend to propose to appropriately understand and portray the culture of the place.

- i. Every culture should be encouraged to develop, research, and document all aspects of its culture to guide against loss of cultural identity and set a standard that can be referred to by future generations.
- ii. Media centre which remains a place of enlightenment, and social interaction while serving as a media centre should exhibit on its façade aspects of the architecture of the past and present so that it serves as a constant reminder to the people of their culture and cultural identity.

- iii. Cultural studies should be encouraged from the start of architecture programs in higher institutions of learning in the form of compulsory electives and group studio works to have a pool of knowledge amongst training architects who already are knowledgeable about requirements for culturally related designs

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**PSYCHOLOGICAL INFLUENCE OF CAREER INFORMATION ON CAREER  
ASPIRATION AMONG SENIOR SECONDARY SCHOOL STUDENTS IN  
POTISKUM METROPOLIS, YOBE STATE - NIGERIA**

**Dr. Ahmad Tahir Adamu Koki**

Department of Education  
Faculty of Art and Education  
Yobe State University, Potiskum,  
Yobe State, Nigeria.

**ABSTRACT**

Guidance and counselling programme has become an important integral part of the school system in Nigeria. Career information services which are components of the guidance and counselling programme are vital activities because one of the long-term goals of education is career placement. If education is to realize this goal, then learners should have appropriate career information and undertake career exploration to boost their aspirations before making career choices. The purpose of this study was to find out the influence of career information on career aspiration among senior secondary school students in Potiskum metropolis, Yobe state, and the study looked into the students' aspiration, school counsellors, and principals on the influence of career guidance and counselling. The study was a descriptive survey. The study was conducted at Potiskum metropolis, Yobe state. The target population was all the students from senior secondary school 3 in the 5 public senior secondary schools in the study areas. Simple random sampling was used to select 208 students from 5 schools, for the study. In addition, 4 school counsellors and 4 principals to be included in the sample. The data was collected using a questionnaire for students and interview schedules for the principals and school counsellors and was analyzed using the Statistical Package for Social Sciences (SPSS) computer programme. Descriptive statistics (frequency tables, percentages and cross tabulations), were used in data analysis. The findings of the study showed that students, school counsellors, and class teachers perceived that career guidance and counselling played a significant role in the career aspirations of senior secondary school students. Majority of the students in Yobe's secondary schools were found to have low levels of career awareness. There were no gender differences in students' career awareness, but female students had higher levels of career planning than male students. The results were expected to be significant in enriching the school managements, ministry of education, school educators, school principals, career masters and teacher counsellors, parents and students through provision of appropriate career guidance and counselling services to secondary school students and beyond.



**Keywords:** Career Aspiration, Career Decision, Career., Counseling, Career counseling, Career decision, Career development, Career guidance, Job opportunities, Vocational Guidance,

## **INTRODUCTION**

The expectation of any educational system in the country is that each citizen should discover and direct his energies towards developing the society in which he belongs. This objectives can only be successfully accomplished if adolescent or students are given adequate career counselling and necessary occupational information that will guide them in choosing their occupational or career aspirations in relation to their interest, talents, potentials and capabilities. Generally speaking, career choice has increasingly become a problem among Nigeria youths.

In his contribution, Schmidt (2001) explained that career guidance and counseling is an important avenue through which students acquire the ability to make rational career decisions, and by extension, programmes for study at universities that impact on their future working lives. This understanding is based on the fact that during the career counseling process, all aspects of an individual's life are considered as an integral part of the career making and planning. After orientation into their degree programmes, a significant percentage of students come wishing to revise their degree programmes, citing dislike for some aspects thereof. Secondly, others come to change, from degree programmes they were admitted into after choosing them as first choice and meeting the degree programme requirements, to others degree programmes they perceive to be better. The inter school transfer process carried out during orientation period assists this category of students. The number transferred thus is however, very small and it leaves a large group of students dissatisfied. This study has investigated the extent to which these needs are known and addressed by the Public Universities.

The decision of which degree programme to pursue at university is very important to secondary school students, their teachers and parents. This importance is underscored by the fact that often, this decision determines the career that the students will take for the rest of their working lives. It is therefore, important that the proper decision is made, or if the wrong one is initially made, opportunity is availed to enable the student correct any mistakes in this important decision making process. At secondary school level, career guidance and counseling services are provided to students. The Ministry of Education recognizes the importance of these services by observing that, deciding on the future career is not quite easy. It is even more difficult when you lack the necessary information on the different types of careers. In an ideal situation the process of career development stretches throughout one's lifetime with a greater emphasis during the secondary and tertiary years (Ministry of Education, 2007). The Joint Admissions and Matriculation Board, (JAMB) places students in the degree programmes in

the Public Universities based on their capacity and the cut-off points for the respective programmes. Those who qualified to join Public universities under JAMB cut off but failed to meet the cut-off points for the chosen degree programmes. In either case, JAMB usually allows all candidates to revise their degree programmes made earlier before they sat the national examinations. This scenario then divides the students between those who chose degree programmes, qualified for them and got admitted, those who otherwise qualified for degree programmes but were not admitted because of not making them the first choice, and those who chose degree programmes for which they did not qualify and hence have to be placed in any available degree programmes.

Making the right career choice has always been indeed, a major source of anxiety and problem for teachers and their educational sponsors in primary and secondary schools. Based on the above mentioned problem on career choice, especially on career aspirations among senior secondary school students, Nwachuku (2000) advised that secondary school graduates who desire to further education to higher school level needs serious help to know what profession exists, and how to become one of such professionals through making a personal decision to make a right career choice.

The imperative of careers in human life cannot be over emphasized. At a certain stage in human development, the need to have a career becomes so apparent that individuals cannot but begin to plan, explore, choose and begin to seek ways of how to develop on a chosen profession or explore other opportunities that come one's way in order to have a fulfilling career and live a life full of joy and satisfaction. A career is totality of time and effort devoted to the pursuance of work in order to live a meaningful life. It includes all the periods spent planning, acquiring education and training qualifying one for an occupation, the period of entrance into, the effort made to ensure progression including acquisition of further training. change of job and development all through a working life. Career is so important that it tends to define human personality and determine the quality of life that individuals live. However, life is dynamic and the reality of globalization stares us in the face. Gone are the days when we talk of careers and the thought of notable professions such as medicine, law, engineering, military, policing, business and piloting quickly comes to mind. These professions have enjoyed great popularity as a result of the great potentials they had, to transform individuals' lives and change their social status and economic fortunes within a relatively short period of time. Hence, when school pupils are asked to name their future ambitions, majority tend to say medicine, engineering and the likes. Apart from the expansions that have happen to these professions leading to the development of equally lucrative and vibrant professions as offshoots of the popular professions, several new, high profile and lucrative professions offering promises of fulfilling careers to the young ones have evolved across the globe. Surprisingly however, majority of our school pupils still indicate the traditional professions (medicine, law, engineering and so on) as their future ambitions. This suggests that they may

not be aware of the new professions springing up across the world and which offer equally-great career opportunities to the young ones. Hence, this study explores the level of awareness level of contemporary high profile careers by Senior Secondary School students in Ogun State, Nigeria.

According to the Social Cognitive Career Theory (SCCT) by Lent, Brown, and Hackett (1994), one's background (or contextual factors) and individual characteristics influence one's learning experiences and, consequently, self-efficacy. Self-efficacy then influences one's interests and outcome expectations, which eventually influence one's career aspirations. Factors such as parental level of education, home environment factors, discipline and academic performance could have an impact on their career aspirations. The study aims at determining the effectiveness of vocational guidance services in career aspiration for senior secondary school students. However, before determining the influence of career information on the career aspirations of senior secondary school students, terms like Career information and career aspirations as they relate to the study have to be conceptualized.

### **Statement of the Problem**

Lack of proper career information and career education among Yobe's public schools, may have led to inappropriate career choices among students. This may eventually have led to misfits in the labour force due to lack of a proper match between the person and his/Tier career. There is need to investigate the status of career guidance and counselling at secondary school level with a view of assessing how students made career choices and what career guidance and counselling services contributed towards these decisions. Furthermore, there is need to find out the extent to which career guidance and counselling programme enhanced this process through creation of career awareness leading to appropriate career planning, and career choice. This complex problem arises because students are not sure of the occupations that are in line with their capabilities, talents, interests and aptitudes

Majority of the students choose occupation or career which they have neither natural knowledge nor information about them. This complex problem arises because students are not sure of the occupations that are in line with their capabilities, talents, interests and aptitudes. More often than not, people regret after choosing a wrong career. This problem has over the time led students and entire citizenry of the country that constitute the potential labour force of the country to personal dissatisfaction and occupational maladjustment thereby retarding the socio-economic development of the country. It is also believed by many that the general laxity to work which may be portrayed by absenteeism, abandoning of duty, discontentment in the job and general labour unrest may be ascribed to the initial ignorance of students in making unrealistic choice of their occupational aspirations. Nevertheless, the fundamental problems are:

1. what career information or guidance do we give to the students to acquire skills in career decision making?
2. in what way(s) can a student be helped to make realistic career choice or aspiration?

It is against this background that the researcher intend to investigate very thoroughly the influence of career information on career aspirations among senior secondary school students in Potiskum, Yobe State.

### **Objectives of the Study**

The objectives of the study are to:

1. Determine the career information/guidance programmes available in senior secondary schools for assisting students in career choice.
2. Establish the career aspirations of senior secondary school students.
3. Find out the influence of career information on career aspirations of senior secondary' school students in Potiskum.
4. To determine ways of improving career information for students in senior secondary Schools
5. Determine the differences between the influence of career information on boy's and girl's aspirations in senior secondary schools III.

### **Research Questions**

The following are the research questions of the study:

1. what are the vocational guidance programmes available in schools for assisting students in career choice in Senior Secondary Schools?
2. what are the career aspirations of senior secondary school students?
3. what is the influence of career information on career aspirations of students in Senior Secondary School?
4. what are the ways of improving career information for students in senior secondary Schools?
5. what are the differences between the influence of career information on boy's and girl's aspirations in senior secondary schools?

### **Research Hypotheses**

The following null hypotheses would be tested in the study.

Hoi: There is no significant influence of career information on career aspirations of senior secondary school students.

Hoi: There is no significant difference between the influence of career information on boys and girls aspirations.

### **Theoretical Framework**

For the current study, the Social Cognitive Career Theory offered a conceptual baseline to understand career development as a process in which environmental factors play an influential role (Lent et al. 2000). As proponents of this theory, Lent et al. (1994) present a career development approach involving three interconnecting aspects: the formation of career interests, the selection of academic and career options, and performance in educational and vocational goals. They emphasize the critical nature of self-efficacy and expectations to attainment. Perhaps the most salient characteristic of this theoretical framework is the emphasis on context and life conditions as critical components of career development (Lent et al. 2000), similar to Super's proposal. However, where this researcher focuses on the interplay of life roles and contexts as they relate to career development, the Social Cognitive Career Theory underscores the critical nature of environmental support systems to facilitate the career choice process. Lent et al. (2000) acknowledge the impact of real world factors, such as cultural and economic conditions, that may fortify or stifle the connections among occupational interests, goals, and actions. This perspective lends itself most poignantly to the current investigation. Exploring the career aspirations of children without consideration of cultural, personal, situational, and environmental conditions would provide an incomplete and inaccurate descriptive portrait of study participants and their career aspirations

### **Career Information Programmes at the School Level**

According to Watts and Fretwell (2004), career guidance and orientation services have been defined as services intended to assist individuals of any age and at any point throughout their lives, empowering them to make educational, training and occupational choices and to manage their careers. They include three main elements: (1) career information, (2) career counseling, and (3) career education (Watts & Fretwell, 2004, p.2). Career guidance in schools usually focuses on career information that provides information on courses, occupations and career paths. It also includes labor market information. The aim of Career counseling in schools is to hold one-on-one or small group interviews focused on the distinctive career issues faced by individuals, such as career in education. Being part of the educational curriculum, attention is paid to help groups of individuals to develop **the** competence to manage their career development. The role of Career Guidance is not only limited to education process but it also affects the national social and economic development. Generally, the aim of career guidance is to help students make decisions based on their interests, passion and abilities, while taking into account current and future career opportunities. Students are encouraged to learn more about the world of employment across different industries, so that they may take right steps to obtain their objectives, goals and aspirations (MoE, Singapore). Another perspective indicated that career **guidance can** be referred to as services and activities intended to assist individuals of any age and at any point throughout their lives, to make educational,

training and occupational choices and to manage their career (OECD, 2004). "Career guidance" denotes systematic programs that facilitate individual career development and career management (Herr & Cramer, 1996). As discussed above, career guidance renders services and activities that are geared towards helping individuals of any age at any point throughout their lives to make their educational training and occupational choices in order to manage their career OECD (2004j). As it is pointed out by Herr and Cramer (1996), career guidance offers systematic programs that facilitate individual career development and career management. Career guidance is much more than mere face to face interviews: SCAGES (Standing Conference of the Association for Guidance in Education Settings UK 1992) recognized eleven different activities of career guidance, such as informing students about the current and future opportunities of job market: advising, assessing, teaching, enabling, advocating, networking, giving feedback, managing and innovation or systems change.

### **Concept of Career Information and Career Aspirations**

The term career guidance has for a long time been variously misunderstood due to lack of conceptual clarity, which has promoted and maintained ambiguity in the development of the common thinking ground (Patton & McMahon, 1999). The terms career, vocational occupation, have been used interchangeably to date. There can be no single definition of a career but a concise definition must include most key elements of career, which include an individual involvement, that is, occupational roles, positions occupied, work experiences, perceptions of career, and attitudes towards the career that an individual gets involved in during his/her preoccupation, occupational, and post occupational life (Patton & McMahon, 1999).

Career aspirations have been studied extensively and remain an important topic for research and practice. Career aspirations can be thought of as vocational possibilities or work preferences given ideal conditions. Johnson (1995) described career aspirations as point in time expressions of career related goals. Although career aspirations are informative they may not be an accurate reflection of subsequent career behaviour. Career expectations may be more closely related to ultimate career choice and attainment because they represent career pursuit that an individual considers realistic and accessible (Armstrong & Crombie, 2000; Heckausen & Tomasik, 2002; Helenga, Aber & Rhodes, 2002; Rowjeski, 2005).

Vocational guidance is a process of helping an individual to choose an occupation, prepare for it, enter it, and progress in it (Mutie & Ndambuki, 1999). Thus career guidance is not a one-step activity but a process that runs through the entire process of learning. It is in fact a lifelong process beginning from birth to death, having various stages and milestones through life.

In addition, globalisation and the continued rise in competitiveness, have posed major challenges for the youth. As such, provision of guidance in educational institutions is vital so

as to enable students to sort out and order their views and decisions about their intended careers.

Career aspirations can be affected by vocational guidance in schools. Efficient educational and vocational guidance services are more and more necessary to guide young students and professionals to the choice of suitable learning paths. In the contemporary society, many young people have to face the problem of the career choice: this can often lead to offhand and wrong decisions, with negative consequences for the single individual as well as for society, either from an economic and a social point of view. The career choice of an individual is obviously related to the development of professional skills belonging to a specific didactic area and for this reason students must select at first a learning subject (Ricci and Boccardi, 2010). The process of developing personal and vocational identity often requires monitoring by a specialized professional, able to discriminate the various components of the process of choosing a profession, above all, within a socio-cultural reality such as the current one, where transformations in the world of work are continuous and rapid. For Muller (2001), to carry out an effective Vocational Guidance process within this realm, demands specialized training, an appropriate theoretical framework, and additional technical instruments, beyond continuous reflection on the emerging signals in each session. Without this, time may go by without appropriately reaching the intended goals, or rather, without adequate stimulus to assume a professional/occupational option within the individual's socio-cultural context.

Occupational aspirations are "expressed career-related goals or choices" that provide important motivational momentum for career-related behaviours and future educational and career success (Rojevovski, 2005, p. 132). Aspirations can have lifelong consequences as they are associated with significant later outcomes, such as where one works and lives, and the standard of living one attains. Occupational aspirations have been widely studied in the west but have not been examined directly in China, despite the growing career research in that country (Granrose, 2007). The present study examined the occupational aspirations of a large group of Chinese adolescents who were nearing the end of their formal secondary education and contemplating life after school.

## **METHODOLOGY**

This study used descriptive survey design. This design is the most appropriate in a study where the independent variable cannot be directly manipulated since its manifestations have already occurred (Kerlinger, 2000). Further this design is appropriate in an after the fact analysis of an outcome or the dependent variable; as well as in comparative studies (Kathuri & Pals, 1993; Mugenda & Mugenda, 1999).

The study investigated the influence of career information which had already taken place, and compare the study variables across demographic characteristics to investigate the influence of career information on career aspirations among senior secondary school students. The

descriptive survey design suited the study because the researcher collected data on the situation as it exists on the ground without manipulating variables. Descriptive survey designs are used in preliminary and exploratory studies to allow researcher to gather information.

### **Population and Sample**

The population of the study constituted all Senior Secondary Schools III students, school counsellors, and class teachers in Potiskum, Yobe State. Virtue of proximity to work, as long travel distances were not feasible due to the time constraints and costs involved, the study narrowed to four secondary schools in Potiskum, Yobe State.

As a result of the inability of the researcher to effectively study the whole school under study, a representative number was chosen as the sample size population. The sample size comprised two hundred and eight (208) senior secondary school students randomly selected from four (4) public senior secondary schools in Potiskum, Yobe State. From each of the four schools, 50 students were randomly selected from the senior secondary schools. All the principals, teacher Counsellors and career masters of the four sample schools will be included in the sample. As such, the study sample comprised of 208 secondary school students, 4 principals, and 4 teacher-counsellors/career masters from 4 secondary schools.

The researcher used two different research instruments. First a questionnaire was designed for Senior Secondary Schools Three students to obtain information about their career awareness, career planning, status of career guidance and counselling, and the influence of career information on their career aspirations. The second instrument was interview schedule designed for school counsellors to obtain information about their counsellor training, status and practice of career guidance and counselling, and their influence in the development of students' career aspirations. The third instrument was an interview schedule designed for principals to obtain information about their role in students' career development process. The instruments was adapted from relevant studies conducted on career guidance and counselling By Mung'ara Elizabeth, 2012.

Career Aspirations Questionnaire for secondary school students was used to collect information from students on their career aspirations and the influence of career information on their aspirations. The questionnaire have items covering background information of the students, career information and influence of career information on their aspirations.

The career aspirations interview schedule for principals was used to conduct face-to face interviews with principals on the influence of career information on career aspirations. The interview schedule comprised items related to the role that the principals play in promoting career aspirations of pupils. Interview schedules are considered important when the sample respondents are few because interviewing allows the researcher to probe the respondent further, thereby obtaining more in-depth information about a phenomenon than would be possible using questionnaires.



The career aspirations interview schedule for career masters and teacher-counsellors was used to conduct face-to face interviews with career masters and teacher counsellors on the availability of career information and how it influence students career aspirations in their schools. This Interview schedule shows the role that the career masters and teacher-counsellors play in promoting career aspirations of students.

The researcher then visits the sampled schools and introduce herself and the research to the principal/deputy principal. Appointments was booked on the appropriate date to conduct data collection. On the appointed date, the schools were visited and the questionnaire were administered to the respondents. The researcher personally administered the questionnaire to participants of the study. The respondents were assured that strict confidentiality is maintained in dealing with the responses. The researcher was available throughout to offer assistance to the respondents and make any necessary clarifications. The researcher booked appointments with the principals, teacher-counsellors and career masters on an appropriate time when face-to-face interviews will be conducted. The data collection process took a period of two weeks.

### **Data Analysis**

This research yielded data that requires both qualitative and quantitative analysis. Quantitative analysis entails analyzing numbers about a situation by choosing specific aspects of that situation. Qualitative analysis entails analyzing information in words or pictures by collecting data, recording peoples' experiences not selecting any pre-chosen aspect. The qualitative data obtained in this study was analyzed by organizing it into similar themes and tallying the number of similar responses.

Descriptive statistics including percentages and frequency counts were used to analyze the quantitative data obtained. Bell (1993) maintains that when making the results known to a variety of readers, simple descriptive statistics such as percentages have a considerable advantage over more complex statistics. Borg and Gall (1989) also hold that the most widely used and understood standard proportion is the percentage. Quantitative data analysis required use of a computer programme, whereby the Statistical Package for Social Sciences (SPSS) was used. As Martin and Acuna (2002) observe, SPSS is able to handle large amount of data, and given its wide spectrum of statistical procedures purposefully designed for social sciences, it is quite efficient. The analysis results were presented in summary form using tables, bar graphs and pie charts.

### **Results and Discussion**

This chapter presents data analysis and discussion of the study findings. The purpose of the study was to find out the Influence of career information on Career Aspirations of Senior Secondary School Students in Potiskum Metropolis, Yobe State. The findings of the research are presented based on the five research questions:

1. what are the vocational guidance programmes available in schools for assisting students in career choice in Senior Secondary Schools?
2. what are the career aspirations of senior secondary school students?
3. what is the influence of career information on career aspirations of students in Senior Secondary School?
4. what are the ways of improving career information for students in senior secondary Schools?
5. what are the differences between the influence of career information on boy's and girl's aspirations in senior secondary schools?

The background data of the respondents is given first, followed by the analysis and discussion of each of the five research questions.

The study targeted 208 students, 4 principals, 4 career teachers. However, the study participants comprised 4 Principals, 4 Teacher counsellors/Career-teachers as well as 200 students from 4 schools in Potiskum, Yobe State giving a 100% return rate of questionnaires. The students who participated in the study were chosen randomly from SSS 1-3, meaning that 50 students were picked from each school which participated in the study. Table 1 shows the students' gender.

**Table 1- Frequency Distribution of Respondents Based on Sex**

<b>Gender</b>	<b>GDSS Potiskum</b>	<b>Ciroma Islamiya Potiskum</b>	<b>Ibrahim GGSTC Potiskum</b>	<b>GSTC Potiskum</b>	<b>Women Day Academy Potiskum</b>	<b>Total</b>
Boys	50	25	0	25	0	100
Girls	0	25	50	0	25	100
Total	50	50	50	25	25	200

The study comprised two hundred (200) senior secondary school students randomly selected from 5 public senior secondary schools in Potiskum, Yobe State. From each of the three schools, 50 students were randomly selected and the remaining 50 students were selected from the two secondary schools, 25 from each.

**Table 2 - Frequency Distribution of Respondents Based on Institutions Base on Institution**

<b>Institution</b>	<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
GDSS Potiskum	50	25.0	25.0	25.0
Ciroma Ibrahim Islamiya Pot.	50	25.0	25.0	50.0
GGSTC Potiskum	50	25.0	25.0	75.0

GSTC Potiskum	25	12.5	12.5	87.5
Women Day Academy Pot.	25	12.5	12.5	100.0
	200	100	100	

### Answer to Research Questions

**Research Question 1:** What are the vocational guidance programmes available in schools for assisting students in career choice in Senior Secondary Schools?

The first research question sought to find out the vocational guidance programmes available in senior secondary schools for assisting students in career choice. To establish this, the respondents were given a series of questions whose responses are discussed above. The students were given a list of vocational guidance programmes and they were required to tick against the choices that were available in their schools. Their responses are shown in table 3.

**Table 3: Vocational Guidance Available In Senior Secondary School**

S/N Vocational Guidance	No Available (No.)	Not Available (%)
1. Guidance and counselling	200	52.0(%)
2. Guidance/Vocational counselling teacher	200	14.5(%)
3. Career days	200	9.5(%)
4. Career club	200	-
5. Inviting guest speakers on careers	200	-
6. Career guidance material e.g. Books, Magazine, Fliers, Pamphlets etc	200	31.0(%)
7. I was informed of my career from the local library	200	15.5(%)
8. The counsellor in my school gives career talk on regular basis	200	9.5(%)
9. I heard other students talk about the career.	200	27.0(%)
10. I heard of the career in the media	200	10.0(%)

The table shows that the most common vocational guidance programmes offered in the schools as reported by over 50% of the students were guidance and counseling while 85.5% have reported to have no guidance and counselling teachers, 90% of the students responded to not having career days in their schools whereas 100% responses shows there has being no career days organized as well as inviting guests to speak on careers. Among the students responses, 69% indicated to have no guidance and counselling materials, no career clubs, haven't invited guests to speak on career, and 84.5% of the students shows they were not informed of their career from local libraries, 90.5% reported to have no career talks on regular basis, 73%

haven't heard of career guidance from other students as well 90% of the report haven't heard of career counselling on media.

**Research Question 2:** What are the career aspirations of senior secondary school students?

**Table 4: What to do After Completing Senior Secondary Level of Education**

Items	Frequency	Percent	Valid Percent	Cumulative Percent
Get Marriage immediately	13	6.5	6.5	6.5
Stay at home and let life take its course	5	2.5	2.5	9.0
Pursue further education (go to college or university)	155	77.5	77.5	86.5
Find any kind of Employment immediately	27	13.5	13.5	100.0
Total	200	100.0	100.0	

Table shows that the majority (77.5%) of the students indicated that they would pursue further education after completing senior secondary schools while 13.5% of them indicated that they would find some kind of employment immediately, 6.5% reported to get married immediately, with only 2.5% who wants to stay at home and let life take its course. This is an indication that the students did not want to stop learning after completing senior secondary school.

**Table 5 - frequency distribution for students' aspirations after completing secondary schools**

Items	Frequency	Percent	Valid Percent	Cumulative Percent
Law Nursing	25	12.5	12.5	12.5
Medicine	47	23.5	23.5	50.0
Teaching	2	1.0	1.0	51.0
Banking	28	14.0	14.0	65.0
Communication Technology e.g Computer Science, IT etc	70	35.0	35.0	100.0
Total	200	100.0	100.0	

Figure shows that 70 (35%) of the students indicated that they would like to pursue communication technology, followed by 47 (23.5%) of them, who indicated they would like to pursue medicine. On the other hand, the careers that students would least like to pursue was

teaching. Further, 28 (14%) of the students indicated that they would like to be nurses and bankers while 25 (12.5%) indicated that they would like to be lawyers.

**Table 6 - Frequency Distribution Table Showing the Highest Level of Education Students Would Like to Attain?**

Items	Frequency	Percent	Valid Percent	Cumulative Percent
Senior Secondary Certificate	12	6.0	6.0	6.0
Post-secondary Diploma	30	15.0	15.0	21.0
Degree	69	34.5	34.5	55.5
Master's Degree	67	33.5	33.5	89.0
Doctorate Degree	22	11.0	11.0	100.0
Tota	200	100.0	100.0	

Figure 6 shows that the majority of the students 69 (34.5%) indicated that they would like to pursue education to degree level, 33.5% indicated they would like to reach masters degree level while 11% reported they would like to reach doctorate level.

**Research Question 3:** What is the influence of career information on career aspirations of students in Senior Secondary School?

**Table 7 - Frequency Distribution Table Showing Availability of Career Information**

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	115	57.5	57.5	57.5
No'	85	42.5	42.5	42.5
Total	200	100.0	100.0	

From the table above, 57.5% Of the students reported to have career information in their schools while 42.5% **have** no career information in their schools.

**Table 8- Frequency Distribution Table on How Vocational Guidance Helps in Choosing Career**

	Frequency	Percent	Valid Percent	Cumulative Percent
To a very great extent	26	13.0	13.0	13.0
To a great extent	89	44.5	44.5	57.5

To a small extent	76	38.0	38.0	95.5
Does not help at all	9	4.5	4.5	100.0 -
Total	200	100.0	100.0	

Table 8 shows that 26 (13%) of the students indicated that career guidance helped them to make career choices to a very great extent, it helped 89 (44.5%) of the students to a great extent while 38% reported it helped them to a small extent. The rest of the students responded as shown in the figure.

The career teachers were also asked whether vocational guidance helped students in choosing careers. All of them indicated that it did. Further, the teachers reported that career guidance helped in career choice in that: it made students more informed about careers, helped students stay focused on their career paths, directed students to know which subjects to focus on in order to realize their career aspirations and also helped students to know the careers that they could choose from, and not concentrate on the common careers only.

**Table 9: What Would Your Parents Want you to do Most After Your Senior Secondary Education?**

Item	Frequency	Percent	Valid Percent	Cumulative Percent
Get married immediately	11	5.5	5.5	5.5
Go into employment	16	8.0	8.0	13.5
Join the family business	3	1.5	1.5	15.0
Help with work at home	18	9.0	9.0	24.0
Go to university	124	62.0	62.0	86.0
Go to college for further training	24	12.0	12.0	98.0
Go into vocational training	4	2.0	2.0	100.0
Total	200	100.0	100.0	

Table 9 shows that majority of the parents 124 (62%) indicated that they would like their children to go to the university, while 24 (12%) of them aspire for joining college for further training.

**Table 9: What Level of Education do Your Parents Aspire For You to Get?**

Items	Frequency	Percent	Valid Percent	Cumulative Percent
Senior secondary certificate examination	2	1.0	1.0	1.0
Post-secondary Diploma	4	2.0	2.0	3.0
University Degree	91	45.5	45.5	48.5

Masters' Degree	46	23.0	23.0	71.5
Doctorate Degree	57	28.5	28.5	100.0
Total	200	100.0	100.0	

Figure 9 shows that that they about 45.5% want their children to reach university degree level, 23% would like them to pursue education to masters level, with 28.5% indicated that they would like them to reach doctorate level.

**Table 11: If you Want to get Employed After Finishing Your Senior Secondary School, What Kind of Job Would You Want to do?**

Items	Frequency	Percent	Valid Percent	Cumulative Percent
Formal (employment)	143	71.5	71.5	71.5
Informal (entrepreneurship/ vocational skills)	57	28.5	28.5	100.0
Total	200	100.0	100.0	

#### 4. What are the Ways of Improving Career Information for Students in Senior Secondary Schools?

To find out the ways in which career aspirations of senior secondary schools students can be enhanced in order to increase the number of students pursuing higher education. To establish this, the respondents were given a series of questions whose answers are discussed below.

1. How does your school provide guidance and counseling service to the students on career choice?

Table 12

Statements	Frequency	%
a. Probe for existence of career club	0	0%
b. Probe for invitation of career speakers	1	25%
c. Probe for mode and frequency of guidance	3	75%

2. What generally would you say are the career aspirations of your SS3 students?

Table 13

Statements	frequency	%
a. Probe for family life aspirations	0	0%
b. Probe for pursuit of a career	2	25%
c. Probe for employment ambitions	3	75%

d. Probe for other aspirations	0	0%
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3. In your opinion, does vocational guidance/career information help students in choosing their careers?

Table 14

Statements	frequency	%
a. Yes	4	100%
b. No	0	0%

Table 14 shows 100% response of career teachers that vocational guidance helped students in choosing the careers they aspire for.

In what ways does it help?

Table 15

Ways in which career counselling help students

1. It made students more informed about careers.
  2. It helped students stay focused on their career paths.
  3. It directed students to know which subjects to focus on in order to realize their career aspirations.
  4. It helped students to know the careers that they could choose from, and not concentrate on the common careers only.
4. Suggest ways through which government, society, school administration and parents could advance career aspirations of senior secondary students.

Table 16

Government

- a. Hold campaigns on the importance of child education
- b. Give bursaries and scholarships to poor students
- c. Providing enough learning resources to schools

Table 17

School administration

- a. Providing necessary materials for learning, as well as a clean environment for learning.
- b. Inviting motivational speakers to speak to students on careers.
- c. Having career days and clubs.
- d. Having guidance and counseling teachers and programmes.
- e. Teaching students their worth and contribution to the society

Table 18



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 Parents/guardians
 

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- a. Build students' self-esteem.
  - b. Be good role models to their children.
  - c. Guide their children towards realizing their goals.
  - d. Pay school fees on time.
  - e. Provide all the help needed for their children to pursue their studies.
- 

In Table 18 .The career masters and school principals were asked to suggest ways in which students' career aspirations could be advanced. Their responses are shown below:

That the best ways of furthering students' career aspirations as reported by over 90% of the career maters/teachers were: to put emphasis on the rights of every child to education, be good role models for the students, provide the school with qualified counsellors, building counselling units in our secondary schools, not assigning counsellors with other responsibilities outside their fields of work, Having career days and clubs, teaching students their worth and contribution to society, build students' self-esteem, as well as pay school fees on time.

Sourcing assistance for poor children who cannot afford school fees, educating parents on the importance of encouraging children to further education, counseling students from time to time on the value of education, subjects combinations, fields they would aspire for, and to work harder, organizing trips outside school for exposure, discouraging gender bias of children among parents, ensuring role models' participation in schools, adequate staffing and resources for schools, advise students on the benefits of education.

5. What are the differences between the influence of career information on boy's and girl's aspirations in senior secondary schools?

Table 19

<b>Gender</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>Mean Diff</b>
Boys	100	2.4000	.88763	
Girls	100	2.2800	.60436	0.12
Total	200	2.3400	.75979	

### Answering Research Hypotheses

Hoi: There is no significant influence of career information on career aspirations of senior secondary school students.

Table 20

<b>Groups</b>	<b>N</b>	<b>Mean</b>	<b>r-cal</b>	<b>Df</b>	<b>p-value</b>	<b>LS</b>
Students with career information	115	3.2261	.552	198	.000	0.05

Students with no career information	85	5.7529
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In order to test the null hypothesis that there is no significant influence of career information on career aspirations of senior secondary school students in Potiskum metropolis, paired sample t-test was performed. From table 20 above there was significant influence of career information on career aspirations of students who received career counselling and students who do not receive career counselling. This was based on the t-calculated value ( $t=.552$ ,  $p=.0000$ ,  $p>.05$ ). Based on the obtained result, a significant influence of career information exists among students who were exposed to career counselling. Thus, the null hypothesis stating there is no significant influence of career information on career aspirations of senior secondary school students is hereby rejected.

Ho2: There is no significant difference between the influence of career information on boys and girls aspirations.

Table 21

Gender	N	Mean	r-cal	Df	p-value	LS
Boys	100	1.3600	-1.866	198	.063	0.05
Girls	100	1.4900				

The result in table 21 above is the independent sample t-test which showed that, there is a significant difference between the influence of career information on male and female students. This is because the calculated p-value of 0.063 was found to be lower than the 0.05 alpha level of significance. The calculated mean value of 1.4900 and standard deviation value of .50242 for girls is higher than the calculated mean value of 1.3600 and standard deviation value of .50242 for the boys. This implies that career information influence female students better than the male students. Consequently, the null hypothesis which state that there is no significant difference between the influences of career information according to gender of the students is hereby rejected.

### Conclusion

Based on the findings of the study as summarized above, the response showed that majority of the respondents agreed that they either rarely or never sought career information at all in their schools. The principals reported that they assist students in career selections by passing career talks on assembly grounds and visitations to classes to give career information during the students' free periods, the principals added that there is no specific programme/activity that guide students towards career choices and aspirations. It can be concluded that most schools had vocational guidance programmes to guide students in the choice of careers, stay more focused on their career paths and also keep them informed of the careers available but they are

not appropriately used as it is supposed to. The study revealed that the students aspired to go to university after completing their senior secondary school. The study further revealed that the parents were involved in their children's aspirations in school and wanted them to further their studies. They therefore supported them by providing all the learning materials and equipment they needed. The study, therefore, sought to find out how regularly activities like, career tours, career days and visits by professionals were organized and provided by schools. The response indicated that these activities were rarely organized by schools. For career guidance and counseling to equip students with decision-making skills, it should be provided more regularly than the current practice. These activities would give respondents a chance to understand the realities of various professions, the challenges, and the social skills like emotional maturity, time management, and confidence among others that are required to cope in work places. Therefore, the provision of the said activities to support career guidance and counseling, according to the study are not adequate in secondary schools. The study found no difference between the influence of career information on boys and girls aspirations.

### **Recommendations**

1. Yobe State Ministry of Education should mainstream career guidance and counseling in the education system. This should begin at, primary through secondary up to university levels. It would help create awareness of the various careers available in the job market and the various requirements. Students would be able to plan their future careers by pursuing relevant subjects at secondary school and degree programmes at university level.
2. The government requires providing clear policies to guide career guidance and counseling provision in schools to compliment the current services in schools, there is need for funding these offices to ensure they do have the relevant resources that
3. The service providers/school counsellors should be relieved of some of their academic duties to enable them deal with career needs of individual students, as opposed to the current practice of group counseling.
4. To remain relevant, career guidance and counseling teachers should be facilitated to attend training, seminars, and workshops and engage in Action research to share and improve their services. The Teachers Service Commission (TSC) should support career services in schools by relaxing their hiring policy on teachers who cannot be employed when they have guidance and counseling as their second subject. In view of the current policy by TSC, there is need to have counseling services included in school curriculum and be examinable.
5. There is need for awareness campaigns targeting the community, parents, local leaders, administrators, teachers and students on the importance of education and

the benefits of education especially in this generation. This should be done through public barazas, seminars, school parents 'days, and other community functions.

6. There is need for students to invest in individual career information by use of various sources such as school libraries should be reinvigorated through adequate funding by the community and government. School principals should spearhead this endeavor. The right caliber of staff for the library should be employed so that they can acquire, organize and store career information resources. Dissemination of career information from school libraries would enable students to access career information conveniently.\
7. It is recommended that career teachers through the auspices of the counsellors association of Nigeria and Counselling Teachers' Association should create a model resource Centre in an accessible school. Career teachers should meet and agree to pool career resources and borrow from it for the common good of all co-operating schools. Such resource centres should have career books, magazines, videos, films, brochures and internet services among others. Teachers could borrow for the use of their students. This would strengthen resource sharing and networking for the benefit of all.

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## EFFECTS OF THERMAL VARIANCE ON THE BOND STRENGTH OF SLAG CEMENT CONCRETE

**Sesugh Terlumun<sup>1</sup>,**

Department of Civil and Environmental Engineering,  
Air Force Institute of Technology, Kaduna,  
Kaduna State, Nigeria

**Victoria Hassan Jiya<sup>1</sup>**

Department of Civil and Environmental Engineering,  
Air Force Institute of Technology, Kaduna,  
Kaduna State, Nigeria

**Okah Michael Chukwu<sup>1</sup>**

Department of Civil and Environmental Engineering,  
Air Force Institute of Technology, Kaduna,  
Kaduna State, Nigeria

**Ibrahim Badamasi Bilal<sup>1</sup>**

Department of Civil and Environmental Engineering,  
Air Force Institute of Technology, Kaduna,  
Kaduna State, Nigeria

**Ashiru Muhammed Ashiru<sup>2</sup>**

Department of Civil Engineering Technology,  
Federal Polytechnic Nasarawa,  
Nasarawa State, Nigeria

### **Abstract**

This work examine the effects of thermal variance on the bond strength of slag cement concrete. In this research, slag cement was prepared by blending 50% Portland cement with Ground Granular Blast Furnace Slag and used as the binder. Concrete cubes of 100mmx100mm were prepared using slag cement, the samples were cured for 28 days to achieve strength. Therafter, some samples were selected and tested to determine the bond strength using pull out test while some were subjected to varying thermal conditions of 150, 200, 250 and 300C at time intervals of 30, 45 and 60 minutes after which pull out test was conducted on the heated samples to determine effects of varying temperature conditions. At

the end of the research, it was observed that concrete has good thermal performance compare to ordinary Portland cement

### **Introduction**

Ground Granular Blast Furnace Slag (GGBS) is obtained by quenching molten iron slag from a blast furnace in water or stream, to produce a glassy, granular product that is then dried and ground into a fine powder. GGBS is used to make durable concrete structures in combination with ordinary Portland cement and/or other pozzolanic materials. GGBS has been widely used in Europe, and increasingly in the United States and in Asia for its superiority in concrete durability, extending the life span of buildings from fifty to a hundred years. GGBS reacts like Portland cement when in contact with water. Bulk GGBS is stored and handled in conditions identical to that of Portland cement. Bulk storage is in watertight silos. Transportation is by bulk tankers, as for Portland cement. GGBS can also be moved by air slides, cement screws and bucket elevators. Dust control is the same as that required for Portland cement. GGBS dust does not present any fire or explosion hazard

Fire resistance is a measurement of the ability of the structure to resist collapse, fire spread or other failure during exposure to a fire of specified severity or in other words it is the duration a structural member (system) exhibits resistance with respect to temperature transmission, structural integrity, and stability under fire conditions. The fundamental step in designing structures for fire safety is to verify that the fire resistance of the structure or each part of the structure is greater than the severity of the fire to which the structure is exposed. The current prescriptive methods for fire resistance are derived from data obtained from standard fire resistance tests and do not consider the effect of many of the important parameters such as load level, fire scenario, and concrete strength (Kodur and Dwaikat, 2008).

Damages caused by a fire on a concrete structure can be observed from simple discolored spots or tarnish produced by smoke to the structural element complete destruction as a result from the loss of its mechanical strength. The effects of fire, as well as its intensity and extension, are directly connected to the capacity a building has to resist or not to the development of a fire. Unfortunately, there is no absolute safety against fires and, therefore, several preventive measures are used with the intent of reducing risks.

Concrete must at times resist the effects of artificially induced high temperatures such as might be encountered near furnaces or in atomic reactors, in pavements subjected to jet engine blast, and in areas exposed to fire. Applications of concrete involving extremely high temperatures, such as landing pads for missiles, are considered expendable, but in most instances it is desired to avoid deterioration of the concrete physical properties as much as possible. A number of factors will enter into a decision regarding the type of concrete to use under conditions of elevated temperature. These include the following: length of exposure, rate of temperature rise, temperature to which the concrete mass will be raised, temperature of concrete at initiation of exposure to high temperature, degree of water saturation of the concrete, age of

the concrete, type of aggregate used, type of cement used, aggregate/ cement ratio, and loading conditions at time of exposure. Concrete appears to sustain no appreciable damage when exposed to temperatures up to 400 degrees Fahrenheit. If temperatures above 400 degrees Fahrenheit are to be experienced, it is wise to investigate the exposure conditions and the concrete which will be employed.

Fire safety measures to structural members are measured in terms of fire resistance which is the duration during which a structural member exhibits resistance with respect to structural integrity, stability, and temperature transmission. Concrete generally provides the best fire resistance properties of any building material. This excellent fire resistance is due to concrete's constituent materials (i.e., cement and aggregates) which, when chemically combined, form a material that is essentially inert and has low thermal conductivity, high heat capacity, and slower strength degradation with temperature. It is this slow rate of heat transfer and strength loss that enables concrete to act as an effective fire shield not only between adjacent spaces but also to protect itself from fire damage.

The behaviour of a concrete structural member exposed to fire is dependent, in part, on thermal, mechanical, and deformation properties of concrete of which the member is composed. Similar to other materials the thermophysical, mechanical, and deformation properties of concrete change substantially within the temperature range associated with building fires. These properties vary as a function of temperature and depend on the composition and characteristics of concrete. The strength of concrete has significant influence on its properties at both room and high temperatures. The properties of high strength concrete (HSC) vary differently with temperature than those of normal strength concrete (NSC). This variation is more pronounced for mechanical properties, which are affected by strength, moisture content, density, heating rate, amount of silica fume, and porosity.

In practice, fire resistance of structural members used to be evaluated mainly through standard fire tests. In recent years, however, the use of numerical methods for the calculation of the fire resistance of structural members is gaining acceptance because these calculation methods are far less costly and time consuming. When a structural member is subjected to a defined temperature-time exposure during a fire, this exposure will cause a predictable temperature distribution in the member. Increased temperatures cause deformations and property changes in the constitutive materials of a structural member. With knowledge of deformations and property changes, the usual methods of structural mechanics can be applied to predict the fire resistance performance of a structural member. The availability of material properties at an elevated temperature permits a mathematical approach for predicting fire resistance of structural members.

The bond strength which is a mechanical property is due to surface roughness and friction (Hannant, 1963), concrete has good fire resistance ability, this implies that the period under which the concrete can still perform satisfactorily under fire is relatively high and no toxic fumes are emitted. The relevant criteria for this are, load bearing capacity are load bearing capacity, resistance to flame penetration and resistance to or low rate of heat transfer when use as fire protective material for steel. It preserve structural action over a desired length of time (that is fire rating), (Nagarain and Sinha, 1994). At temperature below 250°C, the bond strength between concrete and steel remains relatively unchanged, but at higher temperature, the expansion of steel increase while the strength of concrete decreases. Mild steel bars loses



75% of their bond strength at 450°C while high yield bars have the same bond strength as at 250°C (Milovanoov, 1963).

## Methodology

### Materials

The materials used for this research were portable water obtained at University Of Ibadan water works, well graded sand as fined aggregates, granite as coarse aggregates and Slag Cement as the binder. The binder was prepared by blending 50% of Ordinary Portland Cement with Ground Granular Blast Furnace Slag

### Methods

#### Procedures for Pull Out Test

Concrete mix of 1:2:4 having water cement ratio equal to 0.56 were prepared. Concrete cubes of 100mm x 100mm were casted with the steel reinforcements of 10mm diameter. A plumb was used to ensure the bars were vertically aligned, after 24 hours, the samples were demoulded and immersed in water for 28 days. After 28 days, the concrete samples were removed for heating and testing. The samples were heated in a furnace machine at varying temperatures of 100, 150, 200, 250 and 300°C at varying times of 30 minutes, 45 minutes and 60 minutes respectively.

A Universal Testing Machine (UTM) was used for this test. The samples were placed in the UTM and the steel was grip by the upper jaw while the concrete section was held firm by the lower jaw of the machine. A gradual load was applied to pull out the embedded steel out of the concrete until the steel was finally removed. The load at which the steel was wholly pulled out of the concrete was read and recorded.

The ultimate bond stress was calculated using the following formula

$$\sigma_{bu} = P_b / (\pi \times d \times l)$$

where,  $\sigma$  = ultimate bond stress,  $P_b$  = Bond failure load,  $d$  = dia of bar,  $l$  = length of bar (in this case it is 100 mm)

**Table 1.2 Pull out Test Result**

Temperature (°C)	Time(Minutes)	Sample A Load (kN)	Sample B Load (kN)	Sample C Load (kN)	Average Load (kN)
0°C	00	46.20	45.75	45.3	45.75
100°C	30	45.69	45.33	45.90	45.63
	45	45.30	45.87	45.18	45.48
	60	45.24	45.78	45.30	45.42
150°C	30	45.18	45.54	45.60	45.42
	45	45.36	45.27	45.27	45.30
	60	45.24	45.39	45.33	45.27
200°C	30	45.30	45.18	45.24	45.24
	45	45.18	44.70	45.30	45.06

	60	44.55	45.00	44.28	44.61
250 <sup>0</sup> C	30	43.11	45.90	42.90	44.04
	45	42.90	43.50	40.08	42.90
	60	42.30	40.20	41.40	41.31
300 <sup>0</sup> C	30	40.20	37.50	40.20	39.09
	45	39.00	37.80	39.45	37.11
	60	37.20	36.75	36.30	36.75

### Bond Strength at Varying Times and Temperature

The results obtained from the tests are as seen and presented in the table above to enable comprehension. The maximum loss in bond strength was 0.72% at 100<sup>0</sup>C, 1.05% at 150<sup>0</sup>C, 2.49% at 200<sup>0</sup>C, 9.7% at 250<sup>0</sup>C and 19.67% at 300<sup>0</sup>C, Normal concrete losses over 20% of its compressive and bond strength at 300<sup>0</sup>C (. This shows that Slag cement has higher resistance to heat attack than Ordinary Portland Cement in terms of both compressive and bond strength.

### Conclusion

From this research, the following conclusions were made:

- 1 Slag cement concrete has a considerable higher bond strength than Ordinary Portland cement.
- 2 It was observed that from a temperature of 100-200<sup>0</sup>C, there was no significant effects of temperature on the bond strength of the slag concrete (0.26-2.49
- 3 Above a temperature of 200<sup>0</sup>C and up to 300<sup>0</sup>C the effects of temperature on the bond strength concrete became significance. At 250<sup>0</sup>C (5.98%) at 60 minutes but was still not significance at 30 and 45 minutes (3.15-4.27%) , but at 300<sup>0</sup>C, a significance effect was noticed from 45 minutes to be 6.10%.
- 4 It was also observed that the time interval at which the concrete was subjected to heat has a significance influence on the concrete strength, the more the concrete stays under heat, the lesser the strength.
- 5 Slag Cement concrete has slightly higher but approximately the same thermal resistance ability as compared to Ordinary Portland Cement. Hence, Structural design for fire safety for Ordinary Portland Cement can be applicable for slag cement.

### Recommendations

The following recommendations were made:

- 1 Higher temperature values should be use to examine much of the effects of temperature on the bond strength slag cement concrete.
- 2 Other mechanical properties like, flexural strength, fracture toughness e.t.c. should also be investigated to properly examine the performance of slag cement on thermal conditions.

3 Much work should be done to bring out a balance design of slag cement for fire safety.

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## **CORPORATE GOVERNANCE AND TAX ETHICAL BEHAVIOUR OF LISTED NIGERIAN COMPANIES**

**Dashe, Awoena Felix**

Business Education Department  
Federal College of Education Pankshin,  
Plateau State, Nigeria.

**Abdulmuttalib Mohammed Bello**

Business Education Department  
Federal College of Education Pankshin  
Plateau State, Nigeria.

**Dawam Ambrose Moses**

Business Education Department  
Federal College of Education Pankshin  
Plateau State, Nigeria.

### **Abstract**

Over the years tax compliance in Nigeria has been a challenging economic reality due to harsh and volatile business environment. This paper is designed to examine the effect of corporate governance and ethical tax behaviour of list listed companies in Nigeria from 2015 to 2020. The descriptive research design was employed and 57 listed firms on the Nigeria stock exchange were sampled based on firms whose financial reports and tax returns files were available and accessed for this study. Corporate mechanism data was sourced from published financial reports of the sampled firms while tax compliance data were extracted from the tax returns file submitted to FIRS by the sampled firms for the research period. The study measures tax ethical behaviour in terms of timely filing of tax returns form, completeness of tax returns, and accuracy in income declaration on a scale of 0-3. In each year codes 1, 2 Or 3 were used to score ethical tax behaviour depending on the extent of compliance. Otherwise, 0 is scored for noncompliance. The regression analysis was done and the fixed and random effect variant of the regression model for panel data was applied to the data using E-View statistical software. The findings supports the hypothesis that large proportion of independent directors in the management structure decreases tax sharp practices and increases tax ethical behaviour. The result implies that independent board members play a front role in deciding whether a firm engages in tax unethical behaviour or not. The study recommends that corporate entities should maintain moderate board size, use internationally recognised audit firm, encourage managerial ownership and engage investors as independent directors.

**Keywords:** Corporate governance, Taxation, Ethical behaviours, Revenue

## INTRODUCTION

According to a report by the national bureau of statistics, Federal inland revenue service (FIRS) generated the sum of ₦864.72 billion as company income taxes in the first half of the year 2021, representing a 57.8% achievement rate compared to the annual CIT projected revenue of ₦1.49 trillion (NBS, 2021). Nigeria's corporate tax increased by 21.5% and 23.95% compared to ₦711.73 billion and ₦697.71 billion recorded in H2 and H1 2020 respectively. Corporate taxes generated by the government has recorded significant increases in recent time signalling diversion of government's attention from oil revenue sources to other important sources. Despite an increase in Nigeria's tax collection, her tax to GDP ratio remains one of the lowest in the world (World Bank, 2022). At 8% of GDP in taxes (PWC, 2022), Nigeria must increase her revenue collection to meet basic need of citizens and make growth sustainable especially in the context of COVID 19 recovery plan.

As tax authorities intensify effort to maximise tax collection, corporations have been scrutinized for their tax behaviour. Stakeholders have expressed their concern over corporate tax unethical behaviour that allow corporations to pay ridiculous amounts of tax year in year out. Although national governments and international institutions are developing initiatives to reform tax rules to ensure that companies pay their "fair share" of tax, tax framework still offers corporations several opportunities for minimizing their tax burden. To help businesses, self-regulate their behaviour in those "grey areas" where the tax law is imperfect and to drive changes in legislation, corporate taxation has recently been included in the business ethics field. In other words, the ethical responsibilities associated with corporate taxation have started to be investigated and companies are increasingly expected to exhibit a morally responsible approach to filing tax returns and completing tax returns, above and beyond compliance with the letter of the law.

The tax compliance literatures have over the years indicated that so many factors –including economic, socio-psychological and demographic –usually come into play in determining individual compliance decision (Devos, 2012). Besides, individual compliance behaviour also differs from one country to another and from one individual to the other (Kirchler, 2007). The resultant effect is that, today, there exists a 'cobweb' of factors that are considered as affecting taxpayer behaviour with regards timely filing of tax return, completeness of tax returns and accuracy of tax returns, and the decision of whether or not to pay taxes.

Emerging paradigm have emphasized the link between firms' corporate governance mechanisms and their responses to taxes as one of such factors. Desai & Dharmapala, 2009; Desai, Dyck & Zingales, 2007; Desai, Dharmapala & Fung, 2007 pointed out that corporate governance plays important role in affecting firms' responses to changes in corporate tax rates.



The studies found out that the underlying governance arrangements constitutes the major driver for tax aggressive behaviour of management. Those studies argued that when governance is weak, tax aggressiveness will tend to occur but will be reduced if governance is strong. Sound corporate governance is essential for increasing investor confidence, protecting stakeholders such as lenders, borrowers, staff, and the government and complying with supporting tax laws (Muka, 2010).

In most contexts, raising revenues requires an efficient and effective tax system (World Bank, 2019). But standard policy measures for improving taxpayer compliance – such as reforming legislation and administration – may not be enough. They may also be time-consuming or infeasible due to technology infrastructure, limited resources, and political constraints. A thorough understanding of human behaviour and how individuals interact with policies and programs can provide creative and cost-effective solutions to these challenges (OECD, 2021). In fact, according to Jost & Patrick (2019) interventions that consider human behaviour help individuals and firms better process information, make decisions, and submit their tax declarations accurately and on time and help tax administration officials improve the way they do their job.

There is already a considerable literature about corporate governance and tax behaviour for example Jost & Patrick (2019) reviewed recent literature (79 articles) on the impact of corporate governance and tax avoidance. They found out that CG limits tax avoidance. However, for most part, this literature is focused CG and tax compliance (Shamsuddin et al, 2011 and Yinka et al, 2022) and CG and tax sharp practices such as tax avoidance, tax aggressiveness and tax evasion. The unsettled area in the literature is the debate regarding how CG influence tax ethical indices in Nigeria such as timely filing of tax returns, completeness of the tax returns and accuracy in income declaration. The research in this area is bedevilled with paucity of studies paying attention to the search for relationship between CG and tax ethical behaviour. This research took a different approach from previous studies by looking at some aspects of CG in relation to tax ethical behaviour that had been very insufficiently examined by foreign and local studies. Hence, ignoring the relationship between CG and tax ethical behaviour is a gap.

Distinguishing and describing the recorded patterns of tax noncompliance and finally finding ways to reduce it, are clearly a dominant feature of state governments around the world. The economics of tax compliance can be viewed as a problem of public finance, law enforcement, organisational design, labour supply, ethics, or a combination of all of these.

### **Research objectives**

The broad objective of this research is to examine the effect of corporate governance and ethical tax behaviour. While the specific objectives are listed below:

1. Examine the extent to which independent directors affect ethical tax behaviour.

2. Investigate whether board size affect ethical tax behaviour.
3. Find out if board ownership has a relationship with ethical tax behaviour.
4. Examine the extent audit committee affects ethical tax behaviour.

### **Hypotheses of the study**

H<sub>01</sub>; Board independence directors has no significant impact on ethical tax behaviour

H<sub>02</sub>; Board size has no significant impact on ethical tax behaviour

H<sub>03</sub>; Board ownership has no significant impact on ethical tax behaviour

H<sub>03</sub>; Audit committee has no significant impact on ethical tax behaviour

## **LITERATURE REVIEW**

### **Corporate governance**

Anandarajah (2004) opined that there is no universally accepted definition of what the term-corporate governance means, as numerous definitions have evolved owing to the multi-dimensional nature of the concept. A common assertion of most corporate governance definitions implies a mechanism targeted to minimize problems generated by the separation of ownership and control (Wells, 2010). Corporate governance according to Cadbury (1992) is a system by which companies are directed and controlled. It consists of two components: corporate which refers to corporations and governance which refers to the act, fact or manner of governing (Lanno, 1999). Ruin (2001) stated that corporate governance is a group of people getting together as one united body with the responsibility to direct, control and rule with authority. On a collective effort, the body is empowered to regulate, determine, restrain, curb and exercise the authority given to it. Olusanmi and Iyoha (2015) corporate governance is seen as a system or an arrangement that comprises a wide range of practices (accounting standards, rules concerning financial disclosure, executive compensation, size and composition of corporate boards) and institutions that protect the interest of a corporation's owners. According to Hopt (2011), the evolution of the concept of corporate governance has had trends, theories and models which have been picked up by commentators and researchers. The direction and control are the two cornerstones of the corporate governance system which characterize the system to be either shareholder or stakeholder oriented. In other words, it encompasses several mechanisms that serve to protect shareholders' interests and reduce agency conflicts arising from the separation of ownership and control such as board independence, proper audits, nomination and remuneration committees: as well as capital structure and dividend pay-out policies (Fatimoh, 2012). It can be seen also as the sum of processes, structures and information used for directing and overseeing the affairs of an organization (Sanda, Mikailu & Garba, 2005). Therefore, firms with a better corporate governance quality incur fewer agency conflicts.

In Nigeria, the legal and regulatory framework for the observance of corporate governance was secured through a combination of voluntary and mandatory mechanisms such as the

Companies and Allied Matters Act 2004 as amended, Investment and Security Act 2007, Securities and Exchange Commission 2011, Corporate Governance Code and various industry specific governance codes. The Atedo Peterside led committee on corporate governance was commissioned by the Securities & Exchange Commission in Nigeria. It resulted in the publication of the 2003 SEC Corporate Governance Code and presently, a revised SEC Code of 2011. Industry specific Codes were published by the regulators for companies under their domain. They included CBN Codes 2006 for banks and other financial institutions, PENCOM Codes 2008 for pension fund administrators and NAICOM Codes for insurance companies. Corporate governance practices, regulations, and models differ from country to country. Generally, these corporate governance models are divided into two types based on different systems of corporate ownership (Aguilera & Jackson, 2010). The first is the outsider model, and the second, the insider model. According to the above research, notable examples of the outsider model of corporate governance are found in the US and UK. Therefore, the outsider model is also known as the Anglo-Saxon model. The insider model of corporate governance is found in Europe and the Asia-Pacific region. This model is also known as the Continental European model.

### **Ethical tax behaviour**

Conceptually, Ethics is simply the study of what is good and bad, right and wrong, just and unjust. Ethics are the moral principles that an individual uses in governing his or her behaviour-the personal criteria by which an individual distinguished “right from wrong” (Adifila, 2022). Therefore, a society without ethics would face both chaotic and integrity questions. Tax ethical behaviour is a recent phenomenon in the tax world. It had begun to be studied recently in countries like Germany, Europe, America etc. It is defined as a set of existing and accepted norms, values and beliefs in a society that serves as a model of conduct for determining the proper tax compliance (Gonzalez, 2020). Alarcon (2018) argues that moral and tax consciousness have been mentioned as a similar concept but have differentiating elements. Ethical tax behaviour can be viewed from two angles: from both the taxpayers and tax authority. Ethical tax behaviour of taxpayers is the main thrust of this research. Therefore, tax ethical behaviour is acting or conforming to accepted tax standards of conduct, (Gelin & Billard-Moalic, 2019). Companies must pay their fair share of taxes to contribute to the society growth and development. In other word, tax authorities should generate adequate tax revenues, to promote welfare of the citizens, deliver public services and build physical and social infrastructure for long-term growth. The relevant tax authorities have the power to assess taxes; Collection of revenues; Property seizures; Adjustments and fines on tax declarations; Payment (and delays) on tax returns; Closure of business activities, etc. Abuse of these powers can create severe damage to the civil rights of the taxpayer (Kommer, 2009). Ethical tax behaviour of tax authorities are guided by a code of conduct, to avoid any professional or

business activity that may create a conflict between personal interests and the duties of the tax authorities. Kommer (2009) established that code of conduct is mainly based on the following principles: Fairness and equity, Transparency, Integrity and Accountability. The taxpayer's perception has been viewed from different angles. Firstly, taxpayer's attitude of being greedy that want to maximise their income and show no civic responsibility or duty to the government; secondly, absence of punitive measures and control which supposed to serve as a good check on taxpayers. The taxpayers have it in mind that they could avoid paying tax without being caught by the tax authorities in Nigeria. The tax structure and wasteful government spending had demoralised them in paying taxes, which also motivated them to evade tax payment. The major tax obligations arising from tax laws in Nigeria include: Tax registration; Filing of tax returns; Payment of taxes due including minimum tax; Tax collection agent; Withholding tax obligation; Duty to disclose; and Duty to keep books of account. Majorly, a lot of non-compliance behaviour was as a result taxpayer's perception of not being treated fairly and also feel that wasteful spending of tax revenue by the government, (Alm & Torgler, 2012).

### **Theoretical review**

#### **Theory of Plan Behaviour**

Icek Ajzen proposed this theory (Theory of Planned Behaviour) in 1985 through his article "From intentions to actions." The theory suggests that people are much more likely to enact particular behaviour when they feel they can enact them successfully. This theory is based on behavioural intention, which is anchored on three main factors; the behavioural belief- attitude towards the behaviour, the subjective norm- perceived expectations and perceived behavioural control- control beliefs (Ajzen, 1993). The goal of the theory of planned behaviour is to provide a comprehensive framework for understanding the determinants of such behaviours. The attitude aspect of the theory considers the individual evaluation of favourableness and unfavourableness of an attitude object. Based on the behavioural aspect of this theory, it underpinned this study.

#### **Empirical review**

Empirical studies focusing on corporate governance and variables such as tax avoidance, evidence, planning, aggressiveness; Ajueyitse, 2021 and compliance; Shamsuddin et al, 2011, salaudeen, 2022 have been carried by so many researchers. However, in Nigeria, studies on corporate governance and tax ethical behaviour of listed companies have remained majorly unravelled empirically. In a nutshell, there has been paucity of research specifically focusing on corporate governance and ethical tax behaviour of listed firms in Nigeria. However, Okoye and Akenbor (2010) did investigate the effect of accounting policies on corporate tax planning in Nigerian listed firms. The first weakness of the study was that it examined the effect of accounting policies on corporate tax planning only. Another weakness of the study was that it was just a research survey of opinion structured questionnaire without empirical analysis from

the company's financial data. Also, in kiabel and Akenbor (2014) study on tax planning and corporate governance in Nigerian banks, the focus was centred on corporate governance using ordinary least square method.

Olufemi et al (2022) examined the impact of tax ethical behaviour on tax compliance of tax authority and corporate taxpayers of some listed manufacturing firms in Nigeria. The study exploited proxies such as tax fairness, tax compliance and tax responsibility. The analysis was conducted using correlation analysis, analysis of variance and multiple regression. The governance structure of the listed firms that exhibit most of the tax behaviour was not included in the study and the proxies used in the study looked ambiguous.

Yinka & Saliu (2022) analysed corporate governance mechanism and tax compliance of listed firms in Nigeria. 79 selected listed firms for the inclusion in the sample. Data for corporate governance attributes were extracted from the annual reports of the sample firms and those of the tax compliance indices were extracted from their files with the tax office. Based on the result of the Hausman test, the fixed-effect model was used as a basis for the discussion of findings. Findings suggest that managerial ownership and non-executive director have significant positive relationship with tax compliance. Board size has a negative relationship while the effects of gender diversity, auditor profile, ownership concentration, and institutional ownership are not significant. The data extracted from companies' files might not be a true reflection of the tax compliance or behaviour of the selected sample. This to large extent can water down the outcome of the research.

Flora and Taina (2020) examined behavioural nudges and tax compliance sao Paulo. We tested five different behavioural informed letter through a randomized control trial with 15,178 property taxpayers already in debt with the city of São Paulo. The best performing letter, the Consequences Letter, increased the regularization rate in 4.07 percentage points (52.53%, in comparison with 48.46% in the control group), which stands for an 8.4% increase.

Ehassan et al (2021) explores the relationships among voluntary tax compliance behaviour of individual taxpayers with selected economic, social, behavioural and institutional factors. This individual tax compliance behaviour is studied through the multi-perspective lenses of the theory of attribution, equity theory, expected utility theory, and social exchange theory. Quantitative design using the survey method was employed to collect data from 435 individual taxpayers through questionnaire. For testing linkage between constructs, through mediation and moderation tests, structural equation modelling technique was used. The results suggest that tax compliance simplicity has a larger impact on tax filing than perception about Government Spending and tax morale.

## **METHODOLOGY**

The descriptive research design was employed for this research and it is based on the opinion of Kumar (2019) who stated that descriptive design is used to discover and measure the cause

and effect of existing interaction between variable in a construct. It also allows researchers to collect a very high number of in-depth information from the population. The population of the study comprises of 177 listed firms on the Nigeria exchange group. The sample size comprised of 57 listed firms on the Nigeria exchange group. The sample size constitutes only firms whose financial reports and tax returns files were available and accessed for this study. Corporate mechanism data was sourced from published financial reports of the sampled firms for five years (2015-2020) while tax compliance data were extracted from the tax returns file submitted to FIRS by the sampled firms for the same number of years. The study measures tax ethical behaviour in terms of timely filing of tax returns form, completeness of tax returns, and accuracy in income declaration on a scale of 0-3 as in Akhand (2015). In each year codes 1, 2 Or 3 were used to score ethical tax behaviour depending on the extent of compliance. Otherwise, 0 is scored for noncompliance.

The regression framework is applied to guide findings and conclusion. The choice of regression is because of the focus of this study on the association between tax ethical behaviour indices and corporate governance mechanisms. The fixed and random effect variant of the regression model for panel data is applied to the data using E-View statistical software. These variants of regression model for panel data allows for the inclusion of the often unobserved time invariants, cross-sectional and temporal (i.e. time) dimension into the data.

Descriptive statistics and panel regression technique were used to analyse the data. A multiple linear regression model was developed to predict the level of tax ethical behaviour proxied by timely filing of tax returns, completeness of tax returns and accuracy in income declaration using three independent variables. These variables include audit quality, independent directors, board ownership. The  $\beta$  coefficients for each independent variable generated from the model was subjected to a z –test, in order to test each of the hypotheses. The regression model used to test is shown below:

$$TEB_t = \beta_0 + \beta_1 BSZ + \beta_2 AUQ + \beta_3 IND + \beta_4 BOW + \mu$$

Where:  $TEB_t$  is tax ethical behaviour indices,

$\beta_0$  = fixed intercept,

$\beta_1$ - $\beta_4$  = board size, audit quality, independent board, and board ownership, while

$I$  = number of firms in the study;  $t$  = time; and  $\mu$  = the error term.

## DATA ANALYSIS

Table 1 shows the descriptive statistics for the variables and as observed,  $TEB$  has a mean value of 0.409 with a standard deviation of 0.231. Board size has an average value of approximately 9 which implies that the average board size for the sample is 9 members. The mean for  $AUQ$  index,  $IND$  and  $BOW$  stood at 0.7, 0.658 and 0.146 with a standard deviation of 0.523, 0.160 and 0.202 respectively.

**TABLE I: DESCRIPTIVE ANALYSIS**

	Mean	Median	Maximum	Minimum	Std. Dev.	Jarque-bera
TEB	0.4085	0.6	0.609	0	0.231	783.641
BSZ	8.955	9	19	4	2.515	257.704
AUQ	0.7	1	1	0	0.523	119.862
IND	0.658	0.67	0.782	0	0.16	75.443
BOW	0.1458	0.03	0.84	0	0.2015	257.704

Source: Researchers compilation (2020) using Eviews 9.

From table II, the correlation between TEB and independent variables is examined. As observed, BSZ and IND though weak is positively correlated with TEB with a coefficient of 0.008 and 0.071 respectively. On the other hand, AUQ has a strong positive correlation with TEB with a coefficient of 0.165 while BOW has a weak negative correlation with TEB with a coefficient of -0.06.

**TABLE II: CORRELATION MATRIX OF DEPENDENT AND INDEPENDENT VARIABLES**

	TEB	BSZ	AUQ	IND	BOW
TEB	1				
BSZ	0.008	1			
AUQ	0.165**	0.175**	1		
IND	0.071	-0.008	-0.004	1	
BOW	-0.06	-0.110*	-0.09	-0.233**	1

Source: E-Views version 9

#### A. Diagnostic Result.

The multi-collinearity test in table III indicates that there is no case of multicollinearity because the variance inflation factor (VIF) and the tolerance value of the conditions tested are below five (5) and above 0.1.

**TABLE III: VARIANCE INFLATION FACTOR (VIF)**

Coefficients (a)

Model	Collinearity Statistics	
	Tolerance	VIF
BSZ	0.853	1.078
AUQ	0.827	1.209

IND	0.969	1.031
BOW	0.81	1.22

a. Dependent Variable: TEB

Source: E-Views version 9

In order to avoid spurious result, stationary test was carried out to ensure none of the variables are stationary at order of integration two [I (2)]. From the result, it was revealed that TEB and IND were found to be stationary at I(0), while BSZ and BOW were stationary at I(1). The results of the unit root test are presented in table iv. The result of 3 estimators out of four used in table v shows that the residuals and the predictor variables to be uncorrelated at 1% significance level.

TABLE IV: UNIT ROOT RESULT

Variables	Levin, Lin & Chu test	Im, Pesaran & Shin W-stat	ADF-Fisher Chi-square	PP-Fisher Chi-square	Remarks
TEB	0.000	0.0103	0.2109	0.0271	Stationery@ Level I(0)
BSZ	0.000	-	0.0000	0.0000	Stationery@ Diff. I(1)
IND	0.000	0.000	0.0017	0.0000	Stationery@ Level I(0)
BOW	0.000	0.000	0.0000	0.0000	Stationery@ Diff. I(1)

Source: E-Views version 9

TABLE V: SERIAL CORRELATION TEST

Test	Statistic	d.f.	Prob.
Breuseh-Pagan LM	4186.94	3081	0.0000
Pesaran scaled LM	13.08231		0.0000
Bias-corrected scaled LM	3.207307		0,0013
Pesaran CD	0.693185		0.4882

Source: E-Views version 9

### B. Fixed Effect Result

The fixed-effect model in table IV shows a weak positive effect of audit quality (AUD) on Tax ethical behaviour (TEB) with a magnitude of 0.568409(Prob. 0.1595). Independent directors and board ownership proved to have a robust positive effect on tax ethical behaviour with a magnitude of 0.011026(Prob. 0.027) and 0.02685 (prob. 0.0721), while board size has a weak negative effect, with a magnitude of -0.009519 (Prob. 0.7782). Furthermore, the fit



statistics (i.e., R<sup>2</sup>, Adj. R<sup>2</sup>, f-test) shows that the model fit is strong as the independent variables explained 0.40 or 40% of the variance in tax compliance at less than 1% significance level.

TABLE VI: FIXED EFFECT

Variable	Coefficient	Std. error	t-statistic	prob.
TEB	0.65021	0.75618	0.85986	0.391
BSZ	-0.0091	0.03376	-0.282	0.778
AUQ	0.56841	0.40305	1.41029	0.159
IND	0.01103	0.00495	2.2272	0.027
BOW	0.02685	0.01488	1.80467	0.072

Source: Eviews 9

R<sup>2</sup>: 0.45759

Adjusted R<sup>2</sup>: 0.30838

R<sup>2</sup>:

F-statistics: 4.02811

P-value: 0.000000

### C. Hausman Specification Result

The Hausman test of specification validity in the table above indicates a significant P-value, indicating the fixed effect model is appropriate.

TABLE VII: HAUSMAN TEST

Variable	Fixed	Random	Var(Diff)	Prob.
BSZ	-0.0095	-0.00345	0.00077	0.827
AUQ	0.56841	0.002996	0.00004	0.556
IND	0.01103	0.007451	0.00001	0.262
BOW	0.02685	0.000042	0.00021	0.066
Chi-Square Statistics	11.9324			
Probability	0.0766			

Source: E-Views version 9

## DISCUSSION OF FINDINGS

The study has found an empirical evidence to affirm that board ownership encourages management to work hard and increase performance. As a result, enhance ethical tax behaviour. This result reiterates of stimulating managers to judiciously guiding shareholders' financial and non-financial interests in a corporation of which he is one (Boussaidi & Hamed, 2015). The study supports the hypothesis that large proportion of independent directors in the

management structure decreases tax sharp practices and increases tax ethical behaviour. The result implies that independent board members play a front role in deciding whether a firm engages in tax unethical behaviour or not. This finding is consistent with the agency theory (Alegrini & Greco 2013). Findings from the research also shows that board size has negative relationship with ethical tax behaviour. Companies are unlikely to exhibit tax ethical behaviour with large board size. Audit quality though favourable is not strongly supported. The findings contrasted Aliani & Zarai (2012) and Ftouhi (2013).

## CONCLUSION AND RECOMMENDATIONS

In light of the findings of this study, corporate entities should maintain a moderate board size, use internationally recognised audit firm, encourage managerial ownership and engage investors as independent directors. The recommendation arises due to the need to facilitate quality and timely decision-making, board efficacy, and compliance with tax law provisions and authority. Furthermore, the study recommends that tax authorities should be more aggressive in performing their duties to collect taxes and corporations should fulfil their responsibilities as tax payers with the spirit of contributing their piece of wealth to the people through ethical tax behaviour.

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## **EFFECT OF INSECURITY ON ECONOMIC ACTIVITIES IN NORTH-WEST NIGERIA**

**Olatunji, Tunde E. (PhD),**

Directorate of Academic Planning,  
Nigeria Institute of Leather and Science Technology, Zaria,  
Kaduna State, Nigeria.

**Dauda Adamu Abubakar,**

Directorate of Academic Planning,  
Nigeria Institute of Leather and Science Technology, Zaria,  
Kaduna State, Nigeria.

**Alkali Priscilla N.,**

Directorate of Academic Planning,  
Nigeria Institute of Leather and Science Technology, Zaria,  
Kaduna State, Nigeria.

**Shehu Umar**

Directorate of Academic Planning,  
Nigeria Institute of Leather and Science Technology, Zaria,  
Kaduna State, Nigeria.

**Dogara Nasiru Danladi (PhD)**

Nasarawa State Board of Internal Revenue, Lafia,  
Nasarawa State, Nigeria.

### **Abstract**

The alarming level of insecurity in Nigeria has fueled the crime rate and terrorists' attacks in different parts of the country, leaving unpalatable consequences for the nation's economy and its growth. Over the last four decades, Nigeria's North West has witnessed waves of violence including sectarian clashes, religious extremist/militancy and electoral violence. This paper therefore examines the effect of insecurity on economic activities in North-West, Nigeria. The study revealed that the productive aspect of most manufacturing business depends largely on the availability and regular supply of raw materials for production, of which insecurity has cut off the supply of such raw materials hence, jeopardizing production activities. Other matters of concern include, insecurity affects marketing of finished product as there is a continuous exodus from areas of insecurity. There is also an increase in security spending as most

business organizations operating in Nigeria spend a lot in maintaining private security outfits. The destruction of their business building, properties and equipment is tantamount to loss of capital which has ruined not a few businesses in North-West, Nigeria. The study suggests that Nigeria's Federal authorities and State Governments in the North West should work more closely, not only to heal longstanding rifts within communities and curb violence, but also to address the structural causes of insecurity in the region.

**Keywords:** Insecurity, Economic Activities, North West Nigeria, Effect.

### **Introduction**

Global security has deteriorated markedly in the past decade. The number, complexity and lethality of armed conflicts have increased, and there has been prolonged and shocking violence in large parts of the Middle East, Africa and South Asia. The world total of forcibly displaced people is over 65 million and has been climbing sharply in recent years (SIPRI yearbook, 2018). Further layers of complexity exacerbating human insecurity are the internationalization of what often start as purely internal conflicts, the nexus of criminal violence and the activities of a multitude of armed groups, and the impact of climate change. International transfers of major weapons have increased and global military spending has stabilized at a high plateau. A Nation replete with insecurity can never attract investments nor grow its economy. Amidst the deteriorating security situation in the country, Nigeria is also confronted with daunting developmental challenges which pose serious threat to socio-economic development. These developmental challenges include endemic rural and urban poverty, high rate of unemployment, debilitating youth unemployment, low industrial output, unstable and deteriorating exchange rate, high inflation rate, inadequate physical and social infrastructure, very large domestic debt, and rising stock of external debt (Ewetan, 2013). The failure of economic growth in most developing and developed countries of Latin America and Africa, in the late 1970s, to deliver corresponding social goods and solve problems of unemployment, poverty, disease, hunger, illiteracy and ever-increasing crimes and wars, necessitated the new thinking, and redefinition of development from economic growth centered perspective to human centered approach (Nwanegbo and Odigbo, 2013).

It has been widely argued that insecurity and violent extremism can have a negative effect on economic growth in the short run through a variety of channels. Terrorism reduces the capital stock of a country by destroying human and physical capital. To combat terrorism, increased government spending on security may crowd out more growth-enhancing public and private investments in social sectors such as health and education, affecting a country's long-term growth (Micheal, Jelilov, and. Akanegbu. 2019). The risk and uncertainty effect associated with rising level of insecurity causes Foreign Direct Investments (FDI) to be redirected away from countries with higher security risk and toward countries with lower risk. Increased levels

of insecurity reduce investment returns, reducing a developing country's capacity to attract foreign direct and portfolio investments (Chuku, Dominic, and Ima-Abasi. 2019). Furthermore, terrorist activities create economic risks and uncertainties that distort the equilibrium resource allocation within a country by influencing individuals' savings, investment and consumption behaviour. Terrorist activity also stifles growth by increasing the cost of doing business through higher wages, higher insurance premiums and increased security expenditures. These higher costs result in lower profits and, as a result, a lower return on investment. Terrorist attacks can also devastate infrastructure, causing business disruptions (Brodeur 2018). However, the intensity of the consequences of terrorist events on the economy may be varied across countries based on the economic structure.

The bane of Nigeria's development is insecurity. Insecurity situation is costing Nigeria its leadership role in Africa in terms of development. Consequently, more proactive initiatives regarding tackling menace of insecurity are needed in Nigeria since security is central to development, and the national transformation agenda of the current administration may not be achieved if there is no solution to the menace of insecurity ravaging the country. The presence of insecurity in any environment constitutes threat to lives and properties, hinders business activities, and discourages local and foreign investors, all of which stifles and retards socio-economic development of a country. In Nigeria there has been rising wave of insecurity since the country attained independence in 1960. This rising wave has not abated but has assumed a dangerous dimension which is even threatening the corporate existence of the country as one geographical entity (Ali, 2013). Insecurity is a risk factor which business owners and managers dread and avoid by relocating their businesses elsewhere. In the case of Nigeria, there is also evidence of some businessmen and manufacturing companies having to relocate particularly from the North in recent times to other peaceful parts of the country (Nwagboso, 2012).

Many of the Igbos and Yorubas from Southern Nigeria who are engaged in various businesses in Northern Nigeria have had to return to their home states to avoid the violence orchestrated by the terrorist group Boko Haram (Egbewole, 2013). Thus, the Boko Haram insurgency which begun in Maiduguri, Borno State, in 2009, has badly affected the economy of the North as major consumer goods and the companies which produce these consumer goods have withdrawn from the region. A good example are the telecommunication companies which have been forced to close down as their telecommunication apparatuses were repeatedly destroyed; media houses were equally attacked as well as having some of their staff killed; banks too were not spared from the destruction as some branches of the banks were attacked and robbed. Thus, the resources which could have been used in strengthening the infrastructural amenities are increasingly being diverted to fund the security system, therefore constituting a drain on the nation resources (Nwagboso, 2012).

Nigeria has been ravaged by terrorist activities which has made the country unsafe for Nigerians and foreign investors. The country was named the third most afflicted by terrorism

in the 2020 Global Terrorism Index, trailing only Iraq and Afghanistan (GTI, 2021). The disturbing level of insecurity has rendered the economy unappealing to local and foreign investors, who have become apprehensive of investing and putting their hard-earned resources in profitable investment in Nigeria (Chuku et al 2019). In addition to the country's deteriorating security situation, Nigeria is beset with significant developmental issues that constitute a severe threat to socio-economic progress. These socio-economic issues include widespread poverty in the midst of plenty, sharp inequality in income distribution, extreme youth unemployment, poor industrial output, high inflation rate, decrepit infrastructure and fragile GDP growth (Edeme and Nkalu 2019). These and other depressing macroeconomic statistics, compounded by the COVID-19 pandemic, are an effective prescription for conflict and violence as the struggle for survival over limited resources intensifies. Nigeria's myriad of security concerns is becoming rather too complex for the country's armed forces to manage, and overcoming them would require a comprehensive response. Insurgency, banditry, organized kidnapping and other forms of criminality have created a thriving trade in small arms, light weapons and other illicit trafficking. The proliferation of weaponry has increased insecurity in the country, resulting in over 80,000 deaths and 3 million Internally Displaced Persons (IDPs) despite the fact that the country is not at war (United Nations refugee agency and the Council on Foreign Relations 2021). The number of small arms and light weapons in the hands of non-state actors and civilians in Nigeria is estimated to be around 6,145,000, compared to 586,600 firearms in the hands of the armed forces and law enforcement agencies (The Institute for Security Studies 2021). Security forces have been overwhelmed, allowing terror groups to operate with little or no resistance, primarily in huge swaths of ungoverned spaces. Local disputes are used by violent extremist organizations, who take advantage of insufficient governmental security and protection to establish their own influence over local communities and safeguard their groups' survival. In the absence of government security, community members may be forced to assume control of their own security (Yusuf, & Mohd, 2022). This would result in increased violence, the loss of lives and livelihoods and the proliferation of weapons.

Nigeria's arid North West is beset by violence between herders and farmers, which has been compounded by an explosion in criminal activity and infiltration by jihadist groups into the region. Nigeria's North West states are, Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto and Zamfara. According to the 2006 national census, the states' populations were: Kano (9,383,682), Kaduna (6,066,562), Katsina (5,792,578), Jigawa (4,348,649), Sokoto (3,696,999), Zamfara (3,259,846) and Kebbi (3,238,628). Much of the North West is savannah, but the region is also interspersed with vast forests, some of which are home to thousands of mostly Fulani herders (also known as pastoralists). The largest expanses are the Kuyanbana forest straddling Zamfara and Katsina states but also stretching into Kaduna and Niger States; Falgore forest, which stretches through three local government areas (LGAs) –

Riding Wada, Sumaila and Doguwa – in Kano State; Kamuku forest, which covers an area of 1,121 sq km from Kaduna to Zamfara, Katsina, Niger and Kebbi States; Rumah/Kukar Jangarai Forest Reserve, which covers an area of about 800 sq km from the North West of Katsina State to Zamfara State; and Rugu forest, which stretches from the Birnin Gwari area of Kaduna State into Katsina and Zamfara States, once under the watch of forestry authorities, these forests gradually became hideouts for criminals including cattle rustlers, highway robbers, kidnappers and cannabis growers. In Kaduna State, locals now refer to the Kamuku forest as “Sambisa”, suggesting it has become as dangerous as the Borno State woodlands where Boko Haram established its stronghold. The last decade has seen thousands of people killed and hundreds of thousands displaced, with many fleeing into Niger Republic next door. State-level peace efforts with several armed factions have had some success, but these will not prove durable unless more actors lay down their weapons. Over the last four decades, Nigeria’s North West has witnessed waves of violence including sectarian clashes, religious extremists/militancy and electoral violence.

Despite its economic potential, the North West has the highest poverty rate in Nigeria. As of 2019, all seven States in the zone had poverty levels above the national average of 40.1 per cent, led by Sokoto (87.7 per cent), Jigawa (87 per cent) and Zamfara (74 per cent), (National Bureau of Statistics, “2019). The zone currently has the highest number of out-of-school children in Nigeria. In five of the zone’s States – Kano, Katsina, Sokoto, Zamfara and Kebbi – more than 30 per cent of school-age children are not in school. “39% of children in North-West, except Kaduna, are out of school. As security has deteriorated, the region has steadily come under the renewed influence of terrorist groups, which have sometimes attacked security forces (The Nations, 2019). The spike in terrorist activities in the North West has raised fears that the region could soon become a land bridge connecting insurgencies in the central Sahel with the decade-old insurgency in the Lake Chad region of North-Eastern Nigeria. Security sources point to a resurgence of the long-dormant Boko Haram splinter group, Jama’atu Ansarul Muslimina Fi Biladis Sudan (Group of Partisans for Muslims in Black Africa), better known as Ansaru, which was active in North-Western Nigeria between 2011 and 2014. Several factors have been adduced as the driving forces of banditry in Nigeria and most especially in the North-West region of the country (The Punch, 2019). Drivers of banditry in North-Western Nigeria consist in some socio-existential conditions that characterize the interior as well as the frontiers of the region. Prominent among these conditions are the scarcely governed spaces- the hinterlands, forestlands and borderlines of the region. The northwestern hinterlands are marked by extremely dispersed rural settlements, separated by rangelands and farmlands that are susceptible to violent contestations (Gaye, 2018). Another factor that promotes banditry in Nigeria is the high level of unemployment rate. The National Bureau of Statistics (NBS) in 2019 puts Nigeria’s unemployment rate at 23.1%, of which



youth unemployment is 55.4%. Equally, the poverty index in the North-West is 77.7% (NBS, 2012; Rosenje & Moliki, 2016).

Socio economic development is the primary goal of every well-meaning government, and it is essentially dependent on the level of economic activities in a country; the level of economic activities is in turn enhanced by peaceful co-existence by people. In the absence of security, socio-economic development cannot be sustained as it destroys economic, human and social capital. The Boko Haram insurgency in Northern Nigeria has almost crippled economic activities in that region. Also, activities of other militia groups in other parts of the country pose serious threat to the economic health of these regions. The security crises in different parts of Nigeria is destroying existing infrastructure and preventing a peaceful environment for the development of further infrastructure, and a safe environment for economic activities by individuals to give them economic empowerment that will enable households not only to cater for their present generations, create wealth, but also to provide for future generations. The report by World Bank (2011) on “Conflict, Security and Development” reveals that about 1.5 billion people live in countries affected by political and criminal violence, which has exacerbated human misery, and disrupted development (Omoyibo, & Akpom era, 2013). The report by World Bank (2011) on “Conflict, Security and Development” reveals that about 1.5 billion people live in countries affected by political and criminal violence, which has exacerbated human misery, and disrupted development. The United Nations Migration Agency, International Organization for Migration (UNMAIOM), (2022) has expressed worries over rising displacement in the North Central and North West region of the country as a result of growing ethnic and religious groups as well as renewed attacks by bandits.

Recent evidences show that terrorism is becoming frequent in Nigeria, ranging from incessant Boko Haram and its offshoot, the Islamic State of West Africa Province (ISWAP) insurgency in the North East; Independent People of Biafra (IPOB) activities in the South-East states, kidnapping and vandalization of oil pipes in the South-South, nomadic cattle herders and farmers clashes in the Middle Belt, banditry and a thriving mass abduction-for-ransom business in the North-West and North-central states among others. Existing studies have suggested that violence in Nigeria may be considered as a consequence of economic and political factors such as poverty, unemployment, inequality, corruption and poor governance. The predominance of socio-economic insecurity might make survival a vital concern (Purity and Anigbuogu, 2019). The more challenging problem, however, is that the motivation for terrorism in a resource-rich, socially heterogeneous developing country like Nigeria could be confounded by additional dimensions, such as resource competition, ethnic fractionalization and economic deprivation; all of which interact to make the situation more intricate to understand or deal with, especially because of the relatively lower capacity of a typical developing economy to confront the increasing sophistication of terrorist activities. Hence, the consequences of terrorism in such an environment are likely to extend beyond the destruction of lives and property to longer term macroeconomic effects (Isola et al. 2019). Thus, it has been observed that in areas where insecurity are prone in Nigeria, economic activities and variables have been lagging behind.

### Purpose of the Study

The aim of this paper therefore is to review the effect of insecurity on economic activities in North-West Nigeria.

### Research Question

To what extent does insecurity affect economic activities in North-West Nigeria?

### Null Hypothesis

Insecurity has no effect on economic activities in North-West Nigeria.

### Methodology

Descriptive qualitative analysis was used to explain the data gathered for this study. This analysis according to Nnamdi Azika (2004), is used to verbally summarize the information generated in research. It is theoretical with in-depth explanatory and illustrative description, producing results that give meaning, experience and views. As Tilahun Nigatu (2009) puts it, it is a range of processes and procedures whereby we move from the qualitative data that have been collected for a study into some form of explanation, understanding, or interpretation of the situations been investigated. Using such descriptive qualitative analysis therefore and data from secondary sources, I analyzed the effect of insecurity (the dependent variable) on some economic parameters (explanatory variables) and established the direction of such effects. I sought to do this by utilizing tables, percentages, and bar graphs. Bar charts as used in this study presents categorical data with rectangular bars and heights proportional to the values that they represent. Each bar's length is proportional to the bars represented values. The line charts on the other hand, displays information as a series of data points connected by straight line segments. They are used to display trends overtime. In sum, they provide a simple way to visualize a sequence of values. Data for the study were obtained from secondary sources including the Central Bank of Nigeria, National Bureau of Statistics and Papers. Reliance was placed on data from these agencies because of their method of data collection and the integrity of the data.

### Results

**Table 4.14: Correlation between effect of Insecurity and Economic Activities in North-West Nigeria**

Variable	N	Mean	Std. Dev	Std. Error	r- calc	DF	P- value
Effects of Insecurity	179	1.2961	4.8634	0.4129	0.043	177	0.000
Percentage of marital us	171	1.034	4.532	0.182			

(Critical value = 0.073, DF = 177,  $P < 0.05$ )

The result of the test revealed that the two variables, insecurity and economic activities were

significantly correlated. The observed coefficient of correlation in the table 4.14, 0.043 obtained at 177 degrees of freedom. The probability level of significance is 0.000 ( $p < 0.05$ ). These observations are sufficient for the rejection of the null hypothesis. The null hypothesis shows that there is no significant effect between insecurity and economic activities in North-western Nigeria.

### **Discussions**

Trends have shown evidently that insecurity is capable of drying-out investment, increasing unemployment, reducing export receipts and government revenue and by implication slows economic growth. The level of kidnapping and armed robbery is at a high rate, leading to a significant loss of lives and properties, and an economy capable of taking people to hunger and loss of hope on the government. According to Stewart (2004), as cited in Onime (2018), the economic cost of insecurity is enormous. The culture of "get-rich-quick syndrome" has taken over Nigerian ethical standards, thereby, becoming a threat to the nation's image. It is hereby posits that these disturbances and insecurities in its various forms affects economic growth.

The effect of insecurity is very obvious as it presents itself in the destruction of few available infrastructures needed for the industrial growth and development of the nation. No country of the world can develop without the needed prerequisite for growth and development. With the huge outlay of government resources spent on curbing the menace of insecurity and the attendant destruction of the few existing infrastructure, one can assume that the challenges that insecurity posed to development is enormous.

The overall level of insecurity is captured by the Global Fund for Peace's Failed State Index which provides insight into various components of State insecurity. The failed State index has some indicators. It is important to note that the smaller the index or score for each indicator, the better the State of affairs of the country. According to Stewart (2004), the economic cost of insecurity are enormous. People who joined the fighting forces, who are killed or flee, can no longer work productively; schools, power stations, rails ways and roads that are destroyed reduced the productive capacity of the economy. Further, displacement of people reduces the production of exports, thereby reducing foreign exchange earnings, import potentials and consequently further constraining output, leading to a decline in employment and earnings. The menace remains a threat to governance and economic activities in North-West Nigeria and Nigeria as a whole.

Thus, it has been observed that in areas where insecurity are prone in Nigeria, economic activities and variables have been lagging behind. For instance, in the North West of Nigeria where bandits and unknown Gunmen have held sway, the area has been deserted, businesses, including informal sector have been affected, unemployment has soared, internally displaced persons (IDPs) and camps have suddenly emerged, State internally generated revenue have

plummeted among many other destructive patterns of the insurgent, terrorist and bandit activities.

### **Conclusion**

The protection of people and property from local and international dangers is critical for the functioning of markets and the incentives to invest and innovate. This may explain why many countries around the world wish and work to maintain peace and security within and beyond their borders (Amana, Aigbedion, and Zubair, 2020). Good governance entails ensuring justice, empowerment, employment and efficient service delivery. So, governments should continue to work toward eradicating poverty, narrowing income and wealth disparities, eliminating corruption and nurturing good governance policies (Mazumdar and Bhattacharjee 2019). On the other hand, rising levels of insecurity and anti-national activities pose a significant challenge to national rules and regulations, human rights and, in particular, have a significant negative effect on the economy, affecting price, output, employment, trade balance, poverty, inequality, defense expenditure, government budget patterns, socio-political environment and several others (Isola, Ayopo, Abiola, and Joseph, 2019).

Insecurity has reached frightening proportions in Nigerian North Western region, rearing its ugly head in numerous aspects of our national life. Day after day, lives are lost, the population is depleted, businesses are paralyzed, investments are plummeting, multinational corporations are shutting their operations and leaving the country, unemployment is skyrocketing, and the citizenry terrified and acutely impoverished (Laniran, and Ajala, 2021). Clearly, this represents a severe threat to Nigeria's government and economic growth. Unless a more robust counter-terrorism strategy involving kinetic and non-kinetic means is implemented alongside major governance and political reforms aimed at reversing Nigeria's historic, social and economic imbalance, the predominantly military approach to countering various forms of insecurity in Nigeria could continue to create tensions between the government and the populace.

Security operations against armed groups are important to curbing violence in Nigeria's North West, but they will not secure the region durably. The same is true of dialogues with them: while valuable, many of the gains produced by earlier amnesty programs and cash rewards have proven short-lived. Sustainable peace requires a more comprehensive response by Nigerian authorities, at both the state and federal levels, that addresses drivers of violence in the region.

### **Recommendations**

- i. Government at all levels should put in place functional security system like community policing (Vigilante), to supplement the operations of other security agencies as well as the need for proper orientation of the Nigerian security

personnel on the need to maintain peace and order in collaboration with the local vigilante. The local vigilante understands the terrain of their communities/environment better than the newly posted police officers from other states.

- ii. To build a more durable peace, Nigeria's federal authorities and state governments in the North West should work more closely, not only to heal longstanding rifts within communities and curb violence, but also to address the structural causes of insecurity in the region.
- iii. There should be adequate supply and installation of modern technology as well as increased surveillance while border security personnel are urgently required to check trans-border crimes, which are part of the igniting factors accentuating banditry in Nigeria.

### **Suggestion for Further Research**

The study, therefore, suggests that policy makers should, in order to prevent or combat terrorism, focus on improving the economy by improving access to socio-economic infrastructures that reduce poverty, creating job opportunities through provision of conducive environment that supports businesses and reduces inequality gaps. Although the current study provides remarkable insights on the fiscal and socio-economic effects of insecurity on economic activities in north-west Nigeria, it is susceptible to significant limitations, mostly related to data availability and the econometric technique. Future research could look into a comparative assessment of the effects of insecurity on agricultural output and food security in Nigeria's various geopolitical zones using additional variables.

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## COMPARATIVE STUDIES OF PADDY RICE GRAIN ENGINEERING QUALITY PARAMETERS FOR THREE VARIETIES OF UPLAND PADDY RICE GROWN IN MUBI, ADAMAWA STATE NIGERIA

**Hussaini, M. S.,**

Department of Agricultural and Bio-Environmental Engineering Technology,  
Federal Polytechnic, P.M.B. 35 Mubi,  
Adamawa State, Nigeria.

**Abubakar, Y.,**

Department of Agriculture and Natural Resources,  
Potiskum, Yobe State.

**Abdulhamid, Y.**

Department of Plant Resources,  
Agricultural Research Council of Nigeria, Mabushi,  
Abuja

**Gabi, M. N.**

### **Abstract**

The three varieties of upland paddy rice cultivated and harvested, the engineering quality parameters that aimed at evaluating highest quality paddy rice were determined. The parameters evaluated were 1000g weight, paddy shape, percentage broken grains, percentage immature grains and percentage dockage paddy for Narica A-f2, Faro 59 and Champa Chines paddy. The results obtained for the three varieties were 30g weight for Narica A-f2, 20g for Faro 59 and 30g weight for Champa paddy respectively. Other parameters were percentage broken grains of (0.35%, 0.28% and 0.26%), percentage immature grains (0.28%, 0.16% and 0.14%), and percentage dockage paddy of (2.5%, 3.2% and 3.0%) for Narica A-f2, Faro 59 and Champa Chines Paddy respectively. The data obtained were subjected to Microsoft word excel 2010 vision for data analysis. Statistical table's charts was used for presentations, from which observations, conclusion and recommendation were made for further studies.

**Keywords;** Comparative studies, Paddy rice grain, Quality, Variety

### **Introduction**

Rice quality mostly depend on the consumer and the intended end use of the milled grain. Generally the consumer want the best quality for feeding and industrialization. The quality demand has increased with increase in rice production of a particular country. Recently the trend has changed to incorporate preferred quality characteristics that increase the total economic value of rice, but all the same grain quality is not just depend on the variety of rice, but also depend on the crop production environment, harvesting, processing and method of milling. Rice is the only cereal crop cooked and consumed mainly as whole grains, and quality considerations are much more important than for any other food crop (Hossain *et al.*,



2009). Although production, harvesting and postharvest operations affect overall quality of milled rice, variety remains the most important determinant of Market and end-use qualities. Quality desired in rice vary from one geographical region to another and consumer demand certain varieties and favors specific quality traits of milled rice for home cooking (Juliano *et al.*, 1964). The paddy rice under this study was justified for its quality under total yield at harvest, paddy weight of the same quantity, broken/crack grain and grain dimension which results to the highest quality of milled rice grain in terms of economic value, physical characteristics and consumer attraction.

## Materials and Methods

### *Materials*

Seeds sample varieties of Narica A-F2, Faro 59 obtained from Grain Research Institutes Zaria and Chines Champa rice of early ripening which was obtained locally from Modern Grain Market Mubi Adamawa State, experimental plots of the department of Agricultural Engineering Federal Polytechnic Mubi, Rice herbicides, Water, Harvesting Sickles, Graduated bags, Electronic Weighing balance YP10 Model and Vanier Caliper for Measurement.

### *Methods*

#### *Cultural Practice*

A total plot of 25ft×75ft was cleared, ploughed and harrowed for the experiment in the department of Agricultural and Bio-environmental Engineering Federal Polytechnic Mubi, Adamawa State. The plot was divided in to three equal parts of 25ft×25ft for each variety to be planted. The three seeds samples were cleaned, sorted and planted on the same date of 8<sup>th</sup> of July, 2020 with a total of 15kg for each variety. The varieties were given equal considerations of Agronomic activities and treatments, no effects recorded from the above factors. Germination was between (80-90%) for all the three varieties. Since the study emphasized on the harvested paddy quality, the details of agronomic descriptions were less considered.



**Plate 1; Field Establishment of the three varieties**

#### *Paddy Quality Determination*

The parameters considered for the paddy quality were; paddy at harvest, paddy weight, broken grain, grain dimension, immature grains, dockage in paddy and 1000 kernel weight among

others. The samples of approximately 500grams of fresh paddy was weighed and the above parameters were determined as method describe by (ISO Standard 1979) Philippines.

***Determination of paddy weight;***

1000 number of counted paddy grains was weighted using electronic balance YP10KN Model and replicated three times and mean product weight was recorded for each paddy experimental sample.

***Determination of broken grain;***

Manual detection of cracked/broken was done and 100 broken grains was used to compute the percentage (%) broken grain using the equation;

$$\% \text{ Broken grains} = \text{Number of broken grains} / 100\text{grains} \times 100. \quad \mathbf{1}$$

***Determination of grains dimension;***

Digital caliper was used to measure of 10 samples from each replicates and mean average was recorded for length and width of the paddy grains. The paddy shape was obtained from the equation;

$$\text{Length to Width ratio (L/W)} = \text{Average paddy length, (mm)} / \text{Average paddy width (mm)} \quad \mathbf{2}$$

The dimension data will be classified based on the International organization for standardization (ISO) for paddy. Table 1.

Scale	Shape	L/W Ratio
1	Slender	Over 3.0
3	Medium	2.1- 3.0
5	Bold	1.1 - 2.0
9	Round	1.0 or less

**Source;** (Quality Standard of Rice in Philippines National Food Agency 1979).

***Determination of Immature grains;***

A sample of 25grams grains was selected, segregated and weight the immature in the sample. The percentage immature grains in the samples were calculated from the equation;

$$\% \text{ Immature grains} = \text{weight of immature grains} / \text{total weight of the sample} \times 100. \quad \mathbf{3}$$

***Determination of dockage in paddy;***

100 grams of paddy was weight from the samples, all foreign materials was removed and weight separately, then the dockage percentage was obtained from the equation;

$$\% \text{ dockage} = \text{weight of dockage} / \text{total weight of the sample} \times 100. \quad \mathbf{4}$$



**Plate 2; Harvested yield samples for analysis**

### Data Analysis

The data obtained was subjected to Microsoft Word Excel 2010 Vision for data analysis, statistical tables and graphs were used for comparison and presentations.

### Results and Discussions

#### Results

*The products were harvested differently due to rainfall effects and maturity dates; Table 2.*

Variety	Harvesting date	Seeds planted in (kg) & plot size	Yield at harvest in (kg) per plot	Difference in harvesting (days)	in time
Narica-F2	17:10:20	15kg (25ft×75ft)	100kg	101days	
Faro 59	19:10:20	15kg (25ft×75ft)	120kg	103days	

Champa-china 30:10:20 15kg (25ft×75ft) 260kg 114days

*Source: (Field Survey)*

**The paddy grains dimensional parameters Table 3.**

Variety	Replicates	Lengths (mm)	Widths (mm)
<b>Narica-F2</b>	1	8.82	2.69
	2	9.24	2.80
	3	9.75	2.72
	4	7.89	2.80
	5	8.81	2.71
	6	8.92	2.75
	7	9.03	2.69
	8	8.65	2.54
	9	7.91	2.43
	10	8.44	2.76
	<b>Mean</b>	<b>8.75</b>	<b>2.69</b>
<b>Faro 59</b>	1	8.72	2.62
	2	7.89	2.53
	3	9.82	2.68
	4	8.82	2.58
	5	8.90	2.88
	6	9.62	2.71
	7	8.64	2.49
	8	7.94	2.51
	9	8.32	2.55
	10	8.92	2.74
	<b>Mean</b>	<b>8.76</b>	<b>2.63</b>
<b>Champa-china</b>	1	10.49	2.50
	2	10.75	2.53
	3	11.07	2.58
	4	11.06	2.41
	5	10.31	2.45
	6	11.07	2.60
	7	11.02	2.49
	8	10.08	2.38
	9	10.51	2.52
	10	11.36	2.51
	<b>Mean</b>	<b>10.77</b>	<b>2.50</b>

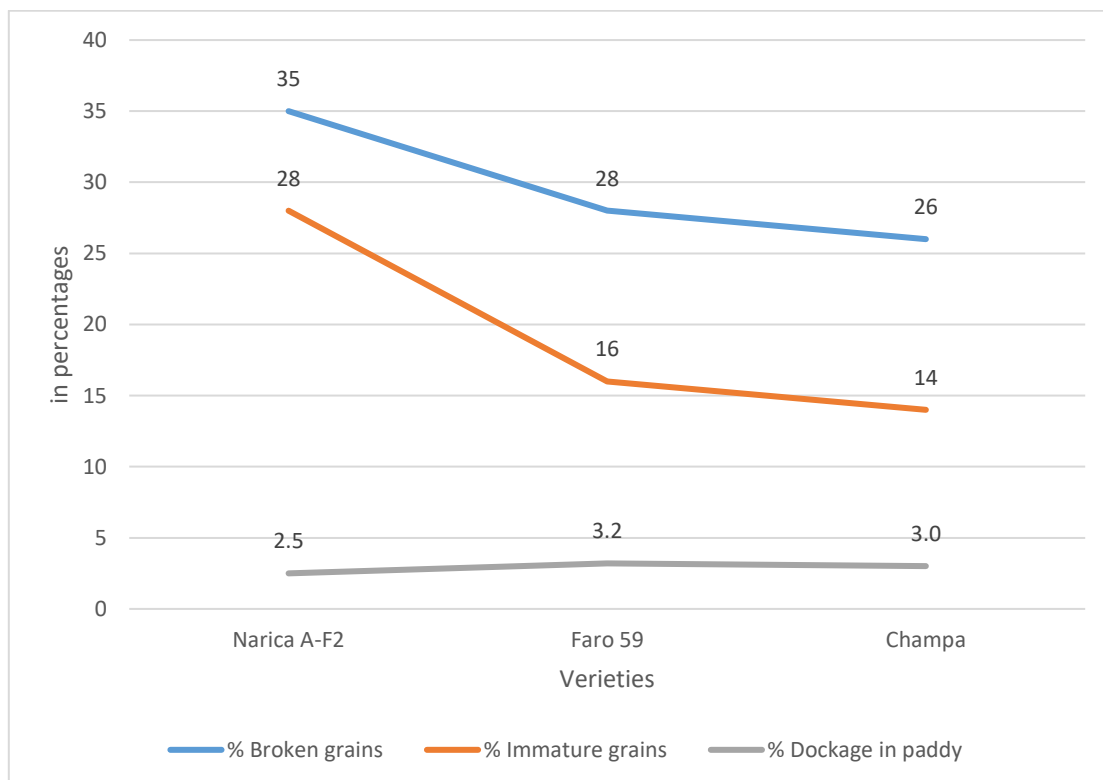
*Source: (Field Survey)*

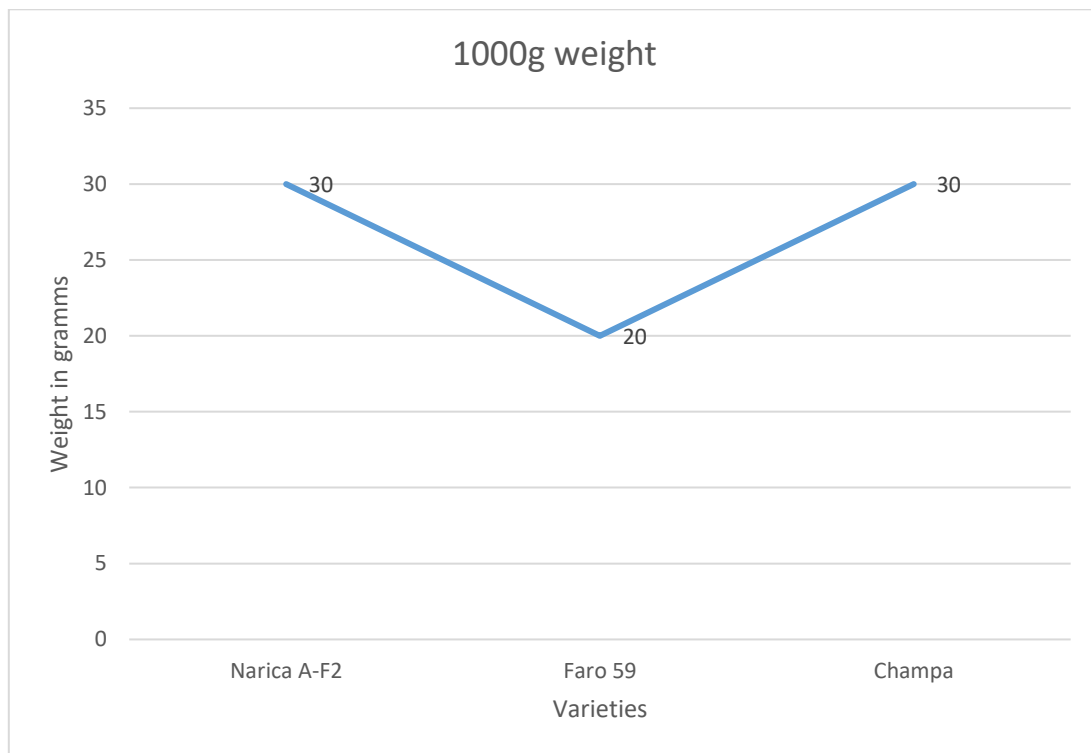
***Determined Grades for Quality Standard Table 4.***

S/N	Variety Samples	Grading Scale	Shape	L/W	Point recorded
1	Narica A-F2	1	Slender	8.75/2.69	3.3
2	Faro 59	1	Slender	8.76/2.63	3.3
3	Champa-Chines	1	Slender	10.77/2.50	4.3

*Source: (Field Survey)****Determined Quality Parameters Table 5.***

S/N	Variety Sample	1000grains weight	Percentage broken grains (%)	Percentage Immature grains (%)	Percentage Dockage in paddy (%)
1	Narica A-F2	30gramms	0.35	0.28	2.5
2	Faro 59	20gramms	0.28	0.16	3.2
3	Champa-Chines	30gramms	0.26	0.14	3.0

*Source: (Field Survey)****Figure 1: Weight of paddy at 1000g***



**Figure 2: Percentages determined quality parameters**

### Discussion

The results of the determined quality parameters of paddy rice were discussed in the following sectors:

The paddy shape which was determined from the ratio of its length to width, and categorized into slender, medium, bold and round. The three varieties investigated were found to have slender shape in terms of quality, and this is in agreement with quality standard of paddy rice in Philippines National Food Agency (1979), that reveals length to width ratio over 3.0 classified as slender rice with high quality, but also contrary to the research conducted by Danbaba, *et. al.*, (2011), in that shape should not be considered as quality parameter for rice quality characteristics. The percentage broken grains for Narica A-F2, Faro 59 and Champa Chinese varieties were found to be 0.35%, 0.28% and 0.26% respectively. The champa Chinese variety of (0.26%) considered the highest quality paddy which is in agreement with the International Standard for paddy rice in Philippines (1979), and also in agreement with that of Japan International Cooperation Agency (JICA), that paddy rice with lowest broken grains should be considered as high quality grade as far as grading system is concerned. The percentage of immature grains for Narica A-F2, Faro 59 and Champa Chinese varieties was found to be 0.28%, 0.16% and 0.14% respectively. This is also in agreement with Japan

International Cooperation Agency specific requirement for grading system that stated rice with 1.0-1.5% immature grains should be considered as grade 1, and others should follow based on the percentages of the immature grains. The percentage dockage for Narica A-F2, Faro 59 and Champa Chines Varieties were found to be 2.5%, 3.2% and 3.0% respectively. The three varieties investigated falls within the acceptable range of quality as reported in both Federal Ministry of Agriculture and Rural Development of Nigeria and Japan international cooperation agency manual on simple paddy grading checking in field and storages of famers (2016), that rice with dockage percentages between 1-5% should be accepted for quality grade 1., 2-3% as 2 and 3-5% as grade 3 respectively.

## **Conclusion and Recommendation**

### ***Conclusion***

Based on the results obtained from this study, champa chines paddy was observed to high quality parameters of good rice characteristics with 1000grains weighted to 30gramms, slender shape of 4.3mm, percentage broken grains of 0.26%, percentage immature grains of 0.14% and percentage dockage in paddy of 3.0% respectively, in comparison to Narica A-F2 and Faro 59 with 1000grains weight to 30g and 20g, percentage broken grains of 0.35% and 0.28%, percentage immature grains of 0.28% and 0.16% and percentage dockage in paddy of 2.5% and 3.2% respectively. Therefore, the champa chines paddy rice obtained the highest quality parameters in terms of economic value, physical characteristics and consumer attraction.

### ***Recommendation***

From the study conducted on the three varieties of paddy rice (Narica A-F2, Faro 59 and Champa Chines paddy) on quality characteristics, the champa chines paddy recorded the highest quality, therefore it is recommended for famers and industries around the study area, and Adamawa State at large.

### ***Acknowledgment***

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## **ACQUIRING WRITING SKILLS IN NIGERIAN SECONDARY SCHOOLS: TEACHERS' AND STUDENTS' CHALLENGES.**

**Noel Donatus Shiolbial**

Department Of Basic Studies,  
Plateau State College Of Agriculture, Garkawa,  
Plateau State, Nigeria.

### **ABSTRACT**

English is an international language and in demand today. English is by far the most widely used language around the world. However, English language writing has always been a challenge for second language students' to master. Developing students' ability in writing is one of the major challenges faced by the ESL teachers in most schools nowadays. Nevertheless, writing has always been a major difficulty faced by students' in English language learning, especially in secondary schools. Not only that, teachers' are also facing some challenges in teaching writing skills for students' in secondary schools. Thus, this study aims to explore the challenges faced by both the students' and teachers' in learning as well as teaching writing skills in secondary schools.

**Keywords:** Writing Skills, Teaching and Learning Writing, Challenges, Secondary School, English as a Second Language.

### **INTRODUCTION**

Writing is an important means of communication in today's technology driven society, those who command both spoken and written skills enjoy a superior social position in comparison to those who handle only the form of speech. For students in academic institutions the ability to write it one of the prerequisites for functional and permanent literacy (Oyetunde, 2015). It is not only for academic success but also for better preparation into the modern workforce, one which places a heavy emphasis on proficient literacy skills (Chase, 2011). Indeed good writing skill is necessary for any student to perform well academically and even beyond school context, writing therefore being a literacy skill is indispensable to students' academic pursuits. Primarily the performance of students in schools is assessed by teachers, through writing of assignments, continuous assessment, tests, national examination and engaging in note taking. Writing is a complex task which requires the coordination of fine motor skills and cognitive skills. It also reflects the social and cultural patterns of the writer's time (Fisher, 2012, Myhill and Fisher, 2010). A close look at the situation or experiences with writing in Nigerian secondary schools today shows that writing seems to be the most difficult skill for language learners to acquire in academic context (Negari, 2012). This is because the nature of writing

itself is complex which involves a process with interrelated system. The same difficulty arises in teaching writing Huot (2002) notes that writing is difficult for teachers to teach and assess. In the Nigerian secondary school curriculum the teaching of writing as a language skill is done by the teachers of the English language. English language is a compulsory subject at all levels of education it also serves as the medium of instruction for other content areas. In addition, in order to gain admission into any tertiary institution in Nigeria, students must obtain at least a credit pass in English language at the senior secondary school certificate examination (SSCE). The SSCE is conducted by examining bodies such as the West African examination council (WAEC) and the National Examination Council (NECO). Students' who lack good writing skills would not be able to obtain the minimum pass required as the section (paper 1) testing the writing skills carries the most marks (60%) of the examination. The following types of essay genres are tested; narrative, expository, descriptive debate/argumentative, speech, article and formal and informal letters. Students' ability to write on any of the types will be able to obtain the minimum pass required. Undoubtedly the ability to write is important in academic context.

Despite its importance reports about students' writing in Nigeria have consistently revealed that students are predominantly deficient in this area for example the West African Examination Council's Chief Examiners Report (2016) lamented poor performance of students' in writing and suggested the need to inculcate writing culture among secondary school students. Also the Chief examiners report of (2017) showed that students' knowledge of basic grammar, tense and sentence construction in their essay writing was poor.

Several reasons could account for students poor performance in English essay writing. The most significant of these reasons, perhaps could be because teaching writing has become difficult as a result of the challenges faced by the students in learning writing skills, some of the challenges faced by the students are lack of vocabulary, poor grammar, poor spelling, students' readiness and lack of exposure to books and reading materials. The challenges faced by the students have made it challenging for teachers to teach writing skills. The challenges that are faced by the teachers to teach writing skills are; difficulty to motivate their students, students of diverse levels, difficult materials and time constraint to teach the students. Therefore this paper seeks to provide a literature review on the challenges faced by both teachers as well as students in teaching and learning writing skills.

## **LITERATURE REVIEW**

Writing is one of the skills among speaking, reading and listening skills in English. Writing is a multiplex activity Ling (2016). Writing activities need to be conducted among students' since elementary school so that the students' can generate good pieces of writing in the future. Even though there are many subjects in elementary schools, writing is known as one of the most vital academic subjects for students'.

### **DEMAND ON WRITING SKILLS**

Writing is a crucial skill that will benefit the rest of the students' lives. Introducing and practicing writing with attractive activities in schools, could increase students' confidence and they will fall in love with writing in a long run. Writing skills are vital for lower primary students to continue learning in all academic areas, communication and self-expression. Writing exercises in schools promote the improvement of penmanship as well as overall academic development through troubleshooting and critical thinking. The writing process also is applicable to other areas such as mathematics and sciences, where the learned traits of planning, research and review is applied as well. General knowledge and vocabulary are also improved as a subsequent effect. Through journals and personal story writing students' can discover themselves and work through their real-life problems. A report by the U.S Department of Health and Human Services states that writing can provide a therapeutic outlet to help students' cope when they are facing hard time in their life such as having problems with their parents or feeling sad.

Writing assists students' with their social development. Writing connects the students' to be in tune with what happens in the world around them. Students' need to consider the audience and purpose in writing. This will help the students' with their verbal communication at the same time. Writing with friends' feedback, makes students' to learn among themselves. As students' progress through their school years, they will need to be both literate and computer literate to succeed. While the two skills complement each other, some computer tools such as spelling and grammar checks, can prevent them from developing their writing skills. As an example, students' who are not practicing their handwriting when they are writing with a keyboard. It is also important for the students' to know that they need to use their own knowledge, not by replacing their knowledge with computers, because computers can make mistakes too.

Today, due to the evolution of information technology, writers are in demand to create digital media content. A content writer is needed for digital marketing corporations. News websites, social media marketing corporations and other related and non-related. I.T corporations need writers to help them through writing for digital marketing channels such as brand quotes, advertisement, and social media posts, blogs among others.

### **PURPOSE OF STUDENTS' WRITING BY USING DIFFERENT WRITING STRATEGIES**

There are many ways to improve students' penmanship through writing exercises at elementary level, students' may use different writing methods at a time. There are various teaching writing strategies for examples; pre-writing, writing warm-up, collaborative writing, using sentence starters, and guided writing. All the teaching of writing strategies cannot be used at the same time as they may have different teaching objectives. Employing various

teaching techniques to teach writing will help the students' improve their writing skills in English. As the students' have interest and become active participants in learning, the learning process will fall on the right track. Besides, using various writing strategies will make the students' think creatively. Students may use what they know by combining opinions and facts, thus, making a new piece of writing.

### **CHALLENGES FACED BY THE STUDENTS' IN LEARNING WRITING SKILLS**

Each student may face different challenges in learning writing. All the students are special and unique in their own ways. These challenges will somehow pull back the students from moving forward to produce a good piece of writing. Lack of vocabulary has caused the students to face challenges in acquiring writing skills. (Misbah, Mohamad, Yunus and Ya'acob, 2017). Vocabulary is the fundamental element in constructing sentences which is the core of effective writing skills (Asep, 2014). Students almost use spoken and written words every single day to communicate their ideas, beliefs and feelings with people around them. Good vocabulary repertoire can help students to speak or write to deliver their thoughts. Usage of electronic dictionary and more reading activities can help students with limited vocabulary.

Some elementary school students' are also having trouble with grammar. Grammar plays an important role in writing. Grammar provides information that helps the readers to understand its meaning. It is a structure that conveys the detailed meaning of the writer to the reader. Grammar also explains the forms and structure of words, called morphology and how they are arranged in sentences, called syntax. By having very limited knowledge in grammar, students will face anxiety to write sentences with correct grammar. According to Muhammad Fareed, Ashraf and Bilal (2016) students make mistakes in subject-verb agreement, pronouns, tenses, articles, prepositions and basic sentence structures, grammar ability can be improved through reading activity and grammar related activities.

Poor spelling is another cause of anxiety for students in learning writing skill and this is supported by Nyang'an Benard (2014). Having good ability in spelling will lead to positive learning of writing skill. If the students are struggling with spellings, it will hold them back to move forward. The students have the habit to spell according to their pronunciation and this will lead to wrong spelling as explained by Afrin (2016). The students will either add or leave letters of the words. For an example. "Ballon" instead of "Ballon." According to Nyang'an Benard (2014) memorization of the spelling will help the students to have good spelling.

Students' readiness is another challenge in learning writing and this was supported by foster (2015). According to Winarso (2016) in order to complete a task successfully, readiness is very important. The readiness can either be physical readiness and mental preparedness. If this is not occurring, students will be having challenges in writing. Students will not be mentally prepared to learn in the classroom if they are not ready. It is very important for the students to

be ready before they enter the classroom. According to Foster (2015) motivating and attracting the students' attention can help students' readiness in learning writing.

Lack of exposure to books and reading materials are other challenges for elementary school students in learning writing and this is supported by Foster (2015). According to Fareed et al. (2016) many students find it very challenging to get enough and significant source of information. Lack of extensive reading will not help the students to writing good sentences or paragraphs. This is because reading and writing are interrelated. If the students are not reading books or other reading materials, they are going to have lack of ideas and vocabulary to write. Their brain neurons will be connected to each other to come out with a good writing if they read more and connecting the ideas with their prior knowledge. Foster (2015) explained that exposure to different reading materials can help the students to be aware with language awareness explained.

Last but not the least, lack of motivation is another challenge faced by the students. If the students are not motivated, they might not be interested to proceed with their learning process. Motivation is important in improving students' learning results. (Gbollie and Keamu, 2017). Teachers could motivate the students by rewarding them with simple motivational phrases by saying "Good job!", "Good try!", "Keep it up" among others. Positive reward will make the students go further in their learning process.

### **CHALLENGES FACED BY THE TEACHERS' IN TEACHING WRITING SKILLS**

Teaching has always been the challenging part for teachers. Teaching English at primary level is naturally much more different from teaching in other levels of students such as secondary and tertiary levels. The challenge will somehow make the teachers' teaching ineffective. The following are the challenges faced by teachers.

Nowadays, teachers are having a hard time in motivating the students, not because of the students' naughtiness, but the students are not interested in learning writing and this is supported by Asep (2014). The younger generation has the perception that they can do whatever they please since much freedom has been given to them by their parents. When students choose to feel reluctant in learning, it is a sign of lack of motivation (Abrar, 2016). Having different levels of students in the classroom is another challenge faced by teachers to teach writing. In many elementary classrooms, students from different levels are placed in the same classroom. Different levels of students will result to difficulty to teachers in order to cater all of their levels simultaneously (Asep, 2014). Different levels of writing ability will require the teachers to use different approaches, as a result the teachers feel difficult to plan their lessons and prepare appropriate activities for the students.

Parental indifference is another challenge. Lack of parents' support will make the teachers having a hard time to help the students. Students who feel lack of warmth and affection from their parents will draw them back from succeeding in their learning process (Gundogmus,

2018). This is due to little guidance, motivation and support from their parents. Besides, lack of professional experience is another challenge faced by the teachers (Gundogmus, 2018). Having lack of professional experience will lead to stress and tension to teach at elementary school students especially among novice teachers. The multiple roles of teacher are also a challenge. The teachers' experience is depending on the level of their previous experience and training. It will take time for the novice teachers to adapt themselves with their students very well. Teachers can only prepare appropriate activities if they know well about their students' proficiency level, and interests. Not only that, longer time is needed for teachers to prepare new teaching materials, appropriate lesson plans, suitable activities, and provide comments or reflections.

Finally, according to Anyiendah (2017) lack of students' interest is another challenge. Developing writing skills is always challenging, however, it is always an interesting task. Especially when it comes to writing, some students zone out. Students feel lack of interest in writing because they need to know many aspects in order to produce a good piece of work. The students need to know punctuations, grammar, vocabulary, spelling and sentence structure in order to write a good piece of writing.

## CONCLUSION AND IMPLICATIONS

This study is to explore the literature review on the challenges faced by both the students and teachers in learning and teaching writing skills. It can be concluded that school students are facing many challenges to learn writing skill and it is not easy for English teachers to teach them writing skills. The existing literature has identified demands on writing skills in English, purpose of students' writing by using various writing strategies, challenges faced by both the students and teachers in learning and teaching writing skills and past studies on the challenges faced by students and teachers to learn and teach writing skills among ESL school students. By understanding both the students' challenges in learning and teaching writing skills, the teachers could choose the best possible approach to teach writing skills by giving feedback and guidance. Besides, the school management should take necessary actions on the challenges faced by the teachers in order to facilitate the teachers to have effective teaching process. Finally, teachers may stress the importance of learning writing skills to the students in order to motivate them to learn writing skills.

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## STAFF-CUSTOMER RELATIONSHIP MANAGEMENT AND ITS IMPACT ON ORGANIZATIONAL IMAGE AND PERFORMANCE

**Koce, Henry Diko**

Department of Marketing,  
Federal Polytechnic, Bida,  
Niger State, Nigeria

**Bello, Babatunde Sikiru**

Department of Marketing,  
Federal Polytechnic, Bida,  
Niger State, Nigeria

### Abstract

Building dependable and reliable relationship between staff and customers is of paramount interest to any business. Organizations have now come to the realization of the inevitability of good customer service relations, so customers constitute an indispensable asset. However, this paper will know how to custom management impacts on organizational image and performance and also analyze the impact of organizational culture organization and performance. In order to realize this objective given the research model, two hypotheses were formulated. Descriptive survey method that involves data collection from respondents with questionnaire was used for the study's presentation. 345 questionnaires were duly filled and returned out of the 400 administered thereby bringing our sample size for the study to 345 respondents who are customers of at least, one of the two banks under the study. Questionnaires returned were analysed with statistical package for social science (SPSS). A major finding indicated that customer management has a significant impact on organization image and performance. Result of analysis indicated that customer management has a statistically significant impact on organization and performance while organizational culture has not yet any significant effect. The study recommends the need for organizations to improve on the culture in order to achieve greater performance and improved organizational image as it is believed that this will help in attaching more customers to strengthen the competitive positions of the organizations.

**Keywords:** Staff; Customer; Relationship; Impact; Organizational Image; Performance.

### Introduction

One of the most important challenges for any organization rests on serving and maintaining good relations with the customers who are adjudged as the 'King'. From the time immemorial,



customers were simple and happy persons at whatever organizations, whether manufacturing or service-orientation offered to them. Marketing no longer depends on development, making, selling and delivering products and services. It is increasingly more concerned with the creation and maintenance of mutually satisfying long-term relationships with customers. Over a period of time, with the competition and technological improvements, customers have become grossly aware of the rights and augmented products that soon become an expected one. This changing business environment is characterized by economic liberalization increasing competition, high consumer choice, well-informative and demanding customers that care about quality and value purchase. The new framework for business activities that came up in 1990s and are characterized by the globalization of markets, technological development, larger number of competitors, and increased customer needs forced firms to rethink their management systems to fit themselves to the new competitive environment through the concept of customer relationship management. Due to rigorous competition in recent years, many organizations have perceived the need to be more customer-oriented. (Bull, 2019). CRM is more of evolution change than revolution. Thus, achieving the full potential of each customer relationship should be the major goal of every business. A dissatisfied customer causes market damage and economic loss to business because they are more likely to persuade others to defect from the firm's products. Therefore, it is no surprise that staff-customer relationship management is an important topic of conversation in business world today (Feinberg, Kadam, Hokama and Kim, 2002). Nonetheless, this study centers on customer management and organizational culture as two of the factors to be adopted in examining the impact they have on the image and performance of business set up with reference to Deposit Money Banks in Nigeria. Keeping this in mind, the proposed research will attempt to explore the impact that staff-customer relationships has on organizational image and performance. The impact of customer relationship is a contractual relationship and staff are the most important channel of communication here. On the other hand, in any business where products are sold or services are rendered, the customer is the key to success. Many years ago, one of American greatest merchants, Alfred Marshall, expressed the whole principles of Customer Relationship in a few words. The customer is always right, they can make or break any business enterprise if they are satisfied with what they buy and are happy about their treatment. They will continue to buy and also inform their friends. But if the product or service or treatment is unsatisfactory, the consumer will not only stop buying but also will tell their friends and show evidence about the unhappy experience. The staff relationship with customers is often as much as an organization wants to create an image for itself, good customer relationship goes hand in hand with organizational image and it is indeed difficult to draw a line between them because customers have repeated contract with the firm's staff. The contract provides the best means for the way communication. They permit an exchange of questions and answers and provide opportunity to explain and persuade customers and also make it possible not to offend the

customers. The general public had anticipated that by now, the picture of the staff/customer relationship especially in the banking sector should have been pretty and nice to behold at least in terms of service and attitude to work and more importantly, in the upholding and enlistment of the basic principles, norms and ethics in the daily practice of the structural relationship in oral and written evidences that stem to attest to the relationship and its effect on the organizational image and performance.

### **Statement of the Problem**

Successfully planned and enforced staff customer relationship management is crucial for DMBs and other financial institutions generally in order to stay afloat of competition in fast-changing and demanding business environment. Business managers continue to invest in boosting the performance and image of their enterprises through Customer Relationship Management (CRM) activity. Holler (2015) opined that managers in the United States were expected to spend more than \$ 36 billion on CRM in the coming years. Despite this considerable investment, managers encountered 70% failure rate of implementation which negatively affected organizational image building and performance (Iriana, Buttle and Angel, 2013; Pedron, Picoto, Dhillon and Caldeira, 2016). Researchers that studied CRM in relation to customer satisfaction of organization's services have not addressed the impact of such relationship on its image and performance (Ali, Zhou, Miller and Ieromonachou, 2016; Crosswell, Kuechler and Wawdo, 2013). The general management problem was that managers may not have clear understanding of the active interrelationships between customers and staff. The specific problem was that managers in Nigeria's DMBs may possess little knowledge of the interrelationship among the factors that facilitate effective staff and customer relationship management (Ali et al., 2016; Crosswell et al., 2013; Wang, Moyle, Whiteford, and Wynn-Moylan, 2014). The repercussion of this situation is that managers will strive to realize the potential benefits that staff and customer relationship management can usher in the to their firm's success (Mohammed and Mohammad, 2015). Although quite a number of researches have emphasized the effect of these factors on business performance, contemporary researches may not have investigated the impact the factors that facilitate effective staff and customer relationship management have on improvement of organizational image and performance.

### **Research Objectives**

This research work is sought to know and analyze staff and customer relationship management and the impact it has on organization's image and performance. The writers aim to achieve the objective through the following:

1. To know how custom management impacts on the image and performance of organizations.

2. To analyze the impact of organizational culture on organizational image and performance

### **Hypotheses**

H<sub>1</sub>: Customer management has no significant impact on organizational image and performance

H<sub>2</sub>: To analyze the impact of organizational culture on organizational image and performance

### **Literature Review**

The concept of the Customer Relationship Management (CRM) is the bedrock for customers and business relationships which derived from marketing to create relationships to customer satisfaction (Kotler, 2019). In the view of Gronroos (2018), CRM in service marketing is defined as a communicating process between customers and an organization's service for the purpose of attracting and maintaining the customers who will become true customers of organization and intend to use services provided by the organization. According to Rajola (2019), there are key components underlying a successful CRM. Vast studies have been made to identify the CRM's important components whereas, Buttle (2004) mentioned four distinctive dimensions of CRM to include customer management, organizational culture, people and leadership as well as process. According to Chen and Popovich (2003), the key factors for CRM are technology, people and process. Notwithstanding, it is necessary to drive forth all the four strategies and implementation processes, enterprise-wide strategy, customer-centric business process, technology-driven process, and cross-functional integration. The four items suggested by Combe (2004) to propel CRM are composed of culture, people, leadership and technology. CRM focuses on enabling firms to provide better service to customers through creating automatic, integrated and reliable processes which try to cover these in various ways such as information gathering, processing and integration (from different sources). With this, definition, it could be concluded that the main purpose of a CRM is to increase customers' and organization's satisfaction as well as enhance both parties' benefits and elevate the efficiency in marketing, sales, services and logistics. In fact, today's customers are seeking purchase-induced benefits and expect excellent value-added benefits from organizations more than products and this is a turning point in organizations' competition. This paper conducted surveys about the impact of staff and customer relationship management on organizational image and performance which affects and leads to the CRM success.

### **Customer Management**

Customer Management is the most important factor that supports the introduction of S-CRM in firms. Customer management begins from getting to know a firm's customers and building good and harmonious trade relationships with them based on the behaviour of targeted

customer groups (Nykamp, 2019). An organization needs inventory of its customers as the foundation for relationship building through the construction of complete customer database that are accessible to the organization. Each customer segment should be profiled in order to understand their peculiar needs and attitudes which are the bases for good relationship building and ongoing relationship maintenance (Stefanou, Sarniotis and Stafyla, 2003). The staff and customer relationship management process cover recording and registering customer accounts, applying caution to their requirements, analyzing the requirements and handling complaints as much as possible for improved customer understanding and assuring them that they are protected no matter the situation they are (Combe, 2004; Ho and Chuang, 2006; Mendoza, Marius, Prez and Griman, 2006; Zablah, 2005).

### **Organizational Culture**

Organizational culture originated and has accumulated from beliefs, expectations, attitudes, and common values of all members of the organization. All of these aspects of CRM results in cooperative learning, acceptance, and implementation so as to attain the organizational aims and are transferred from one generation to another (Wheelen and Hunger, 2019). As far as CRM administration is concerned, it can be said that organizational culture and communication are the most difficult factors to achieve since the administrators need to change attitudes and make the personnel accept new concepts in CRM. Moreover, this involves building of key working culture, establishing agreement for cooperation, building teamwork that consists people of various disciplines that play different roles with integrative cooperation and efficient communication, all of which require participation of personnel at all levels from administrators to operators (Mendoza et.al., 2006; Stone, Woodcock, and Machtynger, 2018). The staff is required to be familiar with and to comprehend the CRM and organizational strategies and vision and also be informed of the customer-oriented service' values and the consequences of building and maintaining good relationship between customers and organizational staff (Greenberg, 2019).

### **Methodology**

The study employed descriptive survey method that entails data collection from respondents through close-ended questionnaires. The study population stood at 400 out of which 345 were taken as sample size for the study through probability sampling technique of simple random sampling where every respondent had equal chance of inclusion in the survey. Descriptive and inferential statistic was used for data analysis in this study wherein both primary and secondary data were explored as sources of the information.

### **Findings**

As earlier stated in the specific objective of this study which is to know and analyze staff and customer relationship management and its impact on organizational image and performance,

a positive relationship between customer management and staff-customer relationship management was hypothesized from the literature. Findings show that customer management has significant impact on organizational image and performance. Result of analysis indicated that customer management has a statistically significant impact on organizational image and performance. The implication of this is that with effective customer management policy, there is high tendency for positive organizational image projection and better performance which will in turn lead to the realization of organizational objective. Drawing from the second objective which was to analyze organizational culture, the study hypothesized a positive relationship between organizational culture and staff-customer relationship management. Findings revealed that organizational culture has not yet any significant effect on organizational image and performance.

Summarily, two staff-customer relationship management factor which are customer management and organizational culture are examined in this research. While customer management impacts on organizational image and performance, organizational culture does not seriously impact on the success of staff and customer relationship management. This was not observed in a research conducted by Naimah, Nurul, Habidin, Hidayah, Nur, Khaidir and Aifaa, (2013) titled “Customer Relationship Management and Organizational Performance in Malaysian Healthcare Industry”, where they were seeking in that study to propose Customer Relationship Management (CRM) and Organizational Performance (OP) model for Malaysian healthcare industry. The results showed that CRM plays an important role in Malaysian Healthcare Industries.

### **Conclusion**

Managers are facing many challenges in the 21st century because of a highly competitive business environment and a surge in customer yearnings for quality services (Parris, Bouchet, Welty Peachey and Arnold, 2016). These managers as well adopt a staff-customer relationship management mechanism in order to increase their competitive edge and further increase provide qualitative products and services to their ever-dynamic consumers. Many writers have provided various definitions of customer relationship management (Brambilla and Dalmarco, 2014, Croswell et al., 2013). Some defined CRM as a comprehensive management strategy that managers apply to enhance customer satisfaction and enhance business competitiveness and profitability (Parris et al., 2016; Peltier, Zahay and Lehmann, 2013). Relationship marketing seems suitable for bolstering organizational image and performance given the realities of modern marketing. The fact that DMBs are primarily service-oriented and their success rests on their ability to draw customer preference and patronage is a testimony to the power of good and effective customer relations. It is worthy to note that staff and customer relationship management is not a product or service any firm can present but rather a commercial strategy of the organization.

Researchers have also realized and pointed out numerous benefits of effective staff-customer relationship management adoption and indicated that the ultimate goal of staff-customer relationship management adoption is to obtain and retain customers, obtain customer satisfaction and loyalty, enhance market competitiveness and increase profitability (Debnath, Datta and Mukhopadhyay, 2016; Marko, Dusica, Luka and Zvonimir, 2015; Toma, 2016). Despite the importance and the benefits of staff-customer relationship management adoption, DMBs and other service-oriented businesses are not able to obtain these benefits due to ineffective organizational culture (Cheng and Yang, 2013).

### Recommendations

From the findings and conclusion above, the study recommends among others that there is need for organizations to improve on their culture in order to achieve greater performance and improved organizational image as this will help in attracting more customers to strengthen their competitiveness.

Again, since the concept of organizational culture is a continuous process, its improvement and influence on the customer relationship management system's success in ensuring organization's achievement of its objectives can be assessed at any time. Finally, it is also suggested that adoption of staff and customer relationship management in other industries aside from the financial sector be considered and their strengths and weaknesses be identified which may become an instrument for progress in building organizational image and enhance its performance.

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**YIELD AND MONETARY ADVANTAGE OF LETTUCE (*Lactuca sativa L.*) AS  
AFFECTED BY COW DUNG RATES AND IRRIGATION INTERVALS IN  
MAIDUGURI, SUDAN SAVANNA, NIGERIA**

**Umar, M. I.,**

Department of Agricultural Technology,  
Mohamet Lawan College of Agriculture Maiduguri,  
Borno State, Nigeria

**Mamza, J. N.,**

Department of Agricultural Technology,  
Mohamet Lawan College of Agriculture Maiduguri,  
Borno State, Nigeria

**Sulum, A. A.,**

Department of Agricultural Technology,  
Mohamet Lawan College of Agriculture Maiduguri,  
Borno State, Nigeria

**Lawan, A.**

Department of Agricultural Technology,  
Mohamet Lawan College of Agriculture Maiduguri,  
Borno State, Nigeria

**Abbas H. W.**

Department of Agricultural Technology,  
Mohamet Lawan College of Agriculture Maiduguri,  
Borno State, Nigeria

**ABSTRACT**

Field experiments were conducted during 2014/15 and 2015/16 cool harmattan dry seasons at Teaching and Research Farm of the Department of Crop Production, University of Maiduguri (Latitude 11.808 and Longitude 13.199), 323m above sea level in Sudan Savana, Maiduguri, Borno State. This was aimed to study the yield and monetary advantage of lettuce as affected by cow dung rates and irrigation intervals in Maiduguri. The treatments consisted of a factorial combinations of five irrigation intervals (2, 3, 4, 5, and 6 days) and six rates of cow dung (0, 10, 15, 20, 25, and 30t/ha) laid out in a split plot design and replicated three times. Irrigation intervals were assigned to the main plots while cow dung rates were assigned to the sub plots



during the two trials. The yield and yield components parameters measured were: root fresh weight (g/plant), dry root weight (g/plant), shoot fresh weight (g/plant), shoot dry weight (g/plant) and shoot yield (kg/ha). The monetary advantage of growing lettuce under different irrigation intervals and cow dung rates were also determined. The results showed that 5 days irrigation interval was optimum for shoot fresh weight, shoot dry weight, fresh root weight, root dry weight, shoot yield and monetary advantage for both seasons and the combined mean at all stages of sampling. The application of 30t/ha of cow dung gave significantly higher values for all the yield, yield components and monetary advantage of the lettuce in both the years and combined mean. Based on the results of the present study, the growing of lettuce using the combinations of 6 days irrigation intervals with 30t/ha of cow dung during the cool harmattan periods in Maiduguri is more economical and therefore, encouraged.

**Keywords:** Cool, Harmattan, Lettuce, Irrigation interval, Cow dungs rate

## INTRODUCTION

Lettuce (*Lactuca sativa L.*) belongs to the family Asteraceae and is believed to have originated in Asia or North Africa (Vernon, 1999). It is the first cultivated salad crop and commercialized internationally (Abu-Rayyan *et al.*, 2004). It is the most popular vegetable according to the highest consumption rate and economic importance throughout the world (Coelho *et al.*, 2005). Lettuce is a vegetable which is grown under cool temperature on fertile and well drained soils, and responds very well to the application of manure. Leafy lettuce types have been cultivated since at least the time of the ancient Greeks 2500 years ago, and different types were subsequently developed by the Moors (Valenzuela *et al.*, 1996).

There are several varieties of lettuce popular among which are Butter-head, Chinese crisp head, Loose-leaf, Romaine/Cos-lettuce, Summer crisp, Stem and Oil seed. The butter-head and crisp head are sometimes known together as “Cabbage-lettuce”, because their heads are shorter, flatter and more cabbage-like than Romaine lettuce (Rhodes, 2004). The major distinguishing features among varieties are the bunch arrangement, leaf shape and texture. *Lactuca sativa* is a small size annual plant that flourishes in well-drained, humus soil. The plant has a shallow root system with a root mass extending 1ft into the soil (Valenzuela *et al.*, 1996). The plants generally have a height and spread of 15-30cm (Ogbodo *et al.*, 2010). The leaves are colourful, mainly in green and red color spectrums with some variegated varieties. There are also a few varieties with yellow, gold or blue-teal leaves. Lettuce plants have a wide range of shapes and textures, from the dense heads of the iceberg type to the notched, scalloped, frilly leaf varieties (Norman, 1992).

Low content of organic manure in the dry zone soil critically affects the crop yield. To obtain sufficient yield of vegetable crops, particularly lettuce, adequate supply of nutrient elements like N, P, and K is necessary, and manure is a valuable source of these nutrients. The use of

organic matter such as animal manures, human waste, sewage sludge and compost has long been recognized in agriculture as beneficial for plant yield and the maintenance of soil fertility. Despite the importance of lettuce as a vegetable, there is dearth of information pertaining to its cultivation using locally available resources such as organic manures. Lettuce is also known to be grown during the cool-dry harmattan season at the study area. Its yield during this period is limited by soil moisture stress caused by high rate of evapotranspiration and low water holding capacity of the sandy semi-arid soil (Rayar 1984). Higher frequency of irrigation could be used to alleviate soil moisture stress and increase lettuce yields, however, the acute shortage of irrigation water in this region necessitates its economy (Adetunji, 1990). Thus, the need to develop the most economic and suitable irrigation interval for such crop.

The present study is therefore designed to determine yield and yield components of lettuce when fertilized with cow dung rates under varied irrigation intervals. The objectives of the study were to determine the effects cow dung rates and irrigation intervals on yield and yield components of lettuce in the semi-arid environment of Maiduguri and to determine effect of different rates of cow dung and monetary advantage of lettuce in the semi-arid environment of Maiduguri.

## **MATERIALS AND METHODS**

### **Description of Experimental Site**

The trials reported here were conducted at the Teaching and Research Farm of the Department of Crop Production, Faculty of Agriculture University of Maiduguri (Latitude 11.808 and Longitude 13.199, and 323m above sea level) during the cool dry seasons of 2014/2015 and 2015/2016. Maiduguri is located in the Sudan Savannah with average peak daily temperature ranging between 34<sup>o</sup>c and 40<sup>o</sup>c especially in April and May. The rainy season last from June to September (GSN 1994; Musa and Pindar, 2005). The site was previously cropped to groundnuts.

### **Treatments and experimental design**

The experiment was a factorial combination consisting of six cow dung rates (0,10,15,20,25, and 30t/ha) and five irrigation intervals (2,3,4,5, and 6 days). The experiment was laid out in a split-plot design with three replications. Irrigation intervals was allocated to the main plots and Cow Dung rates to the sub-plots. The experimental field covered a total area of 456m<sup>2</sup> (12m length and 38m breadth). The main plots size was 144m<sup>2</sup> (12m x 12m), sub plots size was 4m<sup>2</sup> (2m x 2m) and net plots size was 1m<sup>2</sup> each. The main plot alley and sub plot alley was 1m and 0.5m apart. Inter row and intra row spacing was 20cm x 20cm respectively.

### **Meteorological Data**

Data on temperature, relative humidity and wind velocity covering the period of the study for both seasons was obtained from the meteorological unit of Federal Ministry of Aviation, Maiduguri.

### **Soil and Cow dung Analysis**

At land preparations, composite soil samples were taken diagonally from experimental site at 0-20cm and 20-40cm depths for the two seasons. The samples were mixed thoroughly in a container after which a representative sample was scooped out from the bulk and analysed for physico-chemical properties at the Soil Science Laboratory, University of Maiduguri.

Well decomposed Cow dung was obtained from the Livestock farm at the University of Maiduguri. A sample was scooped and taken to the Soil Science Laboratory, University of Maiduguri to analyse its chemical properties.

### **Experimental Materials**

**Description and source of crop variety used:** The lettuce cultivar “Loose-Leaf” seeds was obtained from the Horticultural Unit of Borno State Agricultural Development Program (BOSADP) Maiduguri. This cultivar is quite popular grown by farmers in Northern Nigeria. It has loosely bunched leaves and is the most widely planted by farmers within Maiduguri. It features tender, delicate leaves with loose bunch. Leaves are broad with leaf margins that may be entirely lobed or frilled. They are generally upright but can also be flattened.

### **Cultural practices**

**Land preparation:** The experimental site was cleared and harrowed. The land was properly levelled and the beds marked out according to specification. The edges of each beds were raised to prevent run-off during irrigation. The beds were then thoroughly watered for three days before transplanting.

**Cow dung application:** The cow dung treatment rates were applied and incorporated into the soil according to each plot treatments two weeks before transplanting.

**Sowing and transplanting:** For good germination in the nursery, well tilled seed bed with a fine loose surface was marked out and seed beds were soaked with water before seed sowing. Lettuce seeds were broadcasted on the 6<sup>th</sup> of October, 2014 in the first year and on 5<sup>th</sup> October, 2015 for the second trial, on a moist but drained loose soil that is not soggy, free from stones and large clods of dirt then it was covered with 1cm dry grass mulch and watered thrice a week. Hand weeding and watering continued until seedlings were ready for transplanting. The nursery was well watered prior to transplanting to ease up rooting, while the field was watered two hours before transplanting. Seedlings were transplanted on the 3<sup>th</sup> November, 2014 and 2<sup>th</sup> November, 2015 after emergence of 3-4 mature leaves and a well-developed root system. The inter row and intra row spacing was 20cm x 20cm (Tindall, 1992) respectively.

**Weed and insect pest:** Being an organic farming, strict hygiene was maintained to reduce the incidence of pests and diseases, since the crop will be raised in a chemical-free environment. Sanitation practices like regular weeding is paramount to deter pest and insect, since most

weeds serve as host plants to some harmful insects and pest. Weeding was done by manual method using a hand hoe specially designed for lettuce fields and hand pulling.

**Irrigation:** During the trial for the two seasons, water was collected from a bore hole into a surface tank and allowed to cool down before using it to irrigate the plants. At transplanting the seedlings, enough water was applied to each plot daily for three days to avoid transplanting shocks. Thereafter, Irrigation continued in respective plots according to the scheduled intervals during evenings.

### **Data collection**

During the two trials, crops were monitored from planting through harvest and parameters on growth components were assessed at every two (2) weeks interval.

### **Fresh weight of root/plant (g)**

The fresh weight of three roots selected randomly at 4, 6 WAT and at harvest were weighed using a Sensitive Electronic Balance, and were recorded, and the average fresh weight of root was expressed in g/plant.

### **Dry weight of root/plant (g)**

The roots from the three randomly selected plants in each treatment was sun dried to a constant weight achieved and the dry weight was recorded. The average dry weight of root was expressed in g/plant.

### **Fresh weight of shoot/plant (g)**

The shoot from the three randomly selected plants were weighed and the average value was obtained as shoot weight per plant at 4, 6 WAT and at harvest.

### **Dry weight of shoot/plant (g)**

The shoots from the three randomly selected plants in each treatment were sun dried to a constant weight and the dry weight recorded. The average dry weight of shoot was expressed in g/plant.

### **Shoot yield (kg/ha)**

This was taken from net plots by weighing the total above ground dry matter produced within each plot at harvest and the value obtained was converted to kg/ha. A sensitive electronic balance was used.

## **Data Analysis**

### **Analysis of Variance**

The data collected from the experiment was subjected to Analysis of Variance (ANOVA) at 5% level of probability. The difference among the means was identified using Least Significant Difference (LSD) as reported by Gomez and Gomez (1984).

### Monetary Advantage

Economic analysis was carried out to determine the Gross margin of lettuce production under various rates of cow dung, irrigation interval and total revenue. The total cost of production from nursery raising to harvesting was calculated and net profit were determined according to price per hectare of lettuce in Maiduguri as proposed by Okoruwa *et al.* (2005), using the mathematical expression:

$$GM = TR - VC$$

Where:

GM= Gross margin ( $ha^{-1}$ )

TR= Total revenue (₦)

VC= Variable cost (₦)

## RESULTS

### Meteorological Data of the Experimental Site

Data for mean minimum and maximum temperature, relative humidity and wind velocity for the two seasons are presented in Tables 1. Data on minimum and maximum temperature in Maiduguri during the two seasons experiments is presented in Table 1. In both seasons, the highest minimum and maximum temperature was recorded in November and December respectively. Mean relative humidity from both seasons during the experiments showed increasing trends in percentage as the season advances. Peak relative humidity values were recorded in the month of November. The relative humidity was fairly conducive during vegetative phases of growth. Information on wind velocity for the two seasons is shown in Table 1. Wind velocity is higher in January for the first season and for the second season, highest wind velocity was recorded in the month of November.

**Table 1. Minimum and maximum temperature, relative humidity and wind in 2014/15 and 2015/16 seasons**

	YEAR	NOVEMBER	DECEMBER	JANUARY
Temperature (°c)	2014/2015			
Maximum		35.70	30.40	30.90
Minimum		19.20	12.80	12.70
Relative humidity (%)		58	37	19
Wind (knots)		34.20	45.90	50.25

	2015/2016		
Temperature (°c)			
Maximum	38.00	34.00	35.00
Minimum	18.00	18.60	14.80
Relative humidity (%)	29	24	20
Wind (knots)	49.60	30.60	32.78

Source: Federal Ministry of Aviation, Meteorological unit, Maiduguri, Borno state

**Table 2. Physical and chemical properties of the soil at the experimental site during 2014/2015 and 2015/2016 cool dry seasons**

<b>Soil properties</b>					
		<b>2014/2015</b>		<b>2015/2016</b>	
		<b>0-20cm</b>	<b>20-40cm</b>	<b>0-20cm</b>	<b>20-40cm</b>
<b>Particle</b>	<b>size</b>				
<b>distribution</b>					
Sand g/kg		722.50	735.00	746.00	721.00
Silt g/kg		162.50	150.00	175.00	200.00
Clay g/kg		115.00	115.00	79.00	79.00
Textural class		Sandy loam	Sandy loam	Sandy loam	Sandy loam
<b>Chemical properties</b>					
pH in water (1:25)		7.9	7.9	7.7	7.4
Organic carbon (g/kg)		4.5	3.1	8.4	7.4
Total nitrogen (g/kg)		1.3	1.1	1.4	0.7
Available P (mg/kg)		17.15	15.05	8.05	4.55
Basic cation (Cmol/kg)					
K <sup>+</sup>		0.82	0.91	0.63	0.87
Mg <sup>+</sup>		2.60	2.40	3.00	7.20
Ca <sup>+</sup>		9.60	12.40	6.20	9.80
Na		0.23	0.26	0.11	0.18
CEC		13.25	15.97	9.94	18.05

**Table 3. Chemical properties of the analyzed cow dung used for the experiment**

Parameters	Value (%)	
	2014/15	2015/16
N	1.68	1.12
P	0.21	0.26
K	1.95	2.28
Ca <sup>2+</sup>	2.10	1.10
Mg <sup>2+</sup>	0.49	0.49

### Effects of Irrigation Intervals and Cow Dung Rates on Yield and Yield Components

#### Fresh weight of shoot /plant (g)

Effects of irrigation intervals and cow dung rates on fresh weight of shoot per plant of lettuce during the two trials are presented in Table 4. Fresh weights of shoot per plant at 4 WAT were heavier at a closer irrigation intervals, but from 6 WAT, 5 days irrigation interval was optimum for this parameter for both the seasons and the combined means. Application of cow dung significantly influenced lettuce fresh weight per plant in both seasons and the combined mean. Cow dung of 30t/ha significantly produced heavier fresh weight of shoot per plant at harvest of the two seasons and the combined mean of the two trials. There was significant interaction of irrigation intervals and cow dung rates on fresh weight of shoot per plant (Table 4).

#### Dry weight of shoot (g) per plant

The effects of irrigation intervals and cow dung rates on dry weight of shoot per plant of lettuce for the two seasons is shown in Table 5. The treatments had significant effects on the shoot dry weight per plant at 6 and 8 WAT in both the seasons and at all stages of measurement. The irrigation interval of 5 days was optimum for the dry weight of shoot per plant for both seasons and the combined mean at all stages of sampling. Cow dung rates on the other hand played a role in the increase dry weight of shoot per plant of lettuce. As the cow dung rates were increased, the weight of the shoot per plant also increased significantly and till it reached the highest the maximum rate of cow dung used (30t/ha) in all the seasons and the combined mean at all stages of measurement.

#### Fresh weight of root/plant (g)

The effects of irrigation intervals and cow dung rates on fresh weight of root per plant of lettuce in the years 2014/2015, 2015/2016 seasons and the combined means are shown in Table 6. There was significant effects of irrigation intervals on fresh weight of root per plant of lettuce in both seasons and the combined mean. Generally, 5 day irrigation interval was the optimum for fresh weight of root per plant in both seasons and the combined mean at all periods of sampling. Application of cow dung significantly influenced lettuce fresh weight of

root per plant in both seasons and the combined mean. Cow dung rate of 30t/ha significantly produced heavier fresh weight of root per plant in both seasons and the combined mean with zero cow dung giving the least value.

**Table 4: Effects of irrigation intervals and cow dung (CD) rates on fresh weight of shoot/plant (g) of lettuce at 4, 6, and 8 weeks after transplant (WAT)**

Treatment s	Fresh weight of shoot per plant (g)									
	2014/2015			2015/2016			Combined			
	4	6	8	4	6	8	mean	4	6	8
<b>Irrigation interval (A)</b>										
<b>(Days)</b>										
2	11.32 a	15.50 b	18.27 <sup>a</sup> b	11.39 <sup>a</sup> b	15.42 b	18.33 <sup>b</sup>	11.36 <sup>a</sup> b	15.46 b	18.30 <sup>a</sup> b	
3	11.53 a	15.46 b	18.71 <sup>a</sup> b	11.56 <sup>a</sup>	15.74 b	18.80 <sup>a</sup> b	11.55 <sup>a</sup>	15.60 b	18.76 <sup>a</sup> b	
4	10.76 b	14.89 b	18.69 <sup>a</sup> b	10.06 <sup>a</sup> bc	15.14 b	18.69 <sup>a</sup> b	10.91 <sup>b</sup> c	15.02 b	18.69 <sup>a</sup> b	
5	10.60 b	16.76 a	19.03 <sup>a</sup>	10.51 <sup>c</sup>	16.81 a	20.06 <sup>a</sup>	10.56 <sup>c</sup>	16.79 a	19.57 <sup>a</sup>	
6	10.38 b	13.59 c	17.37 <sup>b</sup> c	10.82 <sup>b</sup> c	13.94 c	17.68 <sup>b</sup>	10.60 <sup>c</sup>	13.77 c	17.53 <sup>b</sup>	
SE±	0.150 0	0.321 0	0.419 <sup>6</sup>	0.1937	0.270 8	0.455 9	0.158 9	0.265 0	0.436 0	
<b>CD (B)</b>										
0.0	7.57 <sup>d</sup>	11.37 d	14.11 <sup>e</sup>	7.69 <sup>e</sup>	11.54 d	13.31 <sup>e</sup>	7.63 <sup>e</sup>	11.46 d	14.21 <sup>e</sup>	
10	7.77 <sup>d</sup>	11.73 d	14.63 <sup>d</sup> e	7.95 <sup>e</sup>	11.85 d	14.33 <sup>d</sup> e	7.86 <sup>de</sup>	11.79 d	14.78 <sup>d</sup> e	
15	8.25 <sup>d</sup>	12.38 d	15.67 <sup>d</sup>	8.63 <sup>d</sup>	12.55 d	15.46 <sup>d</sup>	8.44 <sup>d</sup>	12.47 d	15.77 <sup>d</sup>	
20	10.14 c	13.79 c	16.80 <sup>c</sup>	10.42 <sup>c</sup>	14.21 c	17.12 <sup>c</sup>	10.28 <sup>c</sup>	14.00 c	16.96 <sup>c</sup>	
25	13.75 b	18.59 b	21.75 <sup>b</sup>	13.69 <sup>b</sup>	18.77 b	22.22 <sup>b</sup>	13.72 <sup>b</sup>	18.68 b	21.98 <sup>b</sup>	
30	18.03 a	23.57 a	27.59 <sup>a</sup>	18.02 <sup>a</sup>	23.55 a	27.83 <sup>a</sup>	18.03 <sup>a</sup>	23.56 a	27.71 <sup>a</sup>	



SE±	0.255	0.421	0.353	0.1872	0.384	0.352	0.210	0.378	0.339
	8	3	8		2	6	1	2	1
<b>Interaction (AXB)</b>	**	**	**	**	**	**	**	**	**

Means in a column followed by the same letters are not significantly different from each other according to DMRT

\*\* = Significant at 1% Level of probability

NS = Not significant

WAT = Weeks after transplant

**Table 5: Effects of irrigation intervals and cow dung (CD) rates on dry weight of shoot/plant (g) of lettuce at 4, 6, and 8 weeks after transplant (WAT)**

Treatments	Dry weight of shoot per plant (g)								
	2014/2015			2015/2016			Combined		
	4	6	8	4	6	8	4	6	8
<b>Irrigation interval (A)</b>									
<b>(Days)</b>									
2	5.52 <sup>a</sup>	8.26 <sup>b</sup>	9.27 <sup>b</sup>	5.38 <sup>a</sup>	8.26 <sup>b</sup>	9.54 <sup>ab</sup>	5.45 <sup>a</sup>	8.26 <sup>b</sup>	9.06 <sup>b</sup>
3	5.45 <sup>a</sup>	8.32 <sup>b</sup>	9.69 <sup>b</sup>	5.36 <sup>a</sup>	8.32 <sup>b</sup>	9.33 <sup>ab</sup>	5.40 <sup>a</sup>	8.32 <sup>b</sup>	9.51 <sup>b</sup>
4	5.38 <sup>a</sup>	8.31 <sup>b</sup>	9.62 <sup>b</sup>	5.29 <sup>a</sup>	8.42 <sup>b</sup>	9.55 <sup>ab</sup>	5.34 <sup>a</sup>	8.36 <sup>b</sup>	9.62 <sup>ab</sup>
5	5.04 <sup>a</sup>	11.58 <sup>a</sup>	11.13 <sup>a</sup>	4.94 <sup>a</sup>	9.84 <sup>a</sup>	10.78 <sup>a</sup>	4.99 <sup>a</sup>	10.21 <sup>a</sup>	10.96 <sup>a</sup>
6	5.44 <sup>a</sup>	8.58 <sup>b</sup>	9.70 <sup>b</sup>	5.34 <sup>a</sup>	8.36 <sup>b</sup>	8.84 <sup>b</sup>	5.39 <sup>a</sup>	8.47 <sup>b</sup>	9.58 <sup>b</sup>
SE±	0.243	0.273	0.338	0.322	0.285	0.507	0.275	0.272	0.397
	9	4	3	0	8	8	6	6	1
<b>CD (B)</b>									
0.0	3.80 <sup>d</sup>	6.12 <sup>e</sup>	6.93 <sup>e</sup>	3.68 <sup>c</sup>	5.63 <sup>e</sup>	6.82 <sup>d</sup>	3.74 <sup>c</sup>	5.87 <sup>e</sup>	6.88 <sup>e</sup>
10	4.29 <sup>cd</sup>	6.60 <sup>e</sup>	7.10 <sup>e</sup>	4.09 <sup>c</sup>	6.05 <sup>e</sup>	6.72 <sup>d</sup>	4.22 <sup>c</sup>	6.33 <sup>e</sup>	6.91 <sup>e</sup>
15	4.33 <sup>cd</sup>	7.65 <sup>d</sup>	8.24 <sup>d</sup>	4.27 <sup>c</sup>	7.11 <sup>d</sup>	7.71 <sup>d</sup>	4.30 <sup>c</sup>	7.38 <sup>d</sup>	7.98 <sup>d</sup>
20	4.39 <sup>c</sup>	9.60 <sup>c</sup>	10.43 <sup>c</sup>	4.09 <sup>c</sup>	9.12 <sup>c</sup>	10.10 <sup>c</sup>	4.24 <sup>c</sup>	9.36 <sup>c</sup>	10.26 <sup>c</sup>
25	6.15 <sup>b</sup>	10.77 <sup>b</sup>	12.42 <sup>b</sup>	6.22 <sup>b</sup>	10.22 <sup>b</sup>	12.43 <sup>b</sup>	6.18 <sup>b</sup>	10.50 <sup>b</sup>	12.43 <sup>b</sup>
		b			b	b		b	b
30	9.25 <sup>a</sup>	13.30 <sup>a</sup>	14.17 <sup>a</sup>	9.18 <sup>a</sup>	12.50 <sup>a</sup>	13.86 <sup>a</sup>	9.22 <sup>a</sup>	12.90 <sup>a</sup>	14.01 <sup>a</sup>
SE±	0.196	0.218	0.316	0.298	0.242	0.385	0.241	0.224	0.333
	3	4	0	3	7	0	1	0	8
<b>Interaction (AXB)</b>	NS	NS	NS	NS	NS	NS	NS	NS	NS

Means in a column followed by the same letters are not significantly different from each other according to DMRT

NS = Not significant

WAT = Weeks after transplant

**Table 6: Effects of irrigation intervals and cow dung rates (CD) on fresh weight of root/plant (g) of lettuce at 4, 6, and 8 weeks after transplant (WAT)**

Treatment s	Fresh weight of root per plant (g)									
	2014/2015			2015/2016			Combined			
	4	6	8	4	6	8	mean	4	6	8
<b>Irrigation interval (A)</b>										
2 Days	4.19 <sup>ab</sup>	5.08 <sup>a</sup>	6.62 <sup>a</sup>	4.17 <sup>a</sup>	5.24 <sup>ab</sup>	6.73 <sup>ab</sup>	4.18 <sup>a</sup>	5.16 <sup>ab</sup>	6.68 <sup>a</sup>	
3 Days	4.12 <sup>ab</sup>	5.11 <sup>a</sup>	6.71 <sup>a</sup>	4.16 <sup>a</sup>	5.18 <sup>ab</sup>	6.77 <sup>ab</sup>	4.14 <sup>a</sup>	5.14 <sup>ab</sup>	6.74 <sup>a</sup>	
4 Days	3.63 <sup>b</sup>	4.83 <sup>a</sup>	6.51 <sup>a</sup>	3.72 <sup>b</sup>	4.79 <sup>bc</sup>	6.51 <sup>b</sup>	3.68 <sup>a</sup>	4.81 <sup>ab</sup>	6.51 <sup>a</sup>	
5 Days	4.76 <sup>a</sup>	5.62 <sup>a</sup>	7.26 <sup>a</sup>	3.56 <sup>b</sup>	5.62 <sup>a</sup>	7.27 <sup>a</sup>	4.16 <sup>a</sup>	5.62 <sup>a</sup>	7.26 <sup>a</sup>	
6 Days	3.67 <sup>b</sup>	5.07 <sup>a</sup>	6.75 <sup>a</sup>	3.68 <sup>b</sup>	4.59 <sup>c</sup>	6.22 <sup>b</sup>	3.17 <sup>b</sup>	4.83 <sup>b</sup>	6.48 <sup>b</sup>	
SE±	0.205	0.232	0.308	0.106	0.172	0.205	0.150	0.195	0.253	
	9	2	3	3	3	4	5	6	2	
<b>CD (B)</b>										
0.0t/ha	3.91 <sup>cd</sup>	3.85 <sup>e</sup>	5.49 <sup>d</sup>	3.13 <sup>cd</sup>	3.88 <sup>f</sup>	5.27 <sup>e</sup>	3.52 <sup>d</sup>	3.86 <sup>e</sup>	5.38 <sup>e</sup>	
10 t/ha	3.01 <sup>e</sup>	4.51 <sup>d</sup>	6.10 <sup>c</sup>	2.97 <sup>d</sup>	4.33 <sup>e</sup>	6.11 <sup>d</sup>	2.99 <sup>e</sup>	4.42 <sup>d</sup>	6.11 <sup>d</sup>	
15 t/ha	3.49 <sup>de</sup>	5.05 <sup>c</sup>	6.63 <sup>c</sup>	3.48 <sup>c</sup>	4.89 <sup>d</sup>	6.62 <sup>c</sup>	3.48 <sup>d</sup>	4.97 <sup>c</sup>	6.63 <sup>c</sup>	
20 t/ha	4.17 <sup>bc</sup>	5.51 <sup>b</sup>	7.23 <sup>b</sup>	4.03 <sup>b</sup>	5.39 <sup>c</sup>	7.13 <sup>b</sup>	4.10 <sup>c</sup>	5.45 <sup>b</sup>	7.18 <sup>b</sup>	
25 t/ha	4.61 <sup>b</sup>	5.71 <sup>b</sup>	7.36 <sup>ab</sup>	4.55 <sup>a</sup>	5.76 <sup>b</sup>	7.24 <sup>b</sup>	4.58 <sup>b</sup>	5.74 <sup>b</sup>	7.30 <sup>b</sup>	
30 t/ha	5.27 <sup>a</sup>	6.22 <sup>a</sup>	7.80 <sup>a</sup>	4.98 <sup>a</sup>	6.26 <sup>a</sup>	7.81 <sup>a</sup>	5.12 <sup>a</sup>	6.24 <sup>a</sup>	7.80 <sup>a</sup>	
SE±	0.181	0.149	0.182	0.156	0.121	0.159	0.146	0.125	0.166	
	2	3	5	8	4	1	0	5	7	
<b>Interaction (AXB)</b>	**	NS	NS	**	NS	*	**	NS	NS	

Means in a column followed by the same letters are not significantly different from each other according to DMRT

\* = Significant at 5% Level of probability

\*\* = Significant at 1% Level of probability

NS = Not significant

WAT = Weeks after transplant

### Dry Weight of root/plant (g)

The effects of irrigation intervals and cow dung rates on dry weight of root per plant of lettuce for the two seasons and combined mean are presented in Table 7. There was significant effect of irrigation interval on dry weight of root per plant in both seasons and the combined mean. Generally, 5 days irrigation interval was optimum for dry weight of root per plant in the two seasons and the combined mean at all sampling periods. Cow dung rates on the other hand had a significant effect on dry weight of root per plant of lettuce in both years and the combined mean. The application of cow dung up to 30t/ha favoured dry weight of root per plant of lettuce, while the control treatment with zero (0t/ha) cow dung produced the least of all.

### Shoot yield (kg/ha)

Effects of irrigation intervals and cow dung rates on fresh shoot yield per hectare at harvest of the lettuce in the year 2014/2015 and 2015/2016 dry seasons and the combined mean are presented in Table 8. Irrigation intervals statistically influenced shoot yield per hectare at harvest with an indication of 5 days irrigation intervals to be the optimum for the two seasons and the combined mean. Generally, the least shoot yield per hectare at harvest was obtained from 2 and 6 days irrigation intervals in both years and the combined mean. The cow dung application rate of 30t/ha gave significantly the highest fresh shoot yield per hectare and the least yield was from the lower cow dung rates for both the seasons and the combined means.

**Table 7: Effects of irrigation intervals and cow dung (CD) rates on dry weight of root/plant (g) of lettuce at 4, 6, and 8 weeks after transplant (WAT)**

Treatments	Dry weight of root per plant (g)								
	2014/2015			2015/2016			Combined mean		
	4	6	8	4	6	8	4	6	8
<b>Irrigation interval (A)</b>									
2 Days	0.98 <sup>a</sup>	1.71 <sup>b</sup>	1.90 <sup>b</sup>	1.00 <sup>a</sup>	1.63 <sup>b</sup>	1.67 <sup>b</sup>	0.99 <sup>a</sup>	1.67 <sup>b</sup>	1.79 <sup>b</sup>
3 Days	1.06 <sup>a</sup>	1.50 <sup>b</sup>	1.73 <sup>b</sup>	1.09 <sup>a</sup>	1.52 <sup>a</sup>	1.61 <sup>b</sup>	1.06 <sup>a</sup>	1.51 <sup>b</sup>	1.67 <sup>b</sup>
4 Days	1.09 <sup>a</sup>	1.62 <sup>b</sup>	1.89 <sup>b</sup>	1.09 <sup>a</sup>	1.66 <sup>a</sup>	1.78 <sup>b</sup>	1.09 <sup>a</sup>	1.64 <sup>b</sup>	1.83 <sup>b</sup>
5 Days	1.90 <sup>a</sup>	2.10 <sup>a</sup>	2.36 <sup>a</sup>	1.10 <sup>a</sup>	1.91 <sup>a</sup>	2.05 <sup>a</sup>	1.10 <sup>a</sup>	2.01 <sup>a</sup>	2.20 <sup>a</sup>
6 Days	1.91 <sup>a</sup>	1.54 <sup>b</sup>	1.84 <sup>b</sup>	1.14 <sup>a</sup>	1.66 <sup>a</sup>	1.77 <sup>b</sup>	1.07 <sup>a</sup>	1.60 <sup>b</sup>	1.80 <sup>b</sup>
SE±	0.041	0.072	0.065	0.064	0.079	0.073	0.043	0.061	0.066
	2	2	6	8	6	1	2	4	7

<b>CD (B)</b>									
0.0 t/ha	0.68 <sup>c</sup>	1.24 <sup>e</sup>	1.53 <sup>e</sup>	0.81 <sup>c</sup> d	1.26 <sup>d</sup>	1.43 <sup>c</sup>	0.75 <sup>c</sup>	1.25 <sup>e</sup>	1.48 <sup>d</sup>
10 t/ha	0.69 <sup>c</sup>	1.43 <sup>d</sup> e	1.68 <sup>d</sup> e	0.71 <sup>d</sup>	1.42 <sup>d</sup>	1.66 <sup>c</sup>	0.70 <sup>c</sup>	1.42 <sup>d</sup> e	1.67 <sup>c</sup> d
15 t/ha	0.82 <sup>c</sup>	1.60 <sup>c</sup> d	1.82 <sup>c</sup> d	0.90 <sup>c</sup>	1.52 <sup>c</sup> d	1.67 <sup>c</sup>	0.86 <sup>c</sup>	1.56 <sup>c</sup> d	1.74 <sup>c</sup>
20 t/ha	1.19 <sup>b</sup>	1.76 <sup>b</sup> c	2.04 <sup>b</sup> c	1.23 <sup>b</sup>	1.78 <sup>b</sup> c	1.64 <sup>c</sup>	1.21 <sup>b</sup>	1.77 <sup>b</sup> c	1.84 <sup>b</sup> c
25 t/ha	1.31 <sup>b</sup>	1.95 <sup>b</sup>	2.15 <sup>b</sup>	1.35 <sup>a</sup> b	1.88 <sup>b</sup>	1.97 <sup>b</sup>	1.33 <sup>b</sup>	1.91 <sup>b</sup>	2.06 <sup>b</sup>
30 t/ha	1.52 <sup>a</sup>	2.19 <sup>a</sup>	2.43 <sup>a</sup>	1.50 <sup>a</sup>	2.18 <sup>a</sup>	2.28 <sup>a</sup>	1.51 <sup>a</sup>	2.19 <sup>a</sup>	2.36 <sup>a</sup>
SE±	0.075	0.092	0.077	0.063	0.098	0.101	0.054	0.087	0.084
	0	4	8	0	5	2	5	1	2
<b>Interaction(A XB)</b>	NS	NS	*	**	NS	NS	NS	NS	NS

Means in a column followed by the same letters are not significantly different from each other according to DMRT

\* = Significant at 5% Level of probability      \* \* = Significant at 1% Level of probability

NS = Not significant

WAT = Weeks after transplant

WAT = Weeks after transplant

**Table 8: Effects of irrigation intervals and cow dung (CD) rates on fresh shoot yield (kg/ha) of lettuce at harvest**

Treatment	Shoot yield (kg/ha)		
	2014/2015	2015/2016	Combined mean
<b>Irrigation interval (A)</b>			
2 Days	6578.0 <sup>bc</sup>	6600.0 <sup>b</sup>	6589.0 <sup>b</sup>
3 Days	6736.0 <sup>b</sup>	6768.0 <sup>ab</sup>	6752.0 <sup>ab</sup>
4 Days	6728.0 <sup>bc</sup>	6728.0 <sup>ab</sup>	6728.0 <sup>ab</sup>
5 Days	7235.6 <sup>a</sup>	7222.0 <sup>a</sup>	7228.8 <sup>a</sup>
6 Days	6252.0 <sup>c</sup>	6366.0 <sup>b</sup>	6309.0 <sup>b</sup>
SE±	138.81	164.14	150.12
<b>CD (B)</b>			
0.0 t/ha	5209 <sup>e</sup>	5153 <sup>e</sup>	5181 <sup>e</sup>
10 t/ha	5396 <sup>de</sup>	5376 <sup>de</sup>	5386 <sup>de</sup>

15 t/ha	5685 <sup>cd</sup>	5710 <sup>d</sup>	5697 <sup>d</sup>
20 t/ha	6048 <sup>c</sup>	6163 <sup>c</sup>	6106 <sup>c</sup>
25 t/ha	7829 <sup>b</sup>	7999 <sup>b</sup>	7914 <sup>b</sup>
30 t/ha	10069 <sup>a</sup>	10020 <sup>a</sup>	10044 <sup>a</sup>
SE±	127.01	126.95	121.93
<b>Interaction (AXB)</b>	**	**	**

Means in a column followed by the same letters are not significantly different from each other according to DMRT

\* \* = Significant at 5% Level of probability

NS = Not significantly different from each other

### Monetary Advantage of Irrigation Intervals and Cow Dung rates on Yield of Lettuce

Cost benefit of lettuce as influenced by irrigation intervals and cow dung rates in 2014/2015, 2015/2016 and the combined mean is presented in Table 9. The monetary advantage from 5 days irrigation interval was higher in both the years and the combined mean, proving to be the optimum, while 2 day irrigation interval produced the least amount in terms of monetary advantage. Application of 30t/ha of cow dung significantly produced higher monetary advantage in both the years and the combined mean. The lower rates of cow dung gave the least monetary advantage. There was significant interaction of irrigation intervals and cow dung rates on monetary advantage of lettuce from the seasons and the combined mean.

**Table 9: Monetary Advantage of irrigation intervals and cow dung (CD) rates on Lettuce yield (kg/ha) and combined mean in 2014/15 and 2015/16 seasons**

Treatment	Cost Benefit (₹)		
	2014/2015	2015/2016	Combined mean
<b>Irrigation interval (A)</b>			
2 Days	73,167 <sup>d</sup>	71,847 <sup>d</sup>	72,507 <sup>d</sup>
3 Days	172,247 <sup>c</sup>	170,327 <sup>c</sup>	171,287 <sup>c</sup>
4 Days	201,847 <sup>bc</sup>	201,847 <sup>b</sup>	201,847 <sup>bc</sup>
5 Days	255,487 <sup>a</sup>	256,300 <sup>a</sup>	255,893 <sup>a</sup>
6 Days	212,127 <sup>b</sup>	205,287 <sup>b</sup>	208,707 <sup>b</sup>
SE±	9848.3	8328.8	9007.2
<b>CD (B)</b>			
0.0 t/ha	125,392 <sup>d</sup>	118,480 <sup>d</sup>	121,936 <sup>d</sup>
10 t/ha	130,960 <sup>d</sup>	132,160 <sup>d</sup>	131,560 <sup>d</sup>
15 t/ha	129,976 <sup>d</sup>	128,504 <sup>d</sup>	129,240 <sup>d</sup>
20 t/ha	162,568 <sup>c</sup>	165,928 <sup>c</sup>	164,248 <sup>c</sup>
25 t/ha	224,352 <sup>b</sup>	214,128 <sup>b</sup>	219,240 <sup>b</sup>

30 t/ha	324,600 <sup>a</sup>	327,528 <sup>a</sup>	326,064 <sup>a</sup>
SE±	7617.1	7620.4	7316.0
<b>Interaction (AXB)</b>	*	*	*

Means in a column followed by the same letters are not significantly different from each other according to DMRT

\* = Significant at 5% Level of probability

NS = Not significant

### Conclusion

From the results of the present study, it could be concluded that;

1. Combination of 6 days irrigation interval with the application of 30t/ha of cow dung was the best for lettuce production during the cool harmattan season in the Maiduguri semi-arid environment in terms of yield.
2. Six days irrigation interval combined with 30t/ha of cow dung had higher returns in terms of monetary advantage.

### Recommendations

From the results of the present study, it could be recommended that;

1. Farmers should grow lettuce using 6 days irrigation interval combined with 30t/ha of cow dung to get maximum yield and have greater monetary return from growing lettuce.
2. Farmers could use wider irrigation intervals during the cool harmattan periods in Maiduguri.
3. The application of 30t/ha of cow dung in Maiduguri in Sudan Savanna of Nigeria gave greater monetary return from growing lettuce.
4. Further research with irrigation intervals wider than 6 days and cow dung rates above 30t/ha could prove useful and also to evaluate the interactions of the temperature levels and irrigation intervals should be pursued to enrich knowledge.

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**EXPLORING THREE PLANT POWDERS AS A STRATEGY FOR SUSTAINABLE  
MANAGEMENT OF MAIZE WEEVIL (*Sitophilus zeamais*) IN STORED MAIZE  
GRAINS.**

**Oladejo A.O.;**

Department of Pest Management Technology,  
Federal College of Forestry, Jos  
Plateau State, Nigeria

**Musa Ishaya;**

Department of Pest Management Technology,  
Federal College of Forestry, Jos  
Plateau State, Nigeria

**Sikiru G.K.;**

Department of Pest Management Technology,  
Federal College of Forestry, Jos  
Plateau State, Nigeria

**Ayorinde J.;**

Department of Pest Management Technology,  
Federal College of Forestry, Jos  
Plateau State, Nigeria

**Kyaharle B. S.**

Department of Pest Management Technology,  
Federal College of Forestry, Jos  
Plateau State, Nigeria

**Olorundare O.**

Department of Pest Management Technology,  
Federal College of Forestry, Jos  
Plateau State, Nigeria

**ABSTRACT.**

Maize has become the primary staple food among household of different wealth worldwide especially in Africa, yet most of the yields are lost to insect infestations during storage,



especially *Sitophilus zeamais*. The insecticidal effect of Neem seeds, Garlic bulb and Chilli pepper powders were tested on adult weevil establishment, mortality, oviposition and subsequent emergence after treatment and to determine the synergetic effects of the three botanicals on the weevils. The study was carried out in Federal College of Forestry, Jos Laboratory using a 3×3 factorial experiment laid in a Completely Randomized Design (CRD) and was replicated three times. The result showed that weevils were able to establish in all the treatments. Adult mortality increases as the duration increases with dosage 10, 15, 20 grams and the combination had similar mortality. However, analysis of variance showed no significant difference among 10, 15, 20 grams and combination but significantly different from the control at 48 days after treatments. The few weevils that survive were able to oviposit and this decreases as the dosage increases in all plant powders, with the control recording the highest oviposition values and least value recorded in the combination treatment. Notwithstanding, analysis showed no significant difference. Weevil emergence decreases as the dosage increases in all the plant powders with the control recording the highest values (28.33%), while combination recorded the least values (6.67%) and these was significantly different analytically. The resultant effect was significant difference on the weight loss with the control having the high weight loss. Based on this study, it could be concluded that the combinations of powders and Neem seed powder could be used as an effective control of *Sitophilus zeamais* at dosage 20g/100g of maize grain respectively.

**Keywords:** Plant powder, Maize weevil, Establishment, Mortality and Oviposition,

## INTRODUCTION

Maize (*Zea mays* L.) is originated in central Mexico from a wild grass and was introduced to Nigeria in 16<sup>th</sup> century (Ranum *et al.*, 2014 and FAOSTAT 2014). It is one of the most important cereals crop in the world both as food for man and feeds for animals; therefore it's referred to as 'queen of cereals' because of its high yield potential (Nand, 2015).

Maize is the second most cultivated crop in Nigeria, in terms of area harvested (5.8million Ha, second to Cassava's 7.1 million Ha). Nigeria is the second largest maize producer in Africa, after South Africa and the 10<sup>th</sup> largest producer in the world, with an estimated 10.79 million MT produced in 2014 (Hartwich *et al.*, 2010 and FAOSTAT 2014). The largest volumes of maize are produced in the Northern region, particularly in Kaduna, Borno, Niger, and Taraba and in the South-Western states including in Ogun, Ondo and Oyo. It is the fourth most consumed cereal during the past two decades, below sorghum, millet and rice (FAOSTAT 2014).

Being among the primary food staples, maize consumption is widespread across the country and among households of different wealth. Most of the national production aims at human consumption for the production of some local foods such as; pap, tuwo, gwate and donkunu,

with the cereal cooked, roasted, fried, ground, pounded or crushed form (Abdulrahama and Kolawole, 2006).. However, industrial uses (such as the brewery and feed industry) have been developing in the past decades; the percentage of total maize production used for feed has grown from 13 to 18 percent of total production (USDA, 2010). A specific driver of the feed industry is the development of the poultry sector, as poultry feed represents 95-98 percent of the total feed produced in the country between 2005 and 2010 (USDA, 2010).

Nutritionally, it contains approximately 72% starch, 10% protein and 4% fat, supplying an energy density of 365 Kcal/100 g (Ranum *et al.*, 2014). In addition, it has higher content of protein and fat as compared to other cereals such as millet, sorghum, wheat etc. It also contain vitamin B complex such as B1 (thiamine), B2 (niacin), B3 (riboflavin), B5 (pantothenic acid) and B6. Furthermore, it contains vitamin A, C and K together with large amount of beta carotene and fair amount of selenium that helps to improve thyroid gland and play important role in proper functioning of immune system (Kumar and Jhariya 2013).

Despite its high production value, Nigeria's average maize yield of 1.8 MT/Ha is one of the lowest among the top 10 maize producers in Africa. It lags behind countries such as Egypt and South Africa where the yields are 7.7MT/Ha and 5.3MT/Ha respectively (FAO, 2008). This could partly due to the existence of low capacity stores, use of local mud bins for storage, uncleaned and filthy store houses, improper ventilation, leaky and dampness in store houses, inconvenient storages (with broken walls, ceilings and floors) are some of the serious but less noticeable storage problems. The situation is further compounded when storage is done in open areas where insect pests, rodents and birds cause lots of damage (Tunio, 2012). It is estimated that 50% grain production is lost due to improper storage and attack of insects pests in tropical countries including Pakistan and Nigeria. (Adedire, 2001).

Maize weevil (*Sitophilus zeamais*) is a major pest of stored maize grains in the tropics and temperate regions of the world (Sagheer *et al.*, 2013; and Adedire, 2001, Akob and Ewete, 2007). According to (Yohannes *et al.*, 2014) the estimated global annual losses due to pest's activity in the field and storage are valued more than \$100 billion. The attack may start in the mature crop on the field when the Moisture Content (MC) of the grain had fallen to 18-20% (Radha, 2014). In stored maize, heavy infestation of this pest may cause weight losses of as much as 30-40% (Radha, 2014; Ogunsina *et al.*, 2011).

Stored-product pests are particularly important because they attack the final agricultural product, therefore it is very important to carry out an investigation to curb the menace of weevil infestation. At present, pest control measure in storage rely heavily on the use of synthetic pesticide and fumigants (Ogunsina *et al.*, 2011), this causes some deleterious health hazard to farmers and the consumer hence; the use of botanical that are human friendly and less hazardous to replace synthetic pesticides is necessary.

Many African plants are potential source of pesticide and have been shown to contain either anti-feedant, repellent or insecticidal compound that enable the crude plant materials or an

extract active compound to protect stored product by killing the insects (Oladejo, *et al.*, 2020). For example neem seed produce oil and powder that alter the hormone of bugs so that they cannot fly, breed or eat (Kubo and Nakanish, 2001), Garlic extract on the other hand show considerable toxicity to a number of pest species, across all life stages while Capsaicin (Chili pepper) has repellent and insecticidal properties for all species of pest (Mousa *et al.*, 2013). The phytochemical constituents of these plants as shown below reveal their insecticidal properties (Mohammad and Idris, 2019; Sujata, 2021 and Gayathri *et al.*, 2016). Therefore the objective of this study is to determine the effects of these three medicinal plants on maize weevil.

Phytochemical	Aqueous Extract	Ethanol Extract
Alkaloids	+	+
Flavonoid	+	+
Glycosides	+	+
Reducing sugar	-	-
Saponin	+	+
Steroids	+	+
Phenols	+	+
Terpenoid	+	+
Anthraquinones	+	+
Tannin	+	+

*Phytochemical Constituent of Garlic Bulb (Mohammad and Idris, 2019)*

Alkaloids	+
Saponins	+++
Tannins	++
Steroid	+++
Terpenoid	+++
Glycoside	++
Flavonoid	+
Phenol	+
Oxalic acid	+

+++ : Most present; ++ : Moderately present; + : Least present

*Phytochemical Constituent of Neem seed (Sujata, 2021)*

<b>Carbohydrate</b>	-
<b>Tannis</b>	-
<b>Saphonins</b>	++
<b>Flavonoids</b>	++
<b>Cardiac glycosides</b>	-
<b>Phenols</b>	+++
<b>Steroids</b>	-
<b>Alkaloids</b>	++
<b>Terpenoid</b>	+
<b>Anthroquinones</b>	-
<b>Volatile oils</b>	+

*Phytochemical Constituent of Chilli pepper (Gayathri et al., 2016)***MATERIALS AND METHODS****Study Area**

The experiment was carried out in Entomology laboratory of Federal College of Forestry Jos. Jos North Local Government area of Plateau State is located at north Central zone of Nigeria. Jos is situated between latitude 9° 50'N and 10° 05'N and longitude 8° 50'E and 8° 55'E. It is in highland area that project from plain of central and northern Nigeria. It average temperature range from 20.2°C to 34.3°C ( Kowal and Knabe 2019).

**Source of maize seeds**

About 3kg maize grains were purchased from Terminus market. The grains were sieved to remove non viable seed, dirty and broken particles. Then, 2.5kg grains was randomly sampled and stored in a refrigerator for two weeks to kill any prior sources of the maize weevil inoculum and eggs which might be already pre-existing in the grain as procedure ( Parugrug and Roxas 2008).

**Plant powders preparations**

Neem seeds were collected from neem tree found in Tilde in Bauchi. Garlic bulb and chili pepper will be purchase from Terminus market. Each of these were properly cut into smaller pieces with a sharp blade and dried at room temperature, to avoid loss of active compounds through photo degradation of active ingredient by ultra-violet ray (Salako 2008). The dried materials were then be ground into fine powder using blender and sieved with a 10mm sieve. The fine powders were kept in air-tight containers until required.

### **Sampling Method**

100g of dried maize grains was treated with 10g, 15g, and 20g of each of the test treatment in 12 cm high x 6.5 cm diameter glass jars. In the first treatment neem seed powder; in the second treatment garlic bulb powder, in the third treatment chilli pepper powder, and in the fourth treatment admixture of neem seed, garlic bulb powder and chilli pepper powder was used. The admixtures were shaken manually for 5 minutes and the treated maize grains were undisturbed for an hour. Mixture of 10 adult maize weevils of about 24hours (1:1 male, female ration) was introduced per treatment. The glass jars was covered with Muslin net of about 0.02mm and sealed with rubber ring to prevent the insects from escape. Untreated maize served as control for each. Each treatment was replicated three times.

### **Test for Weevil Establishment**

Weevil establishment was checked through their body movement after 8hours of introducing the plants powder into the maize grain.

### **Test for Weevil Mortality**

Weevil mortality rates was observed by physically counting dead weevils at 24hours to 120hours exposure to the treatment, any weevil that cannot move up to half of it's body length is assumed to be dead ( Oladejo *et al.*, 2020).

### **Test for Weevil Oviposition**

After 120 hours, oviposition was checked by removing all the dead weevil and each grain was carefully observed for a transparent dot or black dot inside the grain using hand lens or Light microscope ( sign of laid egg on maize grain)

### **Test for Weevil Emergence**

The treatment was then kept for 35days, to observe the new emergence of maize weevil, which commenced on the 30th days after oviposition.

### **Statistical analysis**

Data was collected and analysed using ANOVA to determine whether there is significant between the treatment, and Least Significant Difference ( LSD) test was later used to separate the mean. Using SPSS software version 23.

## **RESULTS**

### **Weevil Establishment**

Weevils were able to establish after eight hours of introducing the plants powders and was observed through their body movement.

### Weevil Mortality

Table 1: Illustrates adult weevil mortality after 120 hours of exposure. It was observed that mean mortality increases as both dosage and duration of the experiment increases, except for control treatment that remains constant. Analysis of the overall data show a significant difference between different dosages applied to the weevil's environment and duration, but no significant difference were observed between different plants powder used. However, LSD further revealed the factor that is responsible for the difference (Table 1).

**Table 1: Mean adult mortality after 24, 48, 72, 96 and 120 hours of exposure to different plant powders**

Plants Powder	Dosages.	24hours	48 hours	72 hours	96 hours	120 hours
Garlic Powder	0g/ Control	0.00 <sup>a</sup>	0.00 <sup>a</sup>	0.00 <sup>a</sup>	0.00 <sup>a</sup>	0.00 <sup>a</sup>
	10g	0.00 <sup>a</sup>	6.67 <sup>b</sup>	10.00 <sup>b</sup>	16.67 <sup>b</sup>	16.67 <sup>b</sup>
	15g	6.67 <sup>b</sup>	10.00 <sup>d</sup>	16.67 <sup>d</sup>	16.67 <sup>b</sup>	16.67 <sup>b</sup>
	20g	20.00 <sup>c</sup>	13.33 <sup>c</sup>	13.33 <sup>c</sup>	20.00 <sup>c</sup>	16.67 <sup>b</sup>
	SE ±	0.976	1.164	1.263	1.209	1.171
Pepper Powder	0g/ Control	0.00 <sup>a</sup>	0.00 <sup>a</sup>	0.00 <sup>a</sup>	0.00 <sup>a</sup>	0.00 <sup>a</sup>
	10g	0.00 <sup>a</sup>	6.67 <sup>b</sup>	13.33 <sup>b</sup>	16.67 <sup>b</sup>	20.00 <sup>c</sup>
	15g	6.67 <sup>b</sup>	13.33 <sup>c</sup>	16.67 <sup>c</sup>	16.67 <sup>b</sup>	20.00 <sup>c</sup>
	20g	16.67 <sup>c</sup>	16.67 <sup>d</sup>	16.67 <sup>c</sup>	16.67 <sup>b</sup>	13.33 <sup>b</sup>
	SE ±	5.833	1.164	1.263	1.209	1.171
Neem Powder	0g/ Control	0.00 <sup>a</sup>	0.00 <sup>a</sup>	0.00 <sup>a</sup>	0.00 <sup>a</sup>	0.00 <sup>a</sup>
	10g	3.33 <sup>b</sup>	10.00 <sup>b</sup>	13.33 <sup>b</sup>	13.33 <sup>b</sup>	16.67 <sup>c</sup>
	15g	6.67 <sup>c</sup>	13.33 <sup>c</sup>	13.33 <sup>b</sup>	16.67 <sup>c</sup>	16.67 <sup>c</sup>
	20g	20.00 <sup>d</sup>	13.33 <sup>c</sup>	16.67 <sup>c</sup>	20.00 <sup>d</sup>	10.00 <sup>b</sup>
	SE ±	7.500	1.164	1.263	1.209	1.171
15g Garlic + 15g Pepper + 15g Neem Powder	0g/ Control	0.00 <sup>a</sup>	0.00 <sup>a</sup>	0.00 <sup>a</sup>	0.00 <sup>a</sup>	0.00 <sup>a</sup>
	10g	6.67 <sup>b</sup>	10.00 <sup>b</sup>	13.33 <sup>b</sup>	16.67 <sup>b</sup>	16.67 <sup>c</sup>
	15g	10.00 <sup>c</sup>	16.67 <sup>c</sup>	16.67 <sup>c</sup>	16.67 <sup>b</sup>	16.67 <sup>c</sup>
	20g	20.00 <sup>d</sup>	16.67 <sup>c</sup>	16.67 <sup>c</sup>	16.67 <sup>b</sup>	13.33 <sup>b</sup>
	SE ±	9.167	1.164	1.263	1.209	1.171

(Mean with the same alphabet in the same column are not significant ( $p \leq 0.05$ ))

**Effects of each plant materials on the oviposition.**

Table 2 shows the values obtained from oviposition of weevils in the experimental setup. Oviposition of weevils decreases as the dosages increases in all the plant powders applied, with the control recording the highest oviposition values, while the least values (48.83 each) was observed in the combination treatment (15g Garlic + 15g Pepper + 15g Neem Powder) (21.40). However analysis of variance shows no significant difference.

**Table 2: Effect of plant powders at different concentrations on the oviposition of weevil.**

Different Dosages	Garlic Powder	Pepper Powder	Neem Powder	Combination of the Powders
0g/ Contr	48.83	48.83	48.83	48.83
10g	34.50	33.90	33.70	32.87
15g	30.80	30.23	29.40	26.10
20g	23.30	22.30	23.03	21.40
SE ±	0.31	0.33	0.30	0.31

**Effects of each plant materials on the Weevil emergence.**

On weevils emergence, the result is presented in table 3. Weevils emergence decreases as the plant powders increases in all the treatments, with the control recording the highest values (28.33 each), while the least values (6.67each) was observed in the combination treatment (15g Garlic + 15g Pepper + 15g Neem Powder).

**Table 3: Effects of plants powder at different dosages on weevils emergence.**

Different Dosages	Garlic Powder	Pepper Powder	Neem Powder	Combination of the Powders
0g/ Control	28.33	28.33	28.33	28.33
10g	11.67	13.00	12.33	11.33
15g	10.00	10.33	10.67	10.67
20g	9.67	9.33	9.33	6.67
SE ±	0.57	0.58	0.54	0.57

**Check for the weight loss after the emergence of the weevil.**

Table 4 shows the values obtained from weevils weight loss in the experimental setup. weevils weight loss decreases as the plant powders increases in all the treatments, with the control recording the highest values (14.67each), while the least values (5.33each) was observed in the combination treatment (15g Garlic + 15g Pepper + 15g Neem Powder).

**Table 4: Effects of plants powder at different dosages on maize weight loss.**

Different Dosages	Garlic Powder	Pepper Powder	Neem Powder	Combination of the Powders
0g/ Control	14.67	14.67	14.67	14.67
10g	7.23	8.00	7.37	7.43
15g	7.03	7.07	7.03	6.83
20g	7.07	6.97	7.03	5.33
SE ±	0.28	0.23	0.24	0.27

## DISCUSSION

The efficacy of the botanicals on the *Sitophilus zeamais* were significantly different, the effects of different plant materials on insects may depend on several factors such as chemical composition and species susceptibility (Aktar *et al.*, 2004). The preponderance of tannins, steroids, anthraquinones and cardiac glycoside in the three plant powders may suggest a role in its pesticidal and anti-feedant potencies against some insect and pathogens (Mila, *et al.*, 1996; Thomas and Krishnakumari, 2015). In the present study, mortality of *S. zeamais* varied with the dosage of the plant species. This finding showed that an increase in the botanical dosages results in a reduction in the incidence of weevil attack. This agrees with the work of Mbaiuinam *et al.*, (2006) where Neem powders and Garlic bulb powders showed that grounding the plants allows them to release their insecticidal effect on weevils. The untreated grain offers free environment where weevils suffer no developmental limitations hence the highest feeding rates. However greatest effectiveness of the botanical pesticides was observed at the combination of the three medicinal plants.

The highest mortality in all the treatment was recorded on the 4<sup>th</sup> day after treatment except the control that had 0.00% 1c. This agreed with Berhanu and Eman (2018), Ibrahim and Sisay, (2012) who recorded significantly higher mortality of maize weevils 4 days after treatment exposure in all treatments of integration and other tactics tested at 5 and 10% doses using Neem powder and garlic bulb powder. Also, with combinations of different rates of Malathion 5% dust and neem seed powder, higher significant weevils' mortality was recorded when compared with untreated maize grains.

The weevil were able to oviposit more on the control than those with botanicals, where the control has the highest percentage of oviposition with 48.83% and those that have botanicals has the least of 21.40%. This study revealed that all the selected botanicals had negative effects on egg laying by *Sitophilus zeamais* in stored maize grains. Oviposition by *S. zeamais* was significantly lower in powdered grains than in untreated grains. This confirm the report of Khaliq *et al.*, (2014) and Edeldouk *et al.*, (2012) who concluded that plant powders reduce oviposition of weevils from 25.75% in controls to 18.50% and 25.5 to 1.25% respectively in



Neem seed powder applied at the concentration of 3.0 g / 50 g maize grains after 1 month post treatment. Similarly, Ileke (2014) reported a reduction in the number of eggs laid by *S. zeamais* from  $36.25 \pm 2.27$  in the control to  $8.00 \pm 0.91$  in the combination of Neem seed powder, garlic bulb powder and chili pepper powder applied at 0.4 ml / 20 g maize grains. Effectiveness of Neem seed powder in reducing egg deposition by *S. zeamais* concurs with Kosar *et al.*, (2016) who reported ovipositional deterrence of Chilli pepper powder and Neem seed powder against *S. zeamais*.

Weevils emergence decreases as the concentration increases in all the plant powder applied, with the control recording the highest values (28.33% each), while the least values was observed in the combination treatments (6.67% each). Outcomes of this study have revealed that all the botanicals tested had total inhibition rate in adult emergence of *S. zeamais* in maize grains treated with powders of Neem seed powder, chilli pepper powder and Garlic bulb powder as there was least adult emergence recorded compare to the untreated maize. However, garlic bulb powders of the botanicals were found to be less effective than the other formulations, even though the incident rate was very high compared to the control. The use of plant powders in suppressing adult emergence of *S. zeamais* was previously reported by others ((Edeldouk *et al.*, 2012; Ojo and Ogunleye 2013 and Rivera *et al.*, 2014). Performance of plant powders of the study botanicals in reducing adult emergence of *S. zeamais* agrees with the findings of (Oni and Ogunbite 2015) who reported that botanical powders of Chilli pepper powder, Neem seed powder and Ginger powder inhibited  $28.76 \pm 0.33$  to  $94.13\% \pm 1.06$  adult emergence of *S. zeamais* in stored maize. Similarly, (Edelduok *et al.*, 2015) recorded 0.50 adult emergence of *S. zeamais* in maize grains treated with cotyledon powder of Neem seed powder at the rate of 3.0 g / 50 g at 21 days after treatment. Complete suppression of adult emergence of *S. zeamais* by plant powders of Chilli pepper powder and Neem seed powder of the botanicals achieved in this study is in accordance with (Ojo and Ogunleye 2013). They reported that plant powders of ginger powder and chilli pepper powder completely suppressed the emergence of *S. zeamais* 42 days after introducing the weevils in the treated maize grains. Similarly, (Rivera *et al.*, 2014) reported none emergence of adult *S. zeamais* in maize treated with Neem seed powder at 1.0%. The present study has found that Neem seed powder was more effective than the other botanicals, while untreated maize ( control) recorded more emergence than others. Total inhibition rate in adult emergence of *S. zeamais* in maize treated with combination of Neem seed powder, chilli powder and garlic bulb powder at varying concentrations was achieved. This outcome is in line with the findings of (Ileke *et al.*, 2014) who recorded complete inhibition of adult emergence of *S. zeamais* after 30 days of exposure to plant powder of Neem seed powder applied at 0.4 ml / 20 g maize. Similar result was obtained by (Oni and Ogunbite 2015) that 6, 8 and 10% powder of chilli pepper powder caused 80% inhibition rate in adult emergence of *S. zeamais* in stored maize 42 days after treatment.

The grain weight losses were significantly different from the control and those grains with botanicals, control has the highest weight loss value of 14.67 while the least recorded in the grains with botanicals was 5.33. The low quantity of weight loss observed in this study suggests that combination of this three medicinal plants can be used as good alternative to synthetic pesticides against *S.zeamais*. According to (Duke 2001) weevils are capable of causing 80-100% weight loss if grain is left untreated for long periods.

### Conclusion

In the absence of synthetic chemicals, small holder farmers can use Neem seed powder, chilli pepper powder and Garlic bulb powder to lowered the weevil damage. The powders also have a tendency of blocking the spiracles of the insect thus impairing respiration leading to their death.

It can be concluded from the present study that combinations of powders and Neem seed powder could be used as effective insect control. Based on high rate of control effects, neem seed and combination powders at 20g/100g of maize grain can be used as control for damage caused by maize weevil (*Sitophilus zeamais*). Hence, the use of neem seed, chilli pepper and garlic powders as an alternative control option in integrated storage pest management strategies by small holder farmers.

### Recommendation.

- This study revealed that the insecticidal efficacy of the three plant seed powders were concentration dependent, therefore, a standardized method of concentration formulation should be established.
- Also, further studies should be carried out at high concentration of the powders.

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## **RISK MANAGEMENT STRATEGY AND ORGANIZATIONAL PERFORMANCE: EVIDENCE FROM NIGERIAN BANKS**

**Babalola, O.A,**

Department of Banking and Finance,  
Osun State Polytechnic, Iree,  
Osun State, Nigeria

**Olaoye B.O,**

Department of Business Administration and Management,  
Osun State Polytechnic, Iree,  
Osun State, Nigeria

**Oladeji, A.A,**

Department of Business Administration and Management Studies,  
The Polytechnic, Ibadan,  
Oyo State, Nigeria

**Togun, O.R,**

Department of Accountancy,  
Osun State Polytechnic, Iree,  
Osun State, Nigeria

### **Abstract**

This study examines the effect of the risk management strategy on organizational performance with specific reference to the Nigerian selected banks. A sample of 150 staff members was conveniently selected from all the branches of the three selected banks in the Ibadan metropolis. The sample comprises 50 each from the banks. Consequently, 150 copies of the questionnaire were administered by the researchers to participants who volunteered to participate in the study. Pearson Correlation Coefficient and Path Analysis were employed to analyze the data. The results establish that risk management practices have a significant association with banks' performance. Furthermore, results indicate that reveal that risk understanding, risk monitoring, and control, risk assessment and analysis, managing market risk, managing liquidity risk, and managing operational risk has a significant effect on a bank's performance, while risk identification and managing credit risk is not significantly influenced organizational performance. The findings of this research study, therefore, seem to support the claim that risk management contributes significantly to the performance of some Nigerian banks. Therefore, banks should develop active risk management processes to identify,

measure, monitor, and control various risks, including credit, market, liquidity, and operational risks, and hold capital against these risks. It is also very important to consider the CBN Risk Management Guidelines, the formation of a comprehensive risk management system in Nigerian banks is not only a useful exercise to meet regulatory requirements, but also an effective practice to improve the performance of banking institutions.

**Keywords:** Risk Identification, Risk monitoring, Credit risk, Operational risk, Performance

### **Introduction**

The banking sector is a strong pillar of economic sustainable development across the globe. Economic research establishes that a well-functioning banking system helps accelerate economic growth and poverty alleviation, while poorly-functioning banks can impede economic progress. The general role of commercial banks is to provide financial services to the general public and businesses, ensuring economic and social stability and sustainable growth of the economy (Oyedele, Adeyemi & Fasesin, 2018; Ogunlade & Oseni, 2018). Globally, there is no nation can experience sustainable development without a sound financial system (Alobari, Naenwi, Zukbee, & Grend, 2018). In Nigeria, the sector contributes 24% to Nigeria's GDP as of the first quarter of 2020 (National Bureau of Statistics 2020). In the same direction, Nwanna, and Oguezue (2017) argue that the banking sector has the opportunity to alter useful resource allocation and saving rates with an influence on long-term financial growth. Recently, the Nigerian banks have been bedeviled by asset management challenges owing largely to official recklessness amongst managers, unhealthy competition, adverse global economic conditions feeding through to the local economy and operating environment, low credit costs, and strong loan growth as the economy rebounded after the pandemic shock (Owojori, Akintoye & Adidu, 2011; Kolapo, Ayeni & Oke, 2012). According to Fathi, Zarei, and Esfahani (2012), risks are uncertainties and in the banking sector, financial institutions are faced with a large number of risks. They argue that bankruptcy in the financial sector is costly, not only for the equity and debt holders of banks' but also for the taxpayers and the main goal of the bank's management is to maximize the shareholder's value. Peterson (2014) argues that the rapid growth in the banking sector of Nigeria has made it more leveraged and risky due to modern technological, product innovations, financial deregulations, and global market integration. According to Osuka, and Amako, (2015), poor risk management reduces bank profitability and leads to bank distress and/or failure. To support this revelation, Uwalomwa, et al (2015) confirm that poor implementation of risk management makes the banks' portfolio lead to the problem of bad debts in Nigerian banks which eventually made them perform below expectation.

As a result, the risk has undermined the confidence of depositors, shareholders, and foreign investors in the Nigerian banking sector. Banks in Nigeria are exposed to numerous financial

and non-financial risk factors, including interest rate, liquidity, credit, market, operational, reputational, legal, and exchange rate risks, which can affect the survival and success of banks. ( ). According to a World Bank report (2020), Nigerian banks will be under stress until 2025 unless sound risk management is put in place.

In light of this forecast, the Central Bank of Nigeria has imposed risk management policies on Nigerian banks to improve their ability to cope with the competitive environment (Reta, 2011; Uwuigbe, Uwuigbe & Oyewo, 2015). It provides a detailed description of the main risks and sets out some key principles for any bank's risk management framework, regardless of complexity or size. According to these guidelines, risk management includes identifying, measuring, monitoring, and controlling risks to ensure that: The bank's risks are within limits set by the board of directors, all risk-taking decisions are aligned with the objectives and business strategy set by the Board, the expected payment compensates for the risk borne by the bank, all risk decisions are clear and unambiguous and sufficient capital is available as a buffer for taking risks (Uwuigbe, Uwuigbe & Oyewo, 2015).

Research shows that risk management in financial institutions is fundamental to fair and acceptable banking practices. According to Kagoyire and Shukla (2016), sound risk management is a prerequisite for the stability and continued profitability of financial institutions, and poor credit quality is the most common cause of poor financial performance and health. Apparently, Wambua (2010) found that risk management in the areas of interest rate, credit, foreign exchange, and liquidity risk contributes positively to bank management. Similarly, Owolabi, Oloyede, Iriyemi, and Akinola (2017) found a positive correlation between risk management practices and firm value. This means that risk management is one of the most important activities in any business and cannot be overlooked by any business entity involved in the lending business, regardless of the nature of that business. Risk management and organizational performance have received much research attention in developed and developing countries and have been measured and conceptualized in a variety of ways. However, the construct has not been studied and is still challenging in the Nigerian banking sector. Apparently, the existing literature on Nigerian banks often analyzes specific aspects of Nigerian banks such as credit management, capital management, bank reform, capital structure, efficiency, etc. no one of them explored the relationship between them (Peterson, 2014; Ogunlade & Oseni, 2018). The above discussion highlights that there is an opportunity for special research in the area of Nigerian banking risk management. Therefore, this research intends to explore the above potential research gaps by addressing the full range of risk factors and particularly in examining the relationship between risk management and performance

## **Review of related literature**

### **Risk in banking**

The term risk in banking has been broadly defined by various scholars. These days, there is no universally accepted definition of risk in banking. Different authors have used different approaches to describe the scope of this term. For example, Rahman, Abdullah, and Ahmad

(2012) see risk in banking as the risk of the unpredictability of outcomes with possible variations in desired or expected returns. Ghosh (2012) defines bank risks as potential risks that could arise from adverse events such as economic downturns, adverse changes in tax and trade policies, adverse interest or exchange rate movements, or declines in stock prices. Similarly, Schroeck (2002) interprets risk in banking as the undesirable impact on earnings of various sources of uncertainty. In addition, both contain the caveat that banks' risks depend on real-world conditions, which again consist largely of an amalgamation of conditions in the external environment. According to Ishtiaq (2015), given all the above definitions, the term risk in a bank is defined as the probability of an event or threat that could disrupt a bank's core earning capacity or increase earnings and cash flow volatility. Banking risk can therefore be described as the potential loss of a bank due to the occurrence of certain events. Previous research has shown that the main risks in banking operations include credit risk, interest rate risk, market risk, liquidity risk, solvency risk, and operational risk (Oyedele, Adeyemi & Fasesin, 2018).

### **Risk Management**

The concept of risk management in banking emerged in the 1990s. However, prior to the 1990s, risk management was used to describe the techniques and risks associated with insurance. This type of risk management is the purchase of traditional insurance products that are appropriate for each case to protect against future dangers. Recently, derivatives have also been promoted in financial markets as risk management tools for hedging purposes (Uwuigbe, Uwuigbe & Oyewo, 2015; Uwuigbe, Uwuigbe & Oyewo, 2015). This form of risk management is often referred to as "financial risk management" and derivatives are used as a solution to manage the risks associated with financial activities. Risk management is not a new term in many fields, from business to the military to the environment. Moreover, traditional risk management approaches in the financial and insurance industry have been used for decades in various risk management functions such as audit, credit risk management, and market risk management. Risk management in banking is theoretically defined as "the logical development and execution of plans to deal with potential losses". Typically, the focus of risk management practices in the banking industry is to manage the risk of loss or exposure of a financial institution and protect the value of its assets (Uwuigbe, Uwuigbe & Oyewo, 2015; Uwuigbe, Uwuigbe & Oyewo, 2015).

Risk management practices have been measured differently by different scholars. For example, Nazir, Daniel, and Nawaz (2012) conceptualize risk management through risk identification, risk assessment and analysis, and risk monitoring. A study by Abu Hussain and Al-Ajmi (2012) measures risk management in terms of risk management, risk identification, risk assessment analysis, risk surveillance, and credit risk management. Similarly, Hassan (2011) measures risk management practices as risk identification, risk assessment and



analysis, and risk monitoring. Research conducted by Bilal, Talib, and Khan (2013) conceptualizes risk management practices as risk understanding, risk identification, risk assessment and analysis, risk monitoring, and credit risk management. . Therefore, in this latest research, through risk understanding, risk identification, risk assessment and analysis, risk monitoring and control, credit risk management, market risk management, liquidity risk management, and operational risk management. , which conceptualizes the practice of risk management.

### **Theoretical review**

#### **Transaction Cost Theory**

Previous research has linked many theories such as Agency theory (Sufi & Qaisar, 2015; Moti, Masinde, Mugenda & Sindani, 2012), Institutional theory (Lucy, 2015; Linet & Willy, 2017), Stakeholder theory (Ngwira & William, 2017), Transaction cost theory (Oloyede, Adeyemi & Fasesin, 2018; Njeru, Mohhamed & Wachira, 2017), Shiftability Theory (Peterson, 2014; Ogunlade & Oseni, 2018), Anticipated Income Theory (Ahamed, Abdul & Abdul, 2016; Alobari, Naenwi, Zukbee, & Grend, 2018), Credit Risk Theory (Reta, 2011; Uwuigbe, Uwuigbe & Oyewo, 2015), Liability Management Theory (Owojori, Akintoye & Adidu, 2011; Kolapo, Ayeni & Oke, 2012). This current study is therefore based on traditional cost theory as the theory is relevant to research. Transaction cost theory states that organizations always try to minimize transaction costs through internal resource management or outsourcing of services (Williamson, 2010). From the same perspective, Oloyede, Adeyemi, and Fasesin (2018) postulate that all types of transactions generate coordination costs for monitoring, controlling, and managing transactions. According to Williamson (2010), transaction cost theory states that the goal of an organization is to minimize the costs associated with transactions. Njeru, Mohhamed & Wachira (2017) found that transaction costs can be distinguished from production costs and that decision-makers choose between using a fixed structure or procuring from the market by comparing transaction costs to internal production costs. It shows what you can do. Therefore, the cost is the main determinant of such decisions. Milcah, Kirichi, and Joseph (2014) argue that transaction costs in credit markets are driven by a variety of processes, including finding and gathering relevant information about customers, negotiation procedures and contracts, opportunistic customer behavior, and failure to extend credit. It claims to be an indirect financial cost. the terms, risk aversion behavior associated with credit allocation, and monitoring and enforcement costs incurred in determining whether customers are complying with the terms of the contract; Transaction cost theory, therefore, allows the banking sector to have a healthier ability to monitor and enforce loan repayments. All these benefits give providers a cost advantage over financial institutions (Nduta, 2013). Correspondence. The theory of transaction cost economics makes it very difficult for banks to determine whether a borrower is able to pay (a viable project) and/or is willing to pay (because

of moral hazard). banks argue that they have no interest in providing credit to their customers (Eppy, 2005). Driga (2012) found that lack of adequate and reliable collateral, lack of adequate risk management tools, ignorance of complex information about borrowers, and perceived risks are all contributing factors to Nigeria's commercial banks providing much-needed funding. Strengthen this argument by pointing out that it means you don't want to.

### **Empirical Review**

Available research provides empirical evidence that risk management practices are critical to banking institution performance. For example, Tanui, Wanyoike, and Ngahu (2015) stated that risk management is very important to protect bank assets and shareholder interests. A study by Oloyede, Adeyemi, and Fasesin (2018) demonstrates that risk management is highly relevant to organizational performance. Moti, Masinde, Mugenda & Sindani (2012) found that risk management practices align with the compliance function in terms of compliance requirements, improve a bank's reputation, increase its chances of attracting more customers, and increase the bank's cash flow. Zimbe (2011) conducted a study in Uganda on the role of internal audit and risk management in bank organizational performance. The results show that internal audit and risk management have a significant impact on organizational performance. Similarly, Ahamed, Abdul, and Abdul (2016) conducted a study on the impact of credit risk management on the lending performance of banks in the Ampara district of Sri Lanka. Results show that credit rating, affordability, technical feasibility, creditworthiness, risk transfer, risk diversification, and risk retention are not significantly associated with credit performance. Similarly, Linet and Willy (2017) conducted a study on Kenyan commercial banks and found a positive association between risk management and defined benefit lending.

Another study conducted in Kenya by Njeru, Mohhamed, and Wachira (2017) reaffirms that risk management has a direct link with organizational performance. A similar study conducted in Zambia showcases that risk management practices impact loan performance in selected microfinance banks. Moti, Masinde, Mugenda, and Sindani (2012) also attest that risk management practices such as risk understanding, risk identification, risk assessments, and analysis, risk monitoring and control, managing credit risk, managing market risk, managing liquidity risk, and managing operational risk are independently and jointly predictors of organizational performance. Similarly, Alobari, Naenwi, Zukbee, and Grend (2018) also confirm that a positive and significant relationship exists between risk identification; risk assessment and analysis, risk monitoring, and organizational performance. The study by Abu Hussain and Al-Ajmi (2012) also establishes that risk management, risk identification, risk assessment analysis, risk monitoring, and managing credit risk have a significant relationship with organizational performance. In the same vein, Hassan (2011) proves that risk identification, risk assessment and analysis, and risk monitoring are predictors of organizational performance. The study conducted by Bilal, Talib, and Khan (2013) also

demonstrates that understanding of risk, risk identification, risk assessment and analysis, risk monitoring, and managing credit risk are major determinants of banks' performance.

Based on the empirical review, the following hypotheses emerged:

- H<sub>1</sub>:** Risk understanding is significantly associated with organizational performance
- H<sub>2</sub>:** Risk identification is significantly associated with organizational performance
- H<sub>3</sub>:** Risk assessments and analysis are significantly associated with organizational performance
- H<sub>4</sub>:** Risk monitoring and control are significantly associated with organizational performance
- H<sub>5</sub>:** Managing credit risk is significantly associated with organizational performance
- H<sub>6</sub>:** Managing market risk is significantly associated with organizational performance
- H<sub>7</sub>:** Managing liquidity risk is significantly associated with organizational performance
- H<sub>8</sub>:** Managing operational risk is significantly associated with organizational performance

## **Methodology**

### **Sample and procedure**

The study population comprises permanent staff members of the three selected Nigerian banks, as it is primarily responsible for the implementation of risk management practices. The sample was selected using non-probability sampling techniques. First, a purposive sampling technique was used to select the three banks (Guaranty Trust Bank, Zenith Bank, and First Bank). The selection was based on the fact that they are three of the biggest five banks in Nigeria, it is assumed that some degree of uniformity is expected in the implementation of CBN risk management guidelines and other related policies and practices. Thereafter, a sample of 150 staff members was conveniently selected from all the branches of the three selected banks in the Ibadan metropolis. The sample comprises 50 each from the banks. Consequently, 150 copies of the questionnaire were administered by the researchers to participants who volunteered to participate in the study. At the end of the period, 135 copies of the questionnaires were returned representing a response rate of 0.90%. 30% of them came from the GTB, 50% of respondents came from the First bank, and only 20% of them came from Zenith Bank. 68% of the respondents were male and 32% were female. This trend suggests that men make up the majority of respondents. This distribution may be due to the fact that in most Third World countries, men are culturally more educated than women. Forty-five percent of respondents were between 40-55 years, 36% were between 30- 45 years, and only 19% were above 55 years. The average age of most respondents is 44 years. This means that most faculty members are still very young, energetic, and active. This development means that they can still make a meaningful contribution to the banking sector. 55% of respondents have been in the banking industry for 15 years, 35% have been in university for 10 years, and 10% have

been in university for over 30 years. Years of banking experience show that most of them understand the risk management practices that inevitably determine their coping strategies.

### **Measurements**

This study included eight scales: (1) risk understanding, (2) risk identification, (3) risk monitoring and control (4) risk assessment and analysis, (5) managing credit risk, (6) managing market risk, (7) managing liquidity risk and (8), managing operational risk. Each scale was measured using multiple items, while the respondents responded on a 5-point Likert Scale ranging from 1 (strongly disagree) to 5 (strongly agree)

**Risk Understanding Scale (RUS):** The 4-item scale was developed and validated by Ishtiaq (2015). Sample items are; there is a common understanding of risk management across the bank, there is a proper system for understanding various risks implemented in the bank, and Responsibility for risk management is clearly set out and understood throughout the bank. The author reported a Cronbach's Alpha coefficient of 0.782 and composite reliability of 0.825.

**Risk Identification Scale:** This 5-item scale of leadership capability was derived from the study of Oyedele et al (2018). Sample items are: the bank carries out a compressive and systematic identification of its risks relating to each of its declared aims and objectives, the bank finds it difficult to prioritize its main risks and the bank is aware of the strengths and weaknesses of the risk management systems of other banks. The authors reported a Cronbach's Alpha coefficient of 0.799 and composite reliability of 0.809.

**Risk Monitoring and Control Scale:** This 4-item scale was adopted from the work of Moti et al (2012). Sample items are: “monitoring the effectiveness of risk management is an integral part of routine management reporting, the level of control by the bank is appropriate for the risks that it faces and reporting and communication processes within the bank support the effective management of risk. The authors reported a Cronbach's Alpha coefficient of 0.860 and composite reliability of 0.819.

**Managing Credit Risk Scale:** The 5-item scale developed and validated by Ahamed, Abdul, and Abdul (2016). Sample items are: “the credit risk strategy set by the Board of Directors are effectively transformed and communicated within the bank in the shape of policies and procedures by the top management, the bank has a credit risk rating framework across all type of credit activities, and the bank regularly prepares periodic report of credit risk. The authors reported a Cronbach's Alpha coefficient of 0.719 and composite reliability of 0.822.

**Managing Market Risk Scale:** The 4-item scale developed and validated by Linet and Willy (2017). Sample items are: “the market risk strategy set by the Board of Directors are effectively transformed and communicated within the bank in the shape of policies and procedures by the top management, the bank regularly prepares periodic report of market risk and the bank’s overall market risk exposure is maintained at prudent levels and consistent with

the available capital. The authors reported a Cronbach's Alpha coefficient of 0.771 and composite reliability of 0.815.

**Managing Liquidity Risk Scale:** The 4-item scale developed and validated by Alobari et al., (2018). Sample items are: “there is a proper set of rules and guidelines, for managing liquidity risk, available in the bank, the bank regularly prepares periodic report of liquidity risk and applications of liquidity risk management techniques reduce costs or expected losses The authors reported a Cronbach's Alpha coefficient of 0.749 and composite reliability of 0.888.

**Managing Operational Scale:** The 5-item scale developed and validated by Ishtiaq (2015). Sample items are: “there is a proper set of rules and guidelines, for managing operational risk, available in the bank, senior management of the bank transforms the strategic direction given by the board through operational risk management policy, and the bank regularly prepares periodic report of operational risk. The author reported a Cronbach's Alpha coefficient of 0.707 and composite reliability of 0.818.

**Organizational Performance Scale:** The 6-item scale developed and validated by Oyedele et al (2018). Sample items are: “Book-value per share has improved to a great extent, return on assets and equity improved to a great extent, staff appearance and friendliness towards customers improved to a great extent and corporate governance has improved tremendously. The authors reported a Cronbach's Alpha coefficient of 0.787 and composite reliability of 0.899.

Pearson Moment Correlation Coefficient and Path analysis were employed to analyze the data.

## Results and Discussion

**Table 1: Relationship between variables**

variable	1	2	3	4	5	6	7	8	9
1. OP	1.0000								
2. RU	0.6958	1.0000							
3. RI	0.6030	0.6460	1.0000						
4. RMC	0.6435	0.6408	0.6713	1.0000					
5. RAA	0.5682	0.8611	0.5805	0.5543	1.0000				
6. MMR	0.1383	0.1355	0.1675	0.1058	0.2338	1.0000			
7. MCR	0.5511	0.5978	0.8931	0.5598	0.5789	0.1542	1.0000		
8. MLR	0.8591	0.6297	0.5151	0.5159	0.5994	0.0772	0.5327	1.0000	
9. MDR	0.1413	0.1367	0.1666	0.1033	0.2261	0.9995	0.1538	.0809	1.0000

Table 1 depicts the relationship between risk management practices and organizational performance. The results reveal that organizational performance has a positive and significant association with risk understanding ( $r = 0.6958$ ,  $P < .05$ ), risk identification ( $r = 0.6030$ ,  $P < .05$ ), risk monitoring and control ( $r = 0.6435$ ,  $P < .05$ ), risk assessment and analysis ( $r =$

0.5682,  $P < .05$ ), managing credit risk ( $r = 0.5511$ ,  $P < .05$ ) and managing liquidity risk ( $r = 0.8591$ ,  $P < .05$ ). This demonstrates that the risk management practices put in place by selected Nigerian banks have helped the sector build resilience and promote long-term sustainability, even in the face of COVID-19. Evidence further reveals that managing market risk ( $r = 0.6958$ ,  $P < .05$ ) and managing operational risk ( $r = 0.6958$ ,  $P < .05$ ) are positive related with organizational performance but not significant. This may be due to rising inflation and unemployment, as well as volatility in Naira -dollar exchange rates due to volatile oil prices. These factors combine to curb consumption and investment, reduce government spending, and affect banking activity.

**Table 2: Results of Path Analysis**

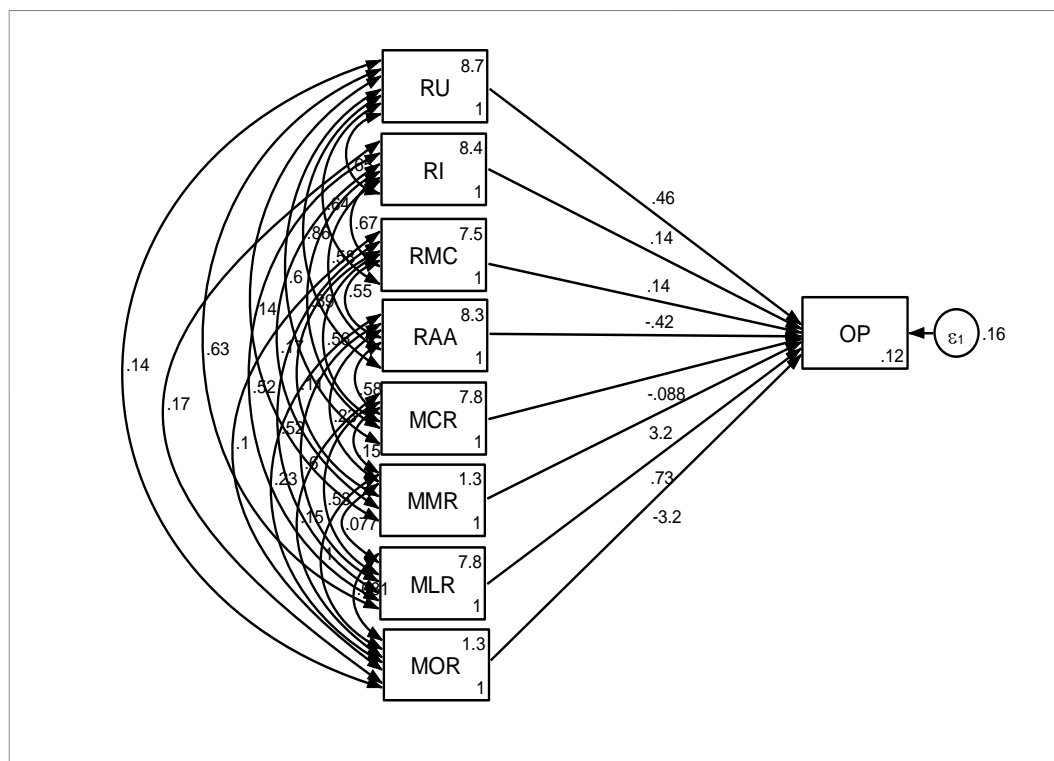
Path	Coefficient	Std. Err.	Z-value	Probability	[95% Conf. Interval]	
OP <- RU	.464	.086	5.36	0.000	.2944065	.6338652
OP <-RI	.136	.083	1.64	0.100	-.0262843	.2998095
OP <-RMC	.144	.049	2.94	0.003	.0482011	.2410612
OP <-RAA	.420	.087	4.79	0.000	-.593154	-.248487
OP <-MCR	.087	.075	1.16	0.248	-.2363268	.061054
OP <-MMR	3.247	1.401	2.32	0.020	.5006755	5.993806
OP <-MLR	.725	.043	16.74	0.000	.6403863	.8102039
OP <-MOP	3.155	1.394	2.26	0.024	-5.888402	-.4228807

Table 2 summarizes the results of the path analysis for the study, which shows the relationship between risk management practices and organizational performance. The results reveal that risk understanding ( $Z = 5.36$ ;  $P < .05$ ), risk monitoring and control ( $Z = 2.94$ ;  $P < .05$ ), risk assessment and analysis ( $Z = 4.79$ ;  $P < .05$ ), managing market risk ( $Z = 2.32$ ;  $P < .05$ ), managing liquidity risk ( $Z = 16.74$ ;  $P < .05$ ), and managing operational risk ( $Z = 2.26$ ;  $P < .05$ ) are independently and significantly associated with organizational performance. The study is consistent with Njeru, Mohhamed, and Wachira (2017) that risk understanding, risk monitoring and control, risk assessment and analysis, managing operational risk are major predictors of bank's performance. A similar study conducted in Zambia also establishes that risk understanding, risk monitoring and control, risk assessment and analysis, and managing operational risk impact bank performance (see figure 1). A similar study by Moti, Masinde, Mugenda, and Sindani (2012) also attest that risk management practices such as risk understanding, risk assessments, and analysis, risk monitoring and control, managing market risk, managing liquidity risk, and managing operational risk are independently and jointly predictors of organizational performance. The study conducted by Bilal, Talib, and Khan (2013) also demonstrates that understanding of risk, risk assessment and analysis, and risk

monitoring are major determinants of banks' performance. Hence, **H<sub>1</sub>**, **H<sub>3</sub>**, **H<sub>4</sub>**, **H<sub>6</sub>**, **H<sub>7</sub>** and **H<sub>8</sub>** are confirmed.

Evidence further reveals that risk identification ( $Z = 1.64; P > .05$ ) and managing credit risk ( $Z = 1.16; P > .05$ ) are not significantly influence organizational performance. This finding is contrary to the previous studies that risk identification and managing credit are major determinants of bank's performance (Oloyede, Adeyemi & Fasesin, 2018; Njeru, Mohamed & Wachira, 2017; Ahamed, Abdul & Abdul, 2016; Alobari, Naenwi, Zukbee, & Grend, 2018). This may be due to rising inflation and unemployment, as well as volatility in Naira -dollar exchange rates due to volatile oil prices. These factors combine to curb consumption and investment, reduce government spending, and affect banking activity. Thus, **H<sub>2</sub>** and **H<sub>5</sub>** are not supported.

The findings of this survey imply that all selected banks should develop proactive risk management systems to address material risks such as credit, market, liquidity and operational risks. Apparently, CBN said that despite a challenging macro-economic environment exacerbated by the COVID-19 pandemic, eight Nigerian banks generated a whopping sum of N176.11 billion as profit in the half-year ended June 30, 2022, an increase of 34.66 per cent over N130.78 billion profit earned in the corresponding period of 2021.



**Figure 1: Path Analysis**

### Conclusion and Recommendations

This study examines the effect of the risk management strategy on organizational performance with specific reference to the Nigerian selected banks. The results establish that risk management practices have a significant association with bank performance. Furthermore, results indicate that reveal that risk understanding, risk monitoring, and control, risk assessment and analysis, managing market risk, managing liquidity risk, and managing operational risk has a significant effect on a bank's performance, while risk identification and managing credit risk is not significantly influenced organizational performance. The findings of this research study, therefore, seem to support the claim that risk management contributes significantly to the performance of some Nigerian banks.

This shows that an effective risk management framework for Nigerian banks depends on many important factors. The effectiveness of risk management practices is highly dependent on the proper understanding of risk and risk management among Nigerian bankers. Banks should therefore develop active risk management processes to identify, measure, monitor, and control various risks, including credit, market, liquidity, and operational risks, and to hold capital against these risks. It is very important to consider the CBN Risk Management Guidelines, the formation of a comprehensive risk management system in Nigerian banks is not only a useful exercise to meet regulatory requirements, but also an effective practice to improve the performance of banking institutions.

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**ANALYSIS OF DIMENSIONAL AND DERIVED PROPERTIES OF SISAL LEAVES  
FIBER (*agave sisalana*) FOR COMPOSITES APPLICATION IN AUTOMOBILE  
ENGINEERING**

**Hussaini, M. S.,**

Department of Agricultural and Bio-Environmental Engineering Technology  
Federal Polytechnic, P.M.B. 35 Mubi,  
Adamawa State, Nigeria.

**Gabi, M. N.**

Department of Plant Resources,  
Agricultural Research Council of Nigeria, Mabushi,  
Abuja

**Abdulhamid, Y.**

Department of Agriculture and Natural Resources, Potiskum,  
Yobe State, Nigeria.

**ABSTRACT**

The fiber extracted from sisal (*agave sisalana*) leaves was studied for its dimensional and derived properties which aimed at evaluating the characteristic of fiber quality in relation to its application in automobile engineering. The dimensional properties evaluated were fiber diameter, which was found to range between (1.933um to 2.50um). Lumen width ranged between (1.00um to 1.50um), from wall thickness of (0.50um). Derived properties computed includes runkle ratio, which was found to be within (0.867 to 1.784), slenderness ratio (106.3 to 128.3), and coefficient of flexibility of (56.01 to 74.55). Data obtained were subjected to statistical analysis and graphs were plotted using Matlab R2007b. Statistical package for social sciences (SPSS) was used to determine the significant different means, and the (ANOVA) tables were constructed from which observations and conclusions were made. The result shows that the fiber possess the high quality characteristic of tensile strength, density as well as moisture absorbency when compared with other leaves fiber of its category. Therefore, it is recommended for different applications in automobile industry such as car interior, bumpers, brake parts and others lining materials.

**Keywords;** Analysis, Dimensional and derived properties, Sisal leaves fiber, Composites application, Automobile engineering.

**INTRODUCTION**

The importance of increasing wood consumption and raw materials availability for the paper industries have resulted in a renewed attention on the benefits inherent in several non-wood

fiber plant with annual or biannual harvest (Jorge, *et al.*, 2011). Owing to their mechanical properties, good thermal insulation properties, low density, nonabrasive nature, easy availability from replenishable sources, cheaper prices and recyclability of natural fiber reinforced polymer composites have attracted the composite industry, both for structural and nonstructural applications. Glass fibers being non-degradable pose serious health and environment hazards. They can't be easily thermally recycled as they melt at very high temperatures and remain as a residue which can damage the furnace and are quite abrasive in nature. However the main focus of this review is to realize the potential of some unique natural fibers as a replacement for glass fibers, a key component in the automobile and structural composites. According to WHO Geneva (1998), apart from ropes, twines, and general cordage, sisal is used in low-cost and specialty paper, dartboards, buffing cloth, filters, geotextiles, mattresses, carpets, handicrafts, wire rope cores, and Macramé. Sisal has been utilized as an environmentally friendly strengthening agent to replace asbestos and fiber glass in composite materials in various uses including the automobile industry. The lower-grade fiber is processed by the paper industry because of its high content of cellulose and hemicelluloses. The medium-grade fiber is used in the cordage industry for making ropes, baler and binder twine. Ropes and twines are widely employed for marine, agricultural, and general industrial use. The higher-grade fiber after treatment is converted into yarns and used by the carpet industry. Other products developed from sisal fiber include spa products, cat scratching posts, lumbar support belts, rugs, slippers, cloths, and disc buffers. Sisal wall covering meets the abrasion and tearing resistance standards of the American Society for Testing and Materials and of the National Fire Protection Association. As extraction of fiber uses only a small percentage of the plant, some attempts to improve economic viability have focused on utilizing the waste material for production of biogas, for stock feed, or the extraction of pharmaceutical materials.

## **MATERIALS AND METHODS**

### **Materials**

The experiments were carried out in Biological department of Adamawa State University Mubi and the materials used were; Sisal (*agave sisalana*) leaves obtained locally in Digil, government reserved forest area, Mubi North local Government Area of Adamawa State, sisal fibre from the leave, NaOH, H<sub>2</sub>SO<sub>4</sub>, potassium Sulphate, Safranin red, potassium chromate, HCl, HNO<sub>3</sub>, distilled water and water. Tools and equipment used was electronic oven dryer M/C NO.11/084 Mod., Motic electric microscope, weighing balance, veneer caliper, sharp knife, water bath and camera.

### **Methods**

#### **Dimensional analysis of the fibers**

In accordance with Ververis *et al.*, (2004), Sharma *et al.*, (2011), for fiber length dimension, small silver was obtained and macerate with 10ml of 67% HNO<sub>3</sub> and boil in a water bath (100±2°C) for 10minutes. The silvers were then washed and placed in a small flask with 50ml distilled water and the fiber bundles were separated into individual fiber using a small brush

with a plastic end to avoid fiber breaking. The macerated fiber suspension was finally placed on a glass slide (7.5cm X 2.5cm) by means of a rubber pipette. For the fiber diameter, fiber lumen width and fiber cell wall thickness determination, cross sections were obtained from the same height as mentioned above and were stained with 1:1 aniline sulphite –glycerine /safranin red mixture to enhance cell wall visibility. Sisal fiber cell was viewed under a calibrated motic electric microscope on  $\times 10$  objective lens.

### Computation of fiber derived properties

The derived properties of sisal fiber were calculated at the matured leaves stage using the measured fiber dimensional analysis as reported in Saikia *et al.*, (1997).

$$\text{Coefficient of flexibility (c)} = \frac{Flw}{Fd} \times 100 \quad 1$$

$$\text{Runkel ratio (r)} = \frac{2Fwt}{Flw} \quad 2$$

$$\text{Slenderness ratio (z)} = \frac{Fl}{Fd} \quad 3$$

Where;

Flw = fiber lumen width ( $\mu\text{m}$ )

Fd = fiber diameter ( $\mu\text{m}$ )

Fwt = fiber wall thickness ( $\mu\text{m}$ )

Fl = fiber length ( $\mu\text{m}$ )

### Determination of the fiber Moisture absorption (Regain)

American society for testing and material (1997) standard testing method for moisture regain as reported by Brindha *et al.*, (2013) was adapted to determine moisture absorption of sisal fiber at the matured stage. Sisal fiber samples were conditioned for 24 hours at  $27 \pm 2^\circ\text{C}$  and the weight was taken as (L). The conditioned fiber sample was oven dried at a temperature of  $105^\circ\text{C}$  for 4 hours and the weight was taken as (W). Moisture absorption percentage of the sample was calculated according to equation 3.4 below;

$$\text{Moisture Absorption \%} = \frac{L-W}{L} \times 100 \quad 4$$

### Determination of the Fiber Density

Technical Association of Pulp and Paper Industries (TAPPI) standard method was adopted as reported in Modibbo *et al.*, (2009). The density of plant fiber at the matured stage was determined by conditioning the fiber sample for 24 hours at  $25^\circ\text{C}$  before the test was carried. 2g of the sample was accurately weighed out for each fiber sample. The weight was immersed in toluene in a calibrated glass tube (30ml measuring cylinder) and the volume of toluene displaced was

determined and equal to the volume of sisal fiber immersed. The density of the fiber sample was calculated as follows;

$$\text{Density} = \frac{\text{Mass of fibre}}{\text{Volume of fibre}} \text{ in } gcm^{-3} \quad 5$$

## RESULTS AND DISCUSSIONS

### Results

The results of the analysis for dimensional and derived properties of sisal fiber were tabulated and discussed:

**Table 1. ANALYSIS OF FIBRE DIMENSIONAL PROPERTIES**

S/N	NO. of Replicates	FIBRE Length (µm)	FIBRE FL Diameter FD (µm)	FIBRE Lumen Width FLW (µm)	FIBRE Wall Thickness FWT (µm)
1	R <sub>1</sub>	153.0	2	1	0.5
	R <sub>2</sub>		2.5	1.8	0.5
	R <sub>3</sub>		2	1	0.5
2	R <sub>1</sub>	190.0	2	1	0.5
	R <sub>2</sub>		2	1	0.5
	R <sub>3</sub>		2	1	0.5
3	R <sub>1</sub>	243.3	2	1	0.5
	R <sub>2</sub>		2.3	1.2	0.5
	R <sub>3</sub>		1.8	1	0.5
4	R <sub>1</sub>	265.3	2.5	1	0.5
	R <sub>2</sub>		1.5	1	0.5
	R <sub>3</sub>		1.8	1	0.5
5	R <sub>1</sub>	316.7	2	1	0.5
	R <sub>2</sub>		3	2	0.5
	R <sub>3</sub>		2.5	1.5	0.5

\*R<sub>1</sub> R<sub>2</sub> R<sub>3</sub> Are Replicates  
(Field Survey 2022)

Source:

Fiber diameter; The mean values of fiber diameter at different stages of fiber length as in Table 1 were 2.167µm, 2.00µm, 2.033µm, 1.933µm, and 2.50µm for the length of 153.0µm, 190.0µm, 243.3µm, 265.3 µm and 316.7µm respectively. The diameter at all stages of length evaluated were higher than that of corn husk fiber (Taiwo *et al.*, 2004). The result in figure 1 shows that the diameter increases with an increase in fiber length, and cellulose content also increase. This is nearly in agreement with the report of Sahin and Young, (2008) that, the chemical solution used to determined cellulose influence the percentage of cellulose content

in plant fibers, and high percentage of cellulose in plant fiber produces fiber with lower diameter in micron. The analysis of variance test indicate that diameter investigated at stages of length were highly significant at  $p=0.05$  level, table 2. And the coefficient of determinant evaluated were found to be  $R^2=0.90$ .

**Table 2. Analysis of variance for fiber diameter:**

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	4567.484	4567.484	2.467667	0.256805
Residual	2	3701.864	1850.932		
Total	3	8269.348			

Fiber lumen width; The mean values of fiber lumen width of *agave sisalana* leave fiber evaluated at different stages of fiber length as in Table 5, were 1.267 $\mu\text{m}$ , 1.00 $\mu\text{m}$ , 1.067 $\mu\text{m}$ , 1.00 $\mu\text{m}$  and 1.50 $\mu\text{m}$  for the length of 153.0 $\mu\text{m}$ , 190.0 $\mu\text{m}$ , 243.3 $\mu\text{m}$ , 265.3 $\mu\text{m}$  and 316.7 $\mu\text{m}$  respectively. The result in Table 5 shows that, in all stages of fiber length investigated the lumen width was lower than that of rice husk fiber and wheat straw fiber Agu *et al.*, (2002). This is also lower than that of corn husk which has short fibers similar to various hard woods, whose length is <2mm, fiber diameter (21.89 $\pm$ 5.1 $\mu\text{m}$ ), lumen width (6.63 $\pm$ 3.5 $\mu\text{m}$ ) and cell wall thickness (7.63 $\pm$ 2.3 $\mu\text{m}$ ) Taiwo *et al.*, (2004). This is in contrast with the result reported by Sharma *et al.*, (2011) that, larger fiber lumen width produces better in beating of the pulp due to penetration of the liquid in fiber lumen, but in agreement with the report of Ogbonnaya *et al.*, (1997) that, fiber length, lumen width and wall thickness were not enough to justify the strength of the papers produced from the plant fibers. The analysis of variance test indicates that the values of fiber lumen width evaluated at all stages of length were significant at  $p=0.05$  level, table 3. And the coefficient of determinant evaluated were found to be  $R^2=0.93$ .

**Table 3: Analysis of variance for fiber lumen width**

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	5424.382	5424.382	3.81332	0.1900849
Residual	2	2844.965	1422.4826		
Total	3	8269.348			

Fiber wall thickness; The mean values of fiber wall thickness of *agave sisalana* leave fiber evaluated at different stages of fiber length were the same at all stages investigated as 0.50 $\pm$ 0.333 for length of 153.0 $\mu\text{m}$ , 190.0  $\mu\text{m}$ , 243.3 $\mu\text{m}$  265.3 $\mu\text{m}$  and 365.7 $\mu\text{m}$  respectively. The result in all cases were higher than that of castor plant fiber and cotton fiber (Maduako *et*

*al.*, 2011), but lower than bambusa tulda (Sharma *et al.*, 2011). Istek, (2006) reported earlier that cell wall thickness governs the fiber flexibility, and thick walled fiber affect the bursting strength and folding endurance of the paper produced from the fiber. The analysis of variance test indicates that, the fiber wall thickness were not significantly different from each other for all stages investigated at  $p=0.05$  level, table 4. And the coefficient of determinant evaluated was found to be not applicable at all stages investigated.

**Table 4: Analysis of variance for fiber wall thickness**

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0	0	0	1
Residual	3	8269.348	2756.449		
Total	4	8269.348			

**Table 5. MEAN VALUES AND STANDARD DEVIATIONS**

<b>Fiber Length</b>	<b>Fiber Diameter</b>	<b>Fiber Lumen Width</b>	<b>Fiber Wall Thickness</b>
<b>FL (μm)</b>	<b>FD (μm)</b>	<b>FLN (μm)</b>	<b>FWT (μm)</b>
153.0	2.167 ± 1.444	1.267 ± 0.844	0.50 ± 0.333
190.0	2.00 ± 1.333	1.00 ± 0.667	0.50 ± 0.333
243.3	2.033 ± 1.356	1.067 ± 0.711	0.50 ± 0.333
265.3	1.933 ± 1.289	1.00 ± 0.667	0.50 ± 0.333
316.7	2.50 ± 1.667	1.50 ± 1.00	0.50 ± 0.333

Source: (Field Survey 2022)

Runkle ratio; The values of runkle ratio of extracted *agave sisalana* leave fiber at different stages of fiber length were found to be 0.867, 0.897, 1.040, 1.250 and 1.874 for the length of 153.0μm, 190.0μm, 243.3μm, 265.3μm and 316.7μm respectively. This is in agreement with Yang and Saheh, (1998) and Dutt, *et al.*, (2009), that, investigated on the fiber quality related to runkle ratio and reported that, fiber with runkle ratio less than 1 are good for paper making because they are more flexible, collapse easily and form a paper with large bonded area while fiber with runkle ratio more than 1 are stiff, difficult to collapse and form bulkier paper with less bonded area. It was observed that, from the result, the runkle ratio was slightly increase with increase in length of the fiber. And the coefficient of determinant  $R^2 = 0.99$ .

Slenderness ratio; The mean values of slenderness ratio of extracted *agave sisalana* leave fiber at different stages of fiber length were found to be 106.3, 110.9, 112.4, 120.1 and 128.3 for 153.0μm, 190.0μm, 243.3μm, 265.3μm and 316.7μm respectively. This is higher than corn husk (Taiwo *et al.*, 2014). The result pointed out that *agave sisalana* leaves fiber have excellent slenderness ratio of greater than (>70) due to long length and thin cells of fiber. The



slenderness ratio of fiber depends on length and diameter, short and thick fiber do not have good surface contact and fiber bonding (Obonnaya *et al.*, 1997). Maduoko, (2011) pointed out that, the higher the slenderness ratio, the stronger the resistant of tearing paper sheet. It has been observed that the slenderness ratio were ranged between 106.3 to 128.3 in all stages of length investigated, and this is in line with the standard of technical association of pulp and paper industries (TAPPI, 1980). Also, in agreement with Xu *et al.*, (2006) that, the slenderness ratio of more than 33 for fibrous materials are considered good for pulp and paper production. And the coefficient of determinant evaluated were found to  $R^2=0.96$ .

Coefficient of flexibility; The computed values of coefficient of flexibility of the extracted *agave sisalana* leave fiber at different stages of fiber length were found to be 56.01, 59.04, 62.35, 72.72 and 74.55 for 153.0 $\mu\text{m}$ , 190.0 $\mu\text{m}$ , 243.3 $\mu\text{m}$ , 265.3 $\mu\text{m}$  and 316.7 $\mu\text{m}$  respectively. The values at all stages of length were higher than cotton fiber (Maduako, *et al.*, 2001). The values also fall within the standard rating of elastic fibers in accordance with Ogbonnaya *et al.*, (1997), and Namessan, (2008) who earlier pointed out that, flexibility coefficient of fiber makes fiber processing easy without breakage, and the fiber with low coefficient of flexibility will have negative effect on the tensile and bursting strength as well as folding endurance. It has been observed that fiber at all stages of evaluated were highly flexible and satisfies the requirement for suitability in pulp and paper making. This is in agreement with Bektas *et al.*, (1999) that, reported earlier that, there are four (4) groups of fiber; High elasticity fiber having coefficient of flexibility  $>75$ , elasticity fiber with coefficient between 50-75, rigid fiber between 30-50 and high rigid fiber with  $<30$ , in accordance with elasticity rating. Rigid fibers do not have efficient elasticity, therefore unsuitable for paper production, but suitable for fiber plates, rigid cardboards production as well as automobile interior parts. It has been observed from the result the coefficient of flexibility of *agave sisalana* leaves extracted fiber increases with increase in length of the fiber. And the coefficient of determinant were found to be  $R^2=0.89$ .

**Table 6. ANALYSIS OF OTHER PHYSICAL PROPERTIES**

1	153.0	R <sub>1</sub>	3.0	0.667
		R <sub>2</sub>	2.5	0.669
		R <sub>3</sub>	3.5	0.665
2	190.0	R <sub>1</sub>	4.0	0.703
		R <sub>2</sub>	3.9	0.668
		R <sub>3</sub>	2.1	0.501
3	243.3	R <sub>1</sub>	3.9	0.669
		R <sub>2</sub>	2.6	0.603
		R <sub>3</sub>	2.5	0.591
4	265.3	R <sub>1</sub>	3.0	0.665
		R <sub>2</sub>	2.7	0.612
		R <sub>3</sub>	3.8	0.664

5	316.7	R <sub>1</sub>	4.0	0.740
		R <sub>2</sub>	3.2	0.660
		R <sub>3</sub>	2.2	0.431

\*R<sub>1</sub> R<sub>2</sub> R<sub>3</sub> Are NO. Of replicatesSource: (Hussaini *et al.*, 2018)

Moisture absorption; The mean values of moisture absorption evaluated at different stages of fiber length presented in Table 6, were 3.0%, 3.0%, 3.0%, 3.2% and 3.1 for length of 153.0 $\mu$ m, 190.0 $\mu$ m, 243.0 $\mu$ m, 265.3 $\mu$ m and 316.7 $\mu$ m respectively. It was observed that the moisture absorption at all stages investigated were lower than cotton fiber (Naveen *et al.*, 2014), flax (Brindha, *et al.*, 2013), and *Agave Americana* with moisture absorption ranged between 8-9% (Ashish *et al.*, 2015). This is in agreement with the report of (Saheb, 1999) that, fiber with low moisture absorption capacity will be suited for different application as composite due to its moisture resistance. And the coefficient of determinant evaluated were found to be  $R^2=0.60$ .

Density; The density values measured at different stages of length were 0.667g/cm<sup>2</sup>, 0.654g/cm<sup>2</sup>, 0.621g/cm<sup>2</sup>, 0.647g/cm<sup>2</sup> and 0.610g/cm<sup>2</sup> for length of 153.0 $\mu$ m, 190.0 $\mu$ m, 243.0 $\mu$ m, 265.3 $\mu$ m and 316.7 $\mu$ m respectively. The result revealed that the density of sisal fiber ranged between  $0.610 \pm 0.407$  to  $0.667 \pm 0.445$ , which is lower than that of jute, kenaf, okra and baobab (Modibbo *et al.*, 2009). The results are in agreement with the studies investigated on natural fibers by (Pai, *et al.*, 2015) and reported that, good quality natural fibers most possess good thermal insulation properties, low density, non-abrasive nature, easily available from replenish able sources, recyclable in nature and sustained good application as composite for structural and non-structural applications. It was observed that from the result that fiber density decrease with an increase in fiber length. And the coefficient of determinant evaluated were found to be  $R^2=0.75$ .

#### MEAN VALUES AND STANDARD DEVIATIONS

FIBRE LENGTH	Mean Moisture absorption (%)	Mean Density g/cm <sup>3</sup>
153.0	$3.0 \pm 2.000$	$0.667 \pm 0.445$
190.0	$3.0 \pm 2.000$	$0.654 \pm 0.436$
243.0	$3.0 \pm 2.000$	$0.621 \pm 0.414$
265.3	$3.167 \pm 2.111$	$0.647 \pm 0.431$
316.7	$3.133 \pm 2.089$	$0.610 \pm 0.407$

Source: (Field Survey

2022)

#### CONCLUSIONS AND RECOMMENDATIONS

##### Conclusions

*Agave sisalana* leaves fiber extracted from the leaves obtained locally from Maiha L.G.A of Adamawa state, were studied for its characterization for engineering application. The fiber was extracted using water retting procedure and treated with alkaline (NaOH).

The following conclusions were drawn;

The dimensional properties evaluated were fiber diameter, which was found to range between (1.933um to 2.50um). Lumen width ranged between (1.00um to 1.50um), from wall thickness of (0.50um). Derived properties computed includes runkle ratio, which was found to be within (0.867 to 1.784), slenderness ratio (106.3 to 128.3), and coefficient of flexibility of (56.01 to 74.55). The fiber runkle ratio in some stages of length (153.0 and 190.0) were less than one (<1) while slenderness ratio in all stages of fiber length were greater than seventy (>70) which is considered good for paper production. It was found that the fiber has moisture absorption of 3.1 % and the density of 0.64 g/cm<sup>3</sup>, this can be used in many applications due to its moisture resistance ability. The results obtained shows that the fiber exhibit high tensile strength and can be used in the production of nets, brake part, interior gaskets, carpets, rugs, door mats and other woven objects.

### Recommendations

Based on this study conducted for dimensional and derived properties of sisal hemp (*agave sisalana*) leaves fiber at different stages of fiber length and thickness, the following recommendations were made;

1. Large scale production of sisal plants should be encouraged to replace the imported fibers and save the country from foreign exchange.
2. It was recommended for lining materials in automobile parts due to its low moisture content and density.
3. The dimensional properties evaluated were fiber diameter, which was found to range between (1.933um to 2.50um). Lumen width ranged between (1.00um to 1.50um), from wall thickness of (0.50um) fall within the range requirements for constructions of insulating parts in aero planes and some automobile engines. Therefore, it is recommended for industries.
4. Further studies on thermal properties of (*agave sisalana*) leaves fiber should be carried out to suit its ability in other applications in thermoplastic in electrical and civil engineering works.

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## **NUTRIENT LOSSES IN NIGERIAN DRIED VEGETABLES (FLUTED PUMPKIN AND BITTER LEAF)**

**Ebu Bridget**

Department of Science Laboratory Technology,  
Federal Polytechnic Bauchi,  
Bauchi state, Nigeria

**Ogbeba Jeremiah**

Department of Science Laboratory Technology,  
Federal Polytechnic Bauchi,  
Bauchi state, Nigeria

**Yakubu Dauda Abubakar**

Department of Science Laboratory Technology,  
Federal Polytechnic Bauchi,  
Bauchi state, Nigeria

### **ABSTRACT**

Vegetables being seasonal products become very scarce and expensive when they are out of season. They also deteriorate rapidly after harvesting; as such they are preserved in dried form using different methods of drying. This research is aimed at knowing the difference in the nutritional content of the fresh and dried vegetables (fluted pumpkin and bitter leaf) and the best method used in drying vegetables. The leaves of fluted pumpkin and bitter leaf were collected from a vegetable farm at Gwalameji Bauchi and were dried using sunlight and room temperature. The fresh and dried vegetables of fluted pumpkin and bitter leaf were analyzed for their nutritive content. The result of the analysis obtained showed the protein content of fresh, sun, and room dried fluted pumpkin to be 17.79%, 20.50%, and 22.4%, moisture 75%, 6.50% and 8.36%, Ash 0.94%, 11.4% and 10.24%, lipid 4.20%, 8.86% and 13.04%, crude fibre 5.90%, 14.20% and 11.50%, carbohydrate 5.70%, 38.24% and 34.46% respectively. While the protein content of fresh, sun, and room dried bitter leaf was found to be 18%, 21.69% and 23%, moisture 72%, 5% and 7.5%, Ash 1.23%, 12.48% and 12.4%, lipid 3.40%, 5.66% and 8.30%, crude fibre 3.24%, 8.80% and 6.50% carbohydrate 2.13%, 46.37% and 46.30% respectively. From the result obtained there is loss in the nutritional content of sun dried fluted pumpkin and bitter leaf. Hence, it could be said that both fresh and dried fluted pumpkin and bitter leaf are rich in nutritional content. But should be preserved using room drying method and should be stored for a short time, (a season) and be kept in bags in a well ventilated place.

**Key;** Nutrient, losses, vegetables, fluted pumpkin, bitter leaf

## **INTRODUCTION**

Vegetables are eaten by almost every human in one form or the other throughout the world. Leaf vegetables also called potherbs, green vegetables or leafy vegetables are leaves eaten as vegetables, sometimes accompanied by tender petiole and shoot. Although, they come from very wide variety of plants. vegetable most often come from short-lived herbaceous plant such as lettuce, spinach, alfafa, clover etc. Some are dried and pound into powder form or pulping for use (Ashebir and Ashenafi, 2015).

Vegetables are typically low in calories, low in fat, high in fibre, high in iron, calcium and very high in phytochemicals such as vitamin C, carotenoids, lutein and folic acid etc. They constitute a group of food that are essential to a well balance diet. Green and yellow leafy vegetable supply an important part of amino acid and vitamins required in the body as well as other 'B' vitamin. (Gruda, 2014). Spinach contains iron, folic acid, vitamin A and essential amino acids in major qualities along with potassium, Sulphur, silicon, magnesium and sodium in minor quantities (Ajushveda, 2008).

Vegetables can be eaten in fresh form as supplementary food, side dishes, sand- wishes or salad. Leafy greens can also be used to wrap other ingredients. They may also be stir-fried, stewed or steam. Leafy vegetables stewed with pork are a traditional dish in soup food in southern US Cuisine (Gruda, 2005),. They are also commonly eaten in a variety of South Asia dishes such as Sasia (Gruda, 2005), Spinach is regarded as the most esteemed green leafy vegetable.

Vegetables can be stored (preserved) through winter, cool, and dry place to prevent mold growth and spoilage. They can last through to early spring and can still be nutritious as when fresh ( Decu, 2010).

## **Justification**

Vegetables being seasonal products become very scarce and expensive when they are out of season. They also deteriorate rapidly after harvesting, as such they are preserved in dried form using different methods of drying. Therefore, there is need to know the difference in the nutritional content of the fresh and dried vegetables (fluted pumpkin and bitter leaf) as it is mostly used, as well as the best method used in drying vegetables.

## **Aim**

This research is aimed at knowing the difference in the nutritional content of the fresh and dried vegetables and the best method used in drying vegetables.

## **Objectives**

To determine the nutritive content of fresh and dried vegetable (Bitter leaf and Fluted pumpkin).

To determine the best method for preserving the vegetables using two drying methods (Sun drying and room temperature drying).

## **MATERIAL AND METHOD**

### **Sample Collection**

The fresh vegetables of fluted pumpkin and bitter leaf were collected from Gwallameji village in Bauchi metropolis using clean containers.

### **Sample Preparation**

According to the method of Hazu *et al.*, (2002),

The vegetables were selected, washed and rinsed thoroughly with tap water to remove accompanying dirt particles sticking to the vegetable. The vegetables were divided into three parts; the first part was analyzed fresh, the second part was dried under the sun before the analysis was carried out, and the third part was dried at room temperature before the analysis was carried out.

### **Sun Drying**

The vegetables were dried under the sun by spreading them on separate trays and placed on an elevated top where the sun rays were able to reach them very well for seven (7) days.

### **Room Temperature Drying**

The vegetables were spread on separate trays inside the room and the windows were opened for proper entrance of air and turned with hand from time to time to enable proper drying for twelve (12) days. After drying the vegetables were pounded into fine powder, sieved and for further analysis.

### **Proximate Analysis**

All parameters were analyzed according to methods recommended by AOAC (1990),

### **Determination of Crude Protein**

Two grams (2g) of each prepared sample was accurately weighed into the Kjeldahl flask, 1g of potassium sulphate, 0.6g copper sulphate and 20ml of concentrated tetraoxosulphate (VI) acid were added to the flask. The flask with its content was placed in an inclined position on a heating mantle inside a fume cupboard and heated. After cooling the digested mixture was transferred into a round-bottomed flask and the digest was diluted with 20ml of distilled water and 40ml of 50% NaOH was then added carefully. 20ml boric acid was measured into the receiver flask and 3 drops of mixed indicator (methyl red and methylene blue) were added to the boric acid. The distillation apparatus was assembled below such that the top of the receiver tube was a

little below the surface of the standard solution of 20% Boric acid in the receiver flask. The content was heated on a heating mantle at 50°C until the ammonia was distilled into the boric acid.

25ml of each distillate was pipetted into 250ml conical flask 2 drops of mixed indicator (methyl red and methylene blue) was added to the distillate and then titrated with 0.1N hydrochloric acid (HCL) until there was a colour change.

The total nitrogen percentage was calculated.

$$\% \text{ nitrogen} = \frac{0.014 (V_2 - V_1) N_A}{W_t} * \frac{100}{1}$$

0.014 = 1g mole of nitrogen

% crude protein = % nitrogen \* 6.25

6.25 is the factor for conversion of Nitrogen value to the protein content of the composite.

### Determination of Crude Lipid

A clean thimble was weighed empty ( $W_1$ ), it was further reweighed when filled with 4g of the sample ( $W_2$ ). The thimble was covered with cotton wool and placed into the extraction barrel of the Soxhlet kit fitted with a small round bottom flask of known weight ( $W_3$ ) containing the solvent (diethyl ether). The condenser was tightly joined in place and the round flask was fitted to the Soxhlet extraction kit and was placed on the heating mantle. The solvent was boiled gently, evaporated and refluxed into the barrel. After six hours, the condensers were then detached from the apparatus and the flask was then dried in an oven at a temperature of 100°C until a constant weight was obtained ( $W_4$ ).

$$\% \text{ oil extracted} = \frac{\text{Weight gained by flask}}{\text{Weight of sample}} * \frac{100}{1}$$

### Determination of Crude Fibre

2g of the sample residue obtained from the lipid determination was transferred to a one liter beaker having 200ml mark on it, boiled water and 25ml of 10%  $H_2SO_4$  were added and was made up to the 200ml mark with distilled water. The mixture was boiled for thirty (30) minutes. The acid solution was then removed by suction. The residue was washed three times with boiled water after which it was transferred to a beaker. Boiled water of 10% NaOH was added and diluted to 200ml mark. The content and the beaker was heated to boil for another thirty (30) minutes. It was then filtered and washed three times.

The resulting residue was then transferred into a large porcelain crucible where the fiber cake was extracted by moistening with a small portion of ethanol that was permitted to drain between additions. The crucible was dried with the material at 100°C in an oven to a constant weight. The content was then incinerated in a muffle furnace at 600°C two hours. The crucible containing the ash was cooled in a desiccator and weight.



$$\% \text{ crude fiber} = \frac{\text{weight of Crucible} + \text{weight of shed crucible}}{\text{Weight of sample}} * 100$$

#### Determination of Moisture Content

The crucible were dried at 100°C in the oven, cooled in a desiccator and weighed. 4g of each sample were weighed into the pre-heated and weighed crucible. These were dried to a constant weight in the oven, maintained at a temperature of 100°C. the weight was expressed as a percentage of weight.

$$\% \text{ moisture content} = \frac{\text{Loss in weight due to drying}}{\text{Weight of sample}} * 100$$

#### Determination of Ash Content

The porcelain crucible were pre-heated in a muffle furnace, cooled in a desiccator and weighted 2g of each sample were weighed into each dish and burnt first to remove the smoke on a Bunsen burner, it was ignited in a muffle at 550°C for four (4) hours. Heating was discontinued after the set time and crucible was removed, cooled in a desiccator and reweighed with the ash residue.

$$\% \text{ Ash content} = \frac{\text{Weight of Ash}}{\text{Weight of sample}} * 100$$

#### Determination of Carbohydrate (Nitrogen Free Extract)

The method used was described by AOAC (1980) was used when the total percentage of moisture, protein, lipid, crude fiber, ash content was subtracted from 100%, the remainder accounts for the nitrogen free extract.

$$\text{Nitrogen free extract} = 100 - (\text{crude protein} + \text{lipid} + \text{moisture} + \text{ash} + \text{crude fiber})$$

## RESULT

**Table I: Proximate Composition of Fresh and dried fluted pumpkin**

Parameters	Fresh	Sun dried	Room dried
Moisture	75	6.50	8.36
Protein %	17.079	20.50	22.4
Fiber %	5.90	14.20	11.50
Ash %	0.94	11.4	10.24
Lipid %	4.30	8.85	13.04
Carbohydrate %	5.70	38.24	34.46

**Table II: Proximate Composition of Fresh and dried Bitter Leaf**

Parameters	Fresh	Sun dried	Room dried
Moisture	72	5	7.50
Protein %	18	21.69	23
Fiber %	3.24	8.80	6.50
Ash %	1.23	12.48	12.4
Lipid %	3.40	5.66	8.30
Carbohydrate %	2.13	46.37	46.30

**Table III: Difference in Nutritional content of sun dried and room dried fluted pumpkin and bitter leaf**

Parameters	Fluted pumpkin		Bitter leaf	
	Sun dried	Room dried	Sun dried	Room dried
Moisture	6.50	8.32	5	7.50
Protein %	20.5	22.4	21.69	23
Fiber %	14.20	11.50	8.80	6.50
Ash %	11.4	10.24	12.48	12.4
Lipid %	8.86	13.04	5.65	8.30
Carbohydrate%	38.24	34.24	46.37	46.30

### Discussion

The fresh vegetables of fluted pumpkin and bitter leaf obtained from Bauchi metropolis at Gwallameji village were analyzed for the effect of preservation methods on its nutritional contents. From the result the protein content of fresh fluted pumpkin was found to be 17.79%. It increased in the sun and room dried form to 20.50% and 22.4% respectively. The same observation was also seen in bitter leaf. The fresh bitter leaf protein content was 18% and it increases in the sun and room dried form to 21.59% and 23 respectively. This increase is in line with the observation of Oshodi (2006) and Aderonke (2011), who stated that vegetables such as bitter leaf preserved by sun drying help to concentrate the protein due to the decreased in moisture content. However, some nutrients are destroyed in the process.

Of the two methods used for preserving (drying) the vegetables, the room drying method was found to be the best method as it does not contribute to nutrients loss.

### Conclusion

The result of the analysis carried out shows that fluted pumpkin and bitter leaf contains the necessary food nutrients within the required dietary levels.

Furthermore, that there is losses in the nutritional content of sun dried fluted pumpkin and bitter leaf in protein and lipid content.

Hence, it could be said that both fresh and dried fluted pumpkin and bitter leaf are rich in nutritional content.

### **Recommendation**

On the basis of the above findings, the following recommendations are made.

- Vegetables should be preserved using room drying method instead of sun drying method.
- The preserved products (room drying) should be stored in a tight bag to prevent further nutrient loss.

However, further work can be carried out to determine the vitamin, mineral and amino acid content

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## SUSTAINABILITY IN THE NIGERIAN HOTEL INDUSTRY TOWARDS COMBATING INCREASING OPERATING COSTS

**Dupe Medinat Jimoh**

Department of Hospitality Management,  
Kaduna Polytechnic, Kaduna  
Kaduna State

**Fauziyyah Muhammad Muazu**

Department of Tourism Management Technology,  
Kaduna Polytechnic, Kaduna  
Kaduna State

### **Abstract**

Sustainability is the most frequently emphasized issue in the hospitality industry in the recent time. This is because of the excruciating effects of a combination of trends such as high cost of capital, emergence of new market niche, customers' demand for quality service delivery, government policies and increasing operating costs. Of these, high operating costs seem to exert more persistent force on the hotelier's drive to achieve profitability that guarantees success. This paper examines the biting effect of ever increasing operating costs in the hotel industry in Nigeria in the face of general fall in occupancies. Hotel operators and managers are expected to keep abreast with the nature of these costs and develop customized model that helps combat them.

**Keywords:** Hotel, operating costs, falling occupancies, sustainability

### **Introduction**

One challenge facing the hospitality industry worldwide and particularly in Nigeria is the ever-increasing costs of operation which are at inverse proportion to the volume of trade. This is just one among other trends such as high cost of capital, emerging market segment, new technology, new expectations on quality service delivery, terrorism, income inequality, public legislative policies and general economic depression which threaten sustainability in the industry. Cost seems to be the most influential in the hotel company's drive for survival: high cost of energy, high cost of labour, high cost of materials and high tax rate. Low valuations,

apathetic equity markets, stagnant debt markets and weak consumer demand have continued to weigh heavily on hotel sector's financial health

In view of stiff competitive global hotel market, it is very important that hoteliers and managers should understand industry best practice and the latest supporting technologies in order to drive revenue performance that increases the chance of profitability. Detailed and accurate forecasting through optimal pricing decisions could result not only in increased revenue, but also lead to decrease in costs across a hotel's entire operations, thereby increasing profits. A quantitative analysis of the levels and trends in the fixed-variable cost structures of hotel properties to evaluate specific and overall expense management is a step in the right direction

Therefore, this paper examines the nature of hotel operating costs and their impact on profits and attempts a discussion on a number of strategies for ameliorating them. The ability of a hotelier or manager to deal decisively with costs determines to a great extent his chance of success in the hospitality market.

### **Cost**

Cost represents value given up for a product or service, commonly described as an expense or expenditure. Reference [1] describes it as denoting the amount of money that a company spends on the creation or production of goods or services. In an hotel, it represents the amount of money spent in the provision of room or food and drinks. Effective cost management allows a business to predict impending expenditures to help reduce the chance of excess spending relative to revenue generated [2].

Hotel costs are classified on various bases but for the purpose of this discussion, they are examined based on their behaviour. Historical or sunk costs are not those that matter since they will be absorbed over time. However, variable and fixed expenses are those that managers constantly endeavor to minimize in order to maximize profits [3], [4]. These costs are many and diverse depending on the size of operation.

### **Variable vs Fixed Costs**

Variable expenses are those that remain constant per unit but increase as the level of activity increases [5]. However, the 'per unit' variable cost may change on the long run due to market forces. Variable costs are clearly related to hotel occupancy and business volume. As business volume or occupancy increases, variable costs will increase; as hotel occupancy decreases, variable costs should decrease as well [6]. Good examples of variable costs in hotel operation

are food, beverages, house keeping cleaning supplies, flower arrangements, guest room amenities, guest room, restaurants and banquets linen, stationeries used in Front desk and restaurants, chemicals for laundry and water treatment plants, commission, flower and decorations, guest supplies –amenities, guest relations, laundry operations, laundry uniform, printing supplies, entertainment, telephone & Fax, transportation, human resources, sales and marketing, administration and general expenses, management fees and other operating supplies. Variable costs are controllable. For instance, food costs can be reduced by directly buying from source, purchasing prime quality items, minimizing production wastages

However, in reality, a hotel's variable operating expenses are unlikely to be perfectly correlated with occupancy [7], [5]. This calls for objective decision when seeking to control variable costs. For example, the cost of housekeeper wages, which is an important line-item component of direct room departmental expenses, may not increase at a constant rate relative to occupancy, particularly when union-related or other employee contract restrictions limit staffing flexibility. One housekeeper may be able to clean a specific number of rooms per shift. When occupancy increases beyond that number of rooms a second housekeeper has to be brought in for part or all of a shift. Similarly, a drop in occupancy beyond what is adequate for one housekeeper reduces the housekeeper's labour hour but does not reduce her wages. The implication of this is that housekeeper-associated wage expenses for a property may be more of a step function that increases each time the property reaches a new occupancy threshold

On the other hand, fixed costs are those operating expenses that remain constant in total at whatever level of business but decrease per unit as the level of activity increases [5]. They are normally not affected by changes in occupancy or sales volume. They are said to have little direct relationship to the business volume because they do not change significantly when the number of sales increases or decreases. However, the term fixed should never be taken to mean static or unchanging, but merely to indicate that any changes that may occur in such costs are related only indirectly or distantly to changes in volume. This is because fixed costs are prone to change on the long run as a result of business expansion or other economic related factors. The most effective way of dealing with fixed expenses is by increasing the volume of trade or occupancies.

Examples of fixed related costs in hotel trade include taxes to government, salaries and wages to employees, employee health premium, advertising costs, contracted security services, maintenance contract fees ( AMC ) for all equipment, machineries and Hotel Management soft wares, fixed internet, telephone plans, yearly external auditing cost, provisions, in- house

moves / satellite TV, music entertainment, reservation expenses, subscription for Newspaper, magazine etc, interest on loan, sales and marketing.

When costs are reduced, the chances for profits are increased. Reducing costs by one percentage point would cause profits to go up by one percentage point. For example, reducing food cost from 40% to 39% will cause profits to rise in the same proportion, all other things being equal.

It may be difficult to reduce all costs and at the same rate. While food costs may be reduced by 5%, it may only be possible to reduce wages by 1%.. No matter the situation, reduction in cost leads to increase in profits.

### Strategies for Controlling Costs

Hoteliers are expected to take varying steps to minimize the impact of increasing costs in the face of decreasing occupancies in order to stay in business. One of such strategies is the application of Cost-Volume-Price Model. This model borrows from the hotel model postulated by [3]. It is concerned with how managers can manipulate costs, volume of trade and selling prices to achieve sustainable profits. The CVP Model is capable of helping hoteliers and managers to minimize or reduce cost effects. Examining each component in detail will shed more light on the usefulness of the model.

#### (a) Reducing Costs

The first step to controlling operating costs is to explore avenues for reducing them as much as possible. This is a difficult task but a manager that is familiar with the business circumstances can reduce costs to some extent. For instance, seeking cheaper alternative sources of supply, minimizing wastage and adjusting portion sizes can reduce food cost. Similarly, labour cost can be reduced by using lower number of personnel or man hours to perform same task. Cross training will increase retention and give the opportunity for more hours to staff. On the other hand, overhead expenses may be tampered with by using less heating, lighting, room supplies, etc. A 1% reduction in total costs is capable of increasing profits by 5%. The following example is a proof of the impact of decrease in costs on profits:

	₦	=N
Sales	100	100
Less:		
Material cost	35	34
Labour cost	15	14

Overheads	<u>10</u>	<u>60</u>	<u>9</u>	<u>57</u>
Profit		<u>40</u>		<u>43</u>

From the above, a decrease in cost from N60 to N57 (i.e. 3%) results in increase of profit from N40 to N43 (i.e. 7.5%). If this is for one unit, imagine how much it could be if it involves thousands of units.

**(b) Increasing the volume of trade**

Increasing the volume of trade or hotel occupancy is one effective way of reducing fixed expenses. Since fixed costs decrease per unit as the level of activity increases, it follows that the more the number of units sold, the less the cost per unit. For instance, when 1000 units are sold at a fixed cost of ₦1000, the cost per unit is ₦1.00. If the number of units sold is increased to 2000, the cost per unit then decreases to ₦0.50.

There are several options for increasing occupancy level or sales in hotels. Some, as suggested by [3], [5] include the following:

- i. Researching into customers' demand and meeting their needs as accurately as possible. Promotion and advertising costs will amount to a waste if a hotel finds itself selling what the existing and potentials customers do not have the need for.
- ii. Offering quality service that generates repeat custom
- iii. Effective revenue management through objective forecasting of operating expenses
- iv. Exploring alternative or additional markets or generating demand through coach party, conferences and concessional pricing. Concessional pricing adopts marginal costing or contribution approach rather than total cost plus. The implication of contribution margin approach is to accept an order provided it contributes to profits by reduction in costs.
- v. Keeping pace with the rapid changes in technology such as social media and mobile applications which form a very strong influencing power on the customers' decision making procedure on travelling. "High tech, high touch" [8], [9]) is the service, the e-tourist wants from the hotel. If the hoteliers want to satisfy the guests' demand they have to be aware of the latest technologies [2]



- vi. Reputation management by creating trust in the use of viral marketing. Reference [10] suggests to hotels to use only one tool instead of different others for managing a property's reputation process. It is the reputation management that translates the intangible products to tangible [11]
- vii. Offering commission or rebate through block booking definitely increases the volume of trade thereby reducing costs eventually.

**(c) Increasing selling prices**

Another way of minimizing the effect of operating expenses is by increasing selling prices where demand is inelastic. A 1 – 2% increase in selling prices across board is capable of offsetting cost increases. This is the option preferred by most hoteliers or managers. Each time cost increases; they revert to increasing price as a response for remedying the situation. However, this approach may be volatile if customers are sensitive to price change, especially if they are from the low budget bracket. But if effectively applied in such a way that patrons do not respond sharply, the manager stands the chance to maintain a sustainable profit. A small amount added to room price can amount to a lot of revenue when many room nights are sold.

Differential menu pricing aimed at differential profit margin (DPM) is an approach by which food price can be varied and increased. Uniform menu pricing is untenable. Higher quality menu items will require higher gross profit margin [9].

**Conclusion**

High cost of operation has always been the concern of hotel managers. It is more so that these costs continue to rise even in the face of falling occupancies occasioned by economic depression. Significant increases are noticed in both variable and fixed expenses. Food prices, wages, workers' health insurance, energy costs, administration expenses, government taxes, are all growing by the day. The implication is that hoteliers will face very low profit margin that may not be able to finance dividend appropriation and sustainable development.

Therefore, it is necessary to be acquainted with the pattern of cost behavior and their impact on profit through financial analysis. Managers should employ a combination of measures to develop customized model for neutralizing the excruciating effect of rising costs. Meeting the customer's demand satisfactorily is a key to increasing the volume of trade which is a potent strategy for overcoming costs. New technology and blue sea model (exploring new grounds) can also be exploited to advantage. Innovative technology became one of the most important

issues in the operation of hotels. Real time marketing is the answer to changes in the macro environment of hotel business.

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## IMPACT OF GIRL-CHILD EARLY MARRIAGE ON THE LEVEL OF DIVORCE AMONG SOME NORTHERNERS IN KANO STATE, NIGERIA

**Aforka Lilian Emeka**

Department Social Sciences

School Of Languages

Federal Polytechnic Oko

### ABSTRACT

The study examined the impact of girl-child early marriage on the level of divorce among some Northerners in Kano State, Nigeria. Two research hypotheses guided the study. The study was limited to underaged married women from four local government areas of Kano State namely Nasarawa, Dawakin Tofa, Sumaila and Takai. Descriptive survey research design was used in the study. Two hundred (200) underaged married women were sampled using simple random sampling technique. A 20 item Researcher constructed questionnaire titled Impact of Early Marriage on Level of Divorce Questionnaire (IEMLDQ) was used for data collection. The questionnaire has a reliability coefficient of 0.76. The data collected were analysed using t-test statistical tool at 0.05 level of significance. The results of the analysis showed that there is a significant impact of girl-child early marriage on the level of divorce and there is a significant impact of maturity on the level of divorce among some northerners. Counselling implications based on the findings were discussed among them is that counsellors should campaign against girl-child early marriage by creating awareness about negative impact of girl-child early marriage. Based on these findings, the study recommends among others that people from northern states should be counselled on the dangers of girl-child early marriage and their impact on level of divorce. Again, parents should be encouraged to send their girl-child to school because education is the key.

**Keywords:** Girl-child, marriage, early marriage, Divorce.

### INTRODUCTION

Marriage is a sacred institution which cuts across every culture, religion and society with some differences in the way and process of executions. Marriage is a formal union of a man and a woman to live together for the purpose of raising their own family (Anyama, 2011). Marriage is one of the fundamentals in many societies which need adequate preparations and maturity for positive outcome. It is basically the union of a mature man and woman, whether educated or not, the rich and the poor (Badejo, 2010). Presently, parents expect their daughters to get married to their choice of husbands especially when they are physically, socially and emotionally ready and they have

attained marriageable age. Sometimes, some parents may also have considerations for level of education, financial status, religious belief, social status, age and ethnicity which may affect their daughters' choices in marriage. Many young people seem so anxious to go into marriage with little or no knowledge of the intricacies of marriage which may adversely affect marriage stability. Once a girl is married, she is expected to assume the multiple roles of wife, daughter-in-law, housekeeper, caretaker and a mother (Adedokun, Tochukwu & Adedeji, 2012). The transition can be psychologically and emotionally stressful for a young girl. Again, in accordance with the customs and traditions in some communities, parents have an overriding say in deciding when and whom their daughters marry irrespective of their ages, choices or level of maturity which advertently leads to girl-child early marriage. In rural customary practice in Nigeria, parental decision plays a larger role in determining marriages, specifically for their daughters (Abdallah, 2011). Early marriage is defined as any marriage carried out below the age of 18 years old, before the girl is physically, physiologically and psychologically ready to shoulder the responsibilities of marriage and child bearing (Al Hassan, 2010). Child marriage occurs when one or both of the spouses are below the ages of 18 (Nuruddin, 2013).

Early marriage seems to be commonly practiced in the northern parts of Nigeria. In Kano state, apart from cultural reasons, economic considerations tend to be the main cause of early marriage among girls leaving the girl with no choice as to whom she will marry or when to marry. Again, from Islamic view point, early marriage is encouraged to avoid *fitna* (fornication) and *zina* (adultery). Early marriage is encouraged under the article 16 of the Muslim code, the minimum marriageable age is 15 for both sexes (Nuruddin, 2013). Despite all the reasons for engaging in early marriage by the girl-child, the fact remains that it causes more harm than good because they are not mature enough to assume responsibilities of marriage. Marriage before the age of 18 should not be permitted since children do not have the full maturity and capacity to act (Bayisenge, 2012). Researchers agree that early marriage contributes to a series of negative consequences such as domestic violence and sexual abuse, high maternal mortality and morbidity, divorce or abandonment and early widowhood both for young girls and the society at large (Akpan, 2013; Salih, 2010). Presently, child marriage is widely recognized as a violation of child right, a direct form of discrimination against the child who as a result of practice is often deprived of her basic rights to health, education, development and equality. Tradition, religion and poverty continue to fuel the practice of child marriage, despite its strong association with adverse reproductive health outcomes and the lack of education of girls (UNICEF, 2011). The practice of child marriage is classified as violation of human rights (Bala, 2013).

Marriage before 18 years is a violation of human rights, compromising the development of girls and often resulting in early pregnancy and social isolation, with little education and poor vocational training reinforcing the gendered nature of poverty (Bayisenge, 2012). The age at which a person gets married is believed to influence the likelihood of divorce; delaying marriage may provide more opportunity or experience in choosing a compatible partner (Nock, Steven, Martin and Willets, 2010). Bala (2013) observed that early marriage will likely lead to early divorce that is why it is not surprising that teenage marriages usually fail. He opined that women who marry early are at increased risk of intimate partner violence. Thus, early marriage is associated with low involvement in the decision to marry, fewer interactions with one's spouse and elevated risk of intimate partner violence, showing that there is an association between early marriage and the rate of divorce among young women.

Janssen (2014) asserted that there is a strong association between marital age differences and propensity to divorce. Larger differences in age, especially when the husband is far older than the wife (mostly in the case of child marriage), have been found to have an adverse impact on marital stability (Lehrer, 2011). Marriages contracted during the teens are known to be highly unstable, a result that has been interpreted as a "maturity effect." There is a greater likelihood of mistaken expectations in the case of such marriages (Oppenheimer, 2008). At very young ages, people often have inadequate self-knowledge and are uncertain about their own future prospects and potentials. They are also prone to misjudge the characteristics and likely trajectories of their partners. As Oppenheimer (2008) observed an early marriage may preclude a premarital matching on adult attributes that have not yet emerged. Thus the "maturity effect" is much broader than just emotional maturity. It seems likely that the maturity effect also includes a learning effect: an individual who enters marriage at a late age, after having spent most of the young adult years in the single state, probably has a deeper understanding of the foregone gains from marriage and is less likely to terminate the union even if it turns out to be far from perfect.

The ability to tolerate the inadequacies of one another sustains marriage a great deal. Marriage requires a lot of compromises by each of the partners (Ojo, 2012). These compromises come in form of tolerance of the shortcomings of each other. Another dimension to tolerance is the ability to accept and ignore some of the inadequacies of the partner's relation.

Tolerance is the ability of people or things to live or exist together without problems. A relationship is all about tolerance; at times, the opposite comes in. Too many opposites will not help any relationship to be successful (Ayodele, 2011). Tolerance in a marriage is something that many people experience and learn about the longer that they are married (Kalafut, 2013). Tolerance does not mean that you constantly have to

“put up” with your spouse; it means that there are times when you need to be patient and choose not to argue when it is not necessary. Tolerance and patience are two virtues that should be practiced when a person is in a marriage (Badejo, 2010). No matter how much you love your spouse there will always be times when your patience may be tested and your character as well. Marriage is a relationship which requires a great deal of effort and compromise, without the effort of both spouses, marriage cannot work.

Disagreements are mild and rare and never dampen the strong bond of positive feelings between spouses. Partners may not always fully agree or appreciate each other, but they have learned to accept and become tolerant of each other's differences. Couples at this level share a strong bond of positive feelings (Akinwande, 2011). They are always seen to be loving and considerate to one another. Their mutual acceptance, trust, respect and admiration make their relationship stable and beautiful.

Kirby (2011) was of the opinion that early marriage will likely result in early divorce, which is why it is not surprising that teenage marriages usually fail. The probability of divorce in the early marriage was nearly four times as high for couples married while still under 20 years old than for couples who were 25 years or older at the time of marriage. Early marriage is often times associated in the long term with a higher probability of divorce and separation. In turn, marriage dissolution creates social and economic challenges for women who, as a single parent, often assume full responsibility for dependent family members (Shah, 2012). Salih (2010) found that there is a definite relationship between early marriage and subsequent unhappiness and divorce.

The probability of divorce in the early marriage was nearly four times as high for couples married while still under twenty years old than for couples who were twenty five years or older at the time of marriage. An early marriage is associated in the long term with a higher probability of divorce and separation (Bala, 2013). Studies on marital happiness tend to show that there is a definite relationship between early marriage and subsequent unhappiness and divorce (Khabir, 2014; Akpan, 2013).

The maturity effect, which is the way age at first marriage is postulated to directly affect the probability of divorce, predicts a pattern of steadily declining marital instability as age at marriage rises (Oppenheimer, 2008). Age at marriage also influences the risk of dissolution indirectly, in two ways. First, the age at which a woman enters her first marriage is systematically associated with other characteristics she has at that time that are relevant to marital stability. Age at marriage is one of the leading factors in divorce. It seems that it is best not to marry too young or wait too long before marrying. Women who marry while still in their teens are twice as likely to divorce as women in their thirties. But those who marry in their thirties are half again as likely to divorce as those who marry in their twenties (Kombum 2001). It has been

observed that, higher ages at marriage are typically thought of as an indicator of female autonomy.

Age at marriage is often found to have a considerable positive effect on marriage stability, both in a western context and African population (Martin and Burmpass 1989; and Reiners 2003). Some young girls are not matured enough to face the realities of marriage due to the intricacies of marriage. As a result, the rate of divorce due to girl-child early marriage is high. Rhyme (2010) argued that the biggest factor in marital disharmony is immaturity.

Although psychological maturity is specifically grounded in the autonomy of one's decision-making ability, these outcomes are deeply embedded in not only cognition, but also in lifelong processes of emotional, social and moral development (Hollingshead, 2007). Various theorists have provided frameworks for recognizing the indicators of maturity. Erikson's stages of psychosocial development describe progression into adult maturity, with each maturational stage characterized by a certain kind of psychosocial conflict. The "Identity" stage is characterized as being mainly concerned with issues of role exploration and role confusion, and also the exploration of sexual and other identities (Hollingshead, 2007). They have to be psychologically prepared to play the role expected of their new status. The marriage of an immature person to a mature person is not pleasant, but it happens day after day, year after year, all over the world. Sometimes mature people marry immature people assuming they will mature in the future and hoping for 'soon' (Akinwale, 2009).

The consequences of marriage affect every aspect of the society. It occupies the most intimate aspect of personal privacy and personal love and reaches the pillars of society, among others. It infiltrates every aspect of human life not only for the married but also for the unmarried. When marriages prosper, the society grows, when marriages fail, the society also fails. Divorce not only rattles the foundation of the judicial system and psychiatry, but through its influence on children, alters the course of the next generation (Adedokun, Tochukwu and Adedeji, 2012).

There is a relationship between marriage and culture. Culture refers to social values, beliefs, norms and standards, when marriages fail the impact upon the rest of a culture is disastrous. The way in which marriage is conducted and its rules and ramifications has changed over time, as has the institution itself, depending on the culture or demographic of the time (Adedokun, et al., 2012). Aminu (2010) found that, among young wives, teenage parenthood did not appear to increase the risk of divorce or separation, whereas teenage marriage significantly raised the probability of disruption. Couple's ethnic/cultural background, coupled with other issues, has been another factor causing divorce, and adversely affects marriage stability. In Nigeria, divorce is frowned upon and seen as an element of culture diffusion. No ethnic group has been found to

be in favour of divorce. Despite this, divorce cases in Nigeria seem to be very high (Okunola, 2012). It was observed that most northerners in Nigeria are still practicing early marriage, which may cause some health issues such as Vesico-Vaginal Fistulae (VVF). It can also be seen as violation of human right that takes place almost exclusively within the context of poverty and gender inequality. It also has social, cultural and economic dimensions. Most countries, including Nigeria, have declared 18 as a minimum legal age of marriage. Despite the sanction of child marriage, however, more girls are going into early marriage as a result of cultural values among northerners in Kano state. Therefore there is urgent need to investigate the impact of girl-child early marriage on the level of divorce among northerners in Kano State.

### **STATEMENT OF THE PROBLEM**

There are some basic norms, beliefs and cultural practices that guide the people in every society. In Nigeria, girl-child early marriage has been a common practice among many ethnic groups despite the fact that child marriage is globally recognized as a violation of child's right. In Northern Nigeria, the practice is more prevalent due to cultural, religious and economic considerations such as poverty, unwanted pregnancy, parental and peer pressures among others with no regard to national laws and international agreements against girl-child early marriage. Some parents have predominant decision in choosing when and whom their daughters' marry irrespective of their ages, choices or level of maturity due to cultural, traditional and religious reasons. Some of the girls are forced into marriage, while others marry do to parental or peer pressure since they are too young to make informed decisions, thus, they seem so anxious to go into marriage with little or no knowledge of the intricacies of marriage which may adversely affect marriage stability. Again, despite all the aforementioned reasons for engaging in girl-child early marriage, the fact remains that they are not physically and psychologically matured enough to assume the responsibilities of marriage. Moreover, girl-child early marriage tend to have physical, social, psychological, educational and health implications such as emotional and mental distress, intolerance, school drop-out, Vesico Vaginal Fistula (VVF), high maternal mortality and morbidity, early widowhood, frustration and hatred for the man which may negatively affect the stability of the marriage.

Again, some of the researches on girl-child early marriage focused more on how it affects their education. However, the current study examines the impact of girl-child early marriage on the level of divorce among northerners in Kano state.

### **PURPOSE OF THE STUDY**

The purpose of this study is to investigate the impact of girl-child early marriage on



the level of divorce among northerners in Kano State. Specifically, the study among other things seeks to:

1. Determine the impact of early marriage on the level of divorce among northerners in Kano State.
2. Examine the impact of maturity on the level of divorce.

### **RESEARCH QUESTIONS**

In order to provide direction for this study, the following questions were asked:

1. What is the impact of girl-child early marriage on the level of divorce?
2. What is the impact of maturity on the level of divorce?

### **Research Hypotheses**

The following hypotheses guided the study:

1. There is no significant impact of early marriage on the level of divorce among northerners in Kano State.
2. There is no significant impact of maturity on the level of divorce among northerners in Kano State.

### **Significance of the study**

Young girls would benefit from this study because this study would add to girls' knowledge about the impact of early marriage on level of divorce among couples. The outcome of this work would portray a vivid idea of peoples' perceptions and impressions on early marriage in Nigeria.

Furthermore, the ideas in this work would help immensely in implementation and meaningful decisions and policies on developmental implications of early marriage as it affects girl child and the entire society. The findings and recommendations of this research work will help tremendously to restore adequate dignity, rights and values of girl child in Nigeria especially in northern parts of Nigeria.

The study would be of great significance in the sense that young girls should know that early marriage and polygamy is not a solution to the search for economic survival.

### **Research Methodology**

The research design used for the study was descriptive research design.

A 20 item researcher-developed questionnaire titled "Impact of Girl-Child Early Marriage and on the Level of Divorce Questionnaire (IGCEMLDQ)" was used for data collection. The instrument has a reliability value of 0.76. A total of two hundred (200) married women aged between 12 and 35 years make up the sample. They were selected through simple random sampling technique from Women Development Centres

organized by Kano State Ministry of Women Affairs, Programme and Poverty Reduction in four local government areas in Kano state namely: Nasarawa, Dawakin Tofa, Sumaila and Takai. Simple random sampling technique was also used to select fifty (50) married women from each of the local government areasselected for the study.

### Results Hypothesis One

In the null form, the hypothesis stated that there is no significant impact of early marriage on the level of divorce among northerners in Kano State. The hypothesis was tested using t-test statistics. The result of the analysis is presented in Table 1.

**Table 1: Independent t-test analysis on impact of early marriage on the level of divorce**

Early marriage	N	$\bar{X}$	SD	t-cal
Low	72	14.35	2.84	2.78*
High	128	18.74	3.06	

\* Significant at 0.05 df = 198; critical t = 1.96

Table 1 shows that a calculated t-value of 2.78 resulted as the impact of early marriage on the level of divorce. This calculated t-value of 2.78 is significant since it is greater than the critical t-value of 1.96 given 198 degrees of freedom at 0.05 level of significance. This means that women who marry early significantly manifest higher tendency to divorce. The null hypothesis was rejected. Therefore, it can be concluded that there is a significant impact of early marriage on the level of divorce among northerners in Kano State.

### Hypothesis Two

In the null form, the hypothesis stated that there is no significant impact of maturity on the level of divorce. The hypothesis was tested using t-test statistics. The result of the analysis is presented in Table 3.

**Table 2: Independent t-test analysis on impact of maturity on the level of divorce**

Integral maturity	N	$\bar{X}$	SD	t-cal
Low	73	21.95	2.38	2.32*
High	127	18.80	3.84	

\* Significant at 0.05 df = 198; critical t = 1.96

Table 2 shows that a calculated t-value of 2.32 resulted as the impact of maturity on the

level of divorce. This calculated t-value of 2.32 is significant since it is greater than the critical t-value of 1.96 given 198 degrees of freedom at 0.05 level of significance. This means that women who have high maturity significantly have lower tendency of proneness to divorce than those who have low maturity. Consequently, the null hypothesis was rejected. Therefore, it can be deduced that there is a significant impact of maturity on the level of divorce.

### **Discussion of Findings**

Hypothesis one states that there is no significant impact of early marriage on the level of divorce among northerners. The hypothesis was rejected. This shows that there is significant impact of early marriage on the level of divorce among northerners. This finding supports Khabir (2014) who noted that girls are not adequately prepared for the roles expected of them in the family. This therefore becomes a burden and has serious impact on their psychological welfare, their perception of themselves and also their relationship. Khabir concluded that early marriage can lead to divorce. Bala (2013) found association between early marriage and the rate of divorce among young women. Janssen (2014) asserted that there is a strong association between marital age differences and propensity to divorce. Kirby (2011) was of the opinion that early marriage will likely result to early divorce that is why it is not surprising that teenage marriages usually fail. The probability of divorce in the early marriage was nearly four times as high for couples married while still under twenty years old than for couples who were twenty five years or older at the time of marriage. An early marriage is associated in the long term with a higher probability of divorce and separation. Salih (2010) found that there is a definite relationship between early marriage and subsequent unhappiness and divorce. The reason for this finding could be that early marriage deprives young girls of the opportunity for personal development as well as their emotional well being. With this, married girls are susceptible to the increased risk of divorce. The girls that are coerced and forced into early marriage are almost always not emotionally and mentally prepared for the responsibilities a marriage brings.

Hypothesis two states that there is no significant impact of maturity on the level of divorce among northerners. The hypothesis was rejected. This shows that there is significant impact of maturity on the level of divorce among northerners. This finding collaborates with Reiners (2003) who confirmed that many broken families have been associated with the immaturity and youthfulness of the married couple who get married in their teens (13-17). Marrying too young is destructive and has a tremendous impact in a relationship. Jones (2000) explicitly links increasing ages at marriage to a greater degree of self-arrangement of marriages, and that is considered as powerful mechanism of declining divorce rates. Akinwale (2009) reported that the marriage of an immature

person to a mature person is not pleasant, but it happens day after day, year after year, all over the world. Sometimes mature people marry immature people assuming they will mature in the future – and hoping for ‘soon’. Badejo (2010) observed that marriage is the union of a mature man and woman, whether educated or not, the rich or the poor. The reason for this finding according to the researcher could be that some girls are not experienced enough to face the realities of life. As a result, it is no wonder that the rate of divorce linked to early marriage is high. This finding supports Ojo (2012) who reported that the ability to tolerate the inadequacies of one another sustains marriage a great deal. Marriage requires a lot of compromises by each other partner. Ayodele (2011) stated that similarity of interest tends to bring couples closer and reduces frictions. Badejo (2010) asserted that tolerance and patience are two virtues that should be practiced when you are in a marriage. No matter how much you love your spouse there will always be times when your patience may be tested and your character as well. Marriage is a relationship which requires a great deal of effort and compromise, without the effort of both spouses, marriage cannot work.

In the opinion of the researcher, the reason for this finding could be that the ability to tolerate the inadequacies of one another sustains marriage a great deal. Marriage requires a lot of compromises by each other partner. These compromises come in form of tolerance of the shortcomings of each other.

### **Summary and conclusion**

It was found that girl-child early marriage has significant impact on level of divorce among northerners in Kano state and that those who have high level of maturity significantly have lower tendency of proneness to divorce than those with low maturity level. Based on the findings of the study, it can be concluded among northerners in Kano State, Nigeria and that low maturity level in marriage have increased the level of divorce among northerners in Kano state. Again, since girl-child early marriage is associated with physical, social, psychological, educational and health implications such as emotional and mental distress, intolerance, school drop-out, Vesico Vaginal Fistula (VVF), high maternal mortality and morbidity, early widowhood, frustration and hatred for the man and high level of divorce, thus, there is need to implement international agreements and enacted Acts that will further enhance the rights of the girl-child in most Northern states has been controversial as some of the states are also being guided by Islamic laws that encourage on early marriage.

### **Counselling implications**

Counsellors should sensitize the general public especially the girl-child and parents in the northern part of Nigeria on the physical, social, psychological, educational and

health implications of early marriage and its impact on the level of divorce. Sensitization on developmental implications of early marriage from time to time will increase women's awareness and growth within the family and the society at large so as to reduce the high divorce rate caused by girl-child early marriage. Thus, attitudinal change on girl-child early marriages should be the watchword.

Counsellors and all stakeholders in girl-child education, child care and welfare, and those who are interested in saving the younger generation should encourage the government to make provisions such as incentives and grants (such as scholarship awards) to support female children from poor parental backgrounds so that they may enjoy a happy childhood, uninterrupted basic education, and good health.

Counselling programme should therefore not be restricted to schools only, rather, it should be extended to the local communities with packages on importance of girl-child education.

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## **ATTITUDE OF PRIMARY SCHOOL TEACHERS TOWARD INCLUSIVE EDUCATION.**

**Kekereowo Isaac Oluwafemi**

Department of Economics,  
Federal College of Education, Yola  
Adamawa State.

### **Abstract**

Inclusive education is one of the most essential programme in all countries. It has given more opportunities to all students in the education system. The success of inclusive education depends on many factors, which teacher is the most significant. To become a competent and successful teacher in inclusive education, teachers need to have adequate knowledge, skills, and a positive attitude toward the students being taught. In the present study, an attempt has been made by the researcher to study the attitude of primary school teachers towards inclusive education in the Ifedore Local Government Area of Ondo State, Nigeria. A descriptive survey method was used in the study. The sample consists of 150 primary school teachers in the three zones from the study area and a stratified random sampling method was used for data collection. A questionnaire requesting information about the demographic variables of teachers and the measurement of their attitudes toward inclusive education was developed. The study employed the use of a five-point Linkert rating scale for the analysis of data. The major findings from the study showed that teachers have a strong belief that inclusive education is socially beneficial to all students, students can learn in inclusive classrooms if their teachers are willing to adapt the curriculum, and students regardless of their ability should be taught in regular classrooms.

### **Introduction**

One of the major problems the world is facing today is discrimination against persons with disabilities. According to the world health organization 2011 world disabilities report about 15 percent of Nigeria's population or at least 25 million people, have a disability. Many of them face several human rights cases of abuse including stigma, discrimination, violence, lack of access to health care, housing, and most importantly education.

In this population, some persons are facing different types of problems in the educational system and the result is that they are excluded from the educational system. In Nigeria, the

government has started some programs as outlined in the National Policy on Education which provides that education must be inclusive and that all children including those with disabilities have the right to qualitative functional, and effective basic education. The policy of inclusive education is an approach to curriculum policy that recognizes that while each learner has multiple needs even more so in situations of vulnerability and disadvantage, everyone should benefit from a commonly accepted basic level of quality education. Furthermore, the National Policy on Disability in Nigeria (2017) and the Discrimination Against a Person with Special Needs (Prohibition) Act (2018) prohibits discrimination based on disability and imposes sanctions including fines and prison sentences on those who contravene it.

UNESCO, (1994) conference on special needs education reaffirmed that every child has the right to attend class within the regular education system. They are to be supported in their learning and to be included in all aspects of school life. Based on this cardinal principle there has been an increasing trend toward including students with disability within the mainstream system, irrespective of their disabilities. The trend is triggered by legal requirements. For example, in 2005, France education system has promoted changes which aim to counteract the social exclusion of these students, for instance, a 4-year-old person with a disability should be registered within the closest school to his/her home and he/she should even benefit from additional support from special education class where he/she still belongs or his/her general grade.

Inclusive education is a stepping stone toward the educational system which includes all children in the educational process. Inclusive education is called special education which originally set out to meet the needs of learners who were being traditionally excluded from the school or otherwise marginalized within the classroom. Inclusive education happens when children with and without disabilities join and learn together in the classes. Research shows that when a child with disabilities attends classes beside peers who do not have disabilities, good things happen. It does not just involve a focus on the barriers to knowledge by learners but the improvement of the detail of the cultures, policies, and practices in the education system and educational institutions hence that they are approachable to the diversity of learners and value them equally. Today inclusive education or inclusion of education is a great concept that helps to achieve the quality of education and to assist the efforts the students to enrolment in the education system

### **Objectives of the study**

1. To find out the Attitude of the primary school teachers toward inclusive education.



2. To find out the difference between male and female primary school teachers regarding their attitude towards inclusive education.

### **Hypotheses of the study**

H<sub>01</sub>: Teachers do not have a favorable attitude among primary school teachers towards inclusive education.

H<sub>02</sub>: there is no significant difference between male and female primary school teachers regarding their attitude towards inclusive education in Ifedore LGA of Ondo State, Nigeria

### **Need and significance of the study**

Inclusive education is an essential part of every education system. It should be more opportunities for all students in the regular classroom in the same schools. But today's inclusive education in our country is facing many challenges. That's why to meet the challenges successfully. It is very necessary to improve the different sectors of inclusive education. The present study is very important; because this study also helps

- I. The present study will help to know the attitude of Teachers of primary schools towards inclusive education in Ifedore LGA.
- II. To conduct this study the present Researcher has constructed Attitude Questionnaires (for the primary school teachers) which will be very helpful for other researchers to conduct future research in the field of inclusive education
- III. The findings of the study will also create awareness for the state and federal Governments regarding Inclusive education
- IV. The findings related to the attitude of primary school teachers toward inclusive education will be very helpful for the government and policymakers to take some important steps and modify the different policies and ideas of inclusive education for its successful implementation of the school education system in Nigeria.

### **Literature review**

#### **Meaning of Inclusive Education**

The principle of inclusive education was adopted at the "World Conference on Special Needs Education: Access and Quality" (Salamanca, Spain 1994) and was restated at the World Education Forum (Dakar, Senegal, 2000).

Inclusive education means schools desired, practice or approach where all children regardless of their physical, intellectual, social, emotional, linguistic, or other conditions. It should include all types of children such as gifted, backward and mentally retarded, learning

disabilities, socio-economic disadvantaged students, etc. it is an approach that fulfills the learning needs of all children, youth, and adults who are vulnerable to marginalization and exclusion from the educational system. Inclusive education means that all students attend and are welcomed by their neighborhood schools in age-appropriate, regular classes and are supported to learn, contribute and participate in all aspects in all of the life of the school (UNESCO, 2008).

Stainback and Stainback (1992) describe inclusive education as ‘A palace where everyone belongs, is accepted. Supported by his or her peers and others members of the school’s community in the course of having his/her educational needs met. To Gingre, (1997) inclusive education is a set of values, principles, and practices that seeks more effective and meaningful education for all students, regardless of whether they have exceptionally labels or not. Inclusive education is a learning environment that promotes the full personal, and professional academic development of all learners irrespective of race, color, disability, gender; learning style, and language (NCSNET,1997). Micheal, (1997) defines inclusive education as a set of values, policies, and practices that seeks more effective and meaningful education for all students, regardless of whether they have exceptionally labels or not.

Manivannan, (2001) describes inclusive education as the implementation of policy and process that allows all children to participate without any restrictions in all the educational programs meant for other children. The process of inclusion denotes the way in the system and makes it welcoming to all. Alqurani & Gut (2012) on the other hand see inclusive education as a situation when all students, regardless of any challenges that may have, are placed in age-appropriate general education classes in their neighborhood schools to receive high-quality instruction, intervention, and supports that enable them to meet success in the core curriculum. UNESCO, (2008) defines inclusive education “as a process of addressing and responding to the diversity of needs of all learners through increasing participation in learning, cultures, and communities, and reducing exclusion within and from education”. So inclusive education involves changes and modifications in content, approaches, structures, and strategies, with the certainty that it is the responsibility of the state to educate all children.

### **Importance of Inclusive Education**

An inclusive system provides a greater chance in the educational system for all children and is instrumental in changing inequitable attitudes. Schools provide the outline for a child’s first relationship with the outside world of their families; facilitate the development of social

relationships and interaction. Respect and understanding grow when students of diverse abilities and backgrounds play, socialize, and learn together.

Education that excludes and segregates perpetuates inequity against traditionally marginalized groups. When education is more inclusive, then the students' concept of civic participation, employment, and community life will increase more.

The advantages of inclusive education are several for both students with and without disabilities.

1. Inclusive education increases the participation of students in all activities of the schools
2. An inclusive setting helps the children do better socially and academically
3. Inclusive settings help different professionals, such as teachers, psychologists, social workers, teacher educators, etc. to work together for the execution and formulation of educational programs.
4. Inclusive education increased understanding and acceptance of diversity
5. Inclusive education provides a greater opportunity for interaction for all students

There is no doubt that the achievement of the above importance is bordered by some critical factors such as the insufficient number of trained teachers for an inclusive education system, lack of schools do providing sufficient resources to teach students in inclusive classes, inaccessibility and nonmotivating curriculum content and funding is the major barrier to the practice of inclusion.

#### **Basic Elements of Inclusive Education:**

The main element of inclusive education as described by Nepal & Pranab, (2018) are of three types:

- I. Use of teaching assistants or specialists: these teaching staffs have a very prospective to inclusive. In occurrence, a specialist who helps the teachers to address the needs of all the students is working inclusively. A specialist who pulls students out of class to work with the individual regularly is not.
- II. Inclusive curriculum: an inclusive curriculum includes locally relevant subjects and contributions by marginalized and alternative groups, it avoids binary narratives of good and bad, and allows adapting the curriculum to the learning styles of children with special education needs.

- III. Parental involvement: Most schools strive for some level of parental involvement, but it is often limited to e-mail home and special parent-teacher conferences. In such situation a diverse school system, inclusion means thinking about several ways to reach out to the parent on their terms

### **Empirical review**

**Khan, (2011)** has conducted a study “Investigation of secondary school teachers’ attitudes towards and knowledge about inclusive education in Bangladesh”. The quantitative and qualitative findings of this study reveal that secondary school teachers have almost favorable or supportive attitudes towards inclusive education for children with special educational needs. This study also concludes that the Bangladeshi secondary school teachers had positive feelings about the inclusion of such children in the mainstream classes.

**Belapurkar & Phatak, (2012)** have conducted a study “Knowledge and attitude about inclusive education of school teacher”. The result of the study shows that teachers in rural and urban have a slightly negative attitude about training and curriculum in teachers’ education concerning inclusive education. This study also indicates that the school teachers are not clear about government policies and planning for inclusive education.

**Das & Bhatnagar, (2014)** conducted a study “attitude of secondary school teachers towards inclusive education in New Delhi”. The major findings of the study were that the teacher in Delhi had a positive attitude toward the inclusion of students with special needs. This study also indicates that the teachers who were a more positive attitude about inclusive Education were Male.

**Galovic, Brojein & Glumbric, (2014)** have conducted a study on “the attitude of teachers towards Inclusive Education in Vojvodina”. The result shows that in general, the participant held a neutral attitude toward inclusive education and more positive expectations regarding the outcome of inclusion. This study also indicates that the high school and preschool as well as the teacher with a previous positive experience with working are an inclusive environment reported a more positive attitude towards IE.

**Karui & Kauri, (2015)** have conducted a study “attitude of secondary school teachers’ toward inclusive education”. In the findings of the study, there was no significant difference between male and female secondary school teachers concerning their attitude towards inclusive education. This study also indicates that there was a significant difference between rural and urban secondary school teachers concerning their attitude towards inclusive education.

**Kumar, (2016)** has conducted a study “exploring the teachers’ attitude towards inclusive education system”. The major findings of the study there is a significant difference between rural and urban teachers regarding inclusive education. This study also concluded that there is a significant difference between male and female teachers and low experience and high experience teachers towards inclusive education.

**Method of the study:**

The researchers employed the use of a descriptive type survey method in the study. Therefore, the researcher used different tools, techniques, strategies, and methods of descriptive survey research to collect, analyze and interpret the data.

**The population of the study:**

The population of the study consist of all the primary school teachers (both male and female) in Ifedore Local Government Area of Ondo State.

**Sample of the study:**

The sampled population for the study are 150 primary school teachers out of which 81 are male primary school teachers and 69 female primary school teachers.

**Sampling technique:**

The stratified Random sampling technique has been applied in the selection of the sample

**Tools used for the study:**

The investigator has used a self-made questionnaire as a tool for collecting the data in the present study. The scale consists of 8 items. The Likert rating scale is constructed using a five-point Likert’s scale i.e., strongly Agree (S.A.) with 5 points, Agree (A) with 4 points, Not Sure (NS) with 3 points, Disagree (D) with 2 points, Strongly Disagree (S.D.) with 1 point.

**Techniques of data analysis:**

The researcher used Mean, SD, and t-tests and the Likert rating scale for analyzing the data.

**Data collection procedure:**

As per Previous planning, the tools were administrated upon the 150 primary school teachers out of 4 (four) rural areas and 4 (four) urban areas. The authorities of the concerned schools were informed well in advance by the investigator for the collection of data. The investigator clearly explained the instruction to the primary school teachers in staff rooms regarding what

to do and how to rate the items on the scales with a time limit of one month. The school teachers were instructed to rate all items on the scale to evaluate to overall attitude to inclusive education. After completion of the rating by all the primary school teachers, the filled-in copies were collected. The collected questionnaire (150) from eight (8) primary schools, the researcher has calculated the total score of a questionnaire by computing the score against every item using a linker tram scale method of analysis.

### Analyses and interpretations.

**H<sub>01</sub>:** Teachers have no favorable attitude toward inclusive education in primary schools.

**Table 1: Shows the number, mean, and S.D of the Total Teachers**

Group	Number	Mean	S.D
Teachers	150	106.12	9.10

$M \pm \sigma$

$$M + \sigma = 106.12 + 9.10 = 115.22$$

$$M - \sigma = 106.12 - 9.10 = 97.02$$

From the table above, there is no significant difference between the attitude of male teachers and female teachers toward inclusive education in the area of study.

**H<sub>02</sub>:** There is no significant difference between male and female primary school teachers regarding their attitude toward inclusive education in Ifedore Local Government Area.

**Table 2: Show the difference between male and female primary school teachers regarding their attitude toward the inclusive education**

Group/ Variable	N	Mean	SD	Mean Difference	SED	DF	t- value	Result
Male	81	106.80	10.376	1.484	1.491	148	0.995	Not significant at 0.05 level
Female	69	105.32	7.323					

\*Significant at 0.05, \*\* Significant at 0.01 and @ not significant (Table Value of 'T' against df (149) at 0.05 level = 1.98 & 0.01 level = 2.16)

From table 2, it is found that the calculated 't' value (0/9995) is less than the table value of 0.05 & 0.01 level of significance (1.98 at 0.05 level of significance. So we can broadly say that there is no significant difference between male and female secondary school teachers

concerning their attitude toward inclusive education. But based on their obtained Means score, we can say that their attitude toward the Inclusive education of male teachers is comparatively more favorable than the female teachers in Ifedore LGA of Ondo state.

**Table 3: Attitude of primary school teachers toward Inclusive Education**

<b>Factors</b>	<b>N</b>	<b>Rank</b>	<b>Mean</b>	<b>SD</b>
<b>I opened that all students regardless of their ability should be taught in regular classrooms</b>	<b>650</b>	<b>3</b>	<b>4.33</b>	<b>1.03</b>
<b>I believe that inclusive is beneficial to all students socially</b>	<b>688</b>	<b>1</b>	<b>4.59</b>	<b>0.63</b>
<b>I believe that inclusive is beneficial to all students academically</b>	<b>588</b>	<b>4</b>	<b>3.92</b>	<b>1.10</b>
<b>I believe that all students can learn in inclusive classrooms if their teachers are willing to adapt the curriculum</b>	<b>678</b>	<b>2</b>	<b>4.52</b>	<b>0.89</b>
<b>I am pleased that I have the opportunity to teach students with lower academic abilities alongside other students in my class</b>	<b>574</b>	<b>5</b>	<b>3.83</b>	<b>1.33</b>
<b>I am glad to teach students with a range of abilities in my class</b>	<b>453</b>	<b>8</b>	<b>3.03</b>	<b>1.43</b>
<b>I am happy that including students with a wide range of abilities will make me a better teacher</b>	<b>526</b>	<b>6</b>	<b>3.51</b>	<b>1.28</b>
<b>I am pleased to have students who need assistance with their daily activities included in my classroom</b>	<b>487</b>	<b>7</b>	<b>3.25</b>	<b>1.29</b>

Source: Author's computation, (2022)

The descriptive data in table 3 above, demonstrated that the three highest attitudes of teachers toward students inclusive associated with the belief that: Inclusion is beneficial to all students socially ( $\bar{x} = 4.59$ ,  $SD = 0.63$ ) students can learn in inclusive classrooms if their teachers are willing to adapt the curriculum, ( $\bar{x} = 4.52$ ,  $SD = 0.89$ ) and all student regardless of their ability should be taught in regular classrooms ( $\bar{x} = 4.33$ ,  $SD = 1.03$ ) respectively.

The three lowest attitudes of teachers towards students' inclusive education were associated with the belief that: including students with a wide range of abilities will make a better teacher ( $\bar{x} = 3.51$ ,  $SD = 1.28$ ), having students who need assistance with their daily activities included in the teacher class will be pleasant, ( $\bar{x} = 3.25$ ,  $SD = 1.29$ ).

The overall mean ( $M = 3.80$ ) suggests that teacher's attitudes towards inclusive education are somewhat affected by the first five beliefs mentioned above as their means ranks (1, 2, 3, 4, and 5) respectively are greater than the overall mean  $M = 3.80$  while the mean ranking 6, 7, 8, have ignorable believe about teachers attitude towards inclusive education.

This implies that primary school teachers generally believe those attitudes ranked 1, 2, 3, 4, and 5 affect students with special needs in inclusive education.

#### **Major findings of the study:**

- I. The first finding of the study is that the attitude of primary school teachers towards inclusive education overall has been favorable in Ifedare LGA of Ondo State.
- II. The second finding of the study is that is no significant difference between male and female primary school teachers concerning their attitude toward inclusive education. It means that gender does not influence the attitude of primary school teachers towards inclusive education in Ifedore LGA.
- III. The third finding of the study revealed that there is no significant difference between the attitudes of teachers with high teaching experience and less teaching experience towards inclusive education in Ifedore LGA.

#### **Discussion of findings:**

This study was conducted to know the teacher's attitudes toward inclusive education. The results of the study showed that there is a strong to moderate attitude of teachers toward inclusive education. This is due to the result of inclusive education in pre-service teacher programs and in-service teacher programs.

Inclusive education is about comprehensive education (Thomas & Loxely, 2001). Regular teachers need to know that inclusive education is a social and human issue that benefits all individuals. With a clear understanding of inclusive education, teachers would not recognize disabled children as "strangers" but rather as integral and active participants of the regular school community.

The study showed that the belief that inclusion is beneficial to all students in special terms was the highest which means a students with special needs can improve their social interactions



with classmates in inclusive education. However, the belief to teach students with a range of abilities in the teacher's class was the lowest of eight items as most teachers were not impressed to have more students who need assistance with their daily class activities included in the normal classrooms. They see this as a waste of teaching hours as the teaching would be done over and over again. This negative attitude of teachers toward inclusive education is in tandem with a study conducted by Bindhu and Niranjana (2014).

**Conclusion:**

Inclusive education is one of the most educational programmers in the education system. It gives equal opportunity to all children in regular classrooms. The result of the study is like that the moderate attitude of the primary school teachers in inclusive education. So, this result indicates that in the implementation of inclusive education in primary schools, teachers are needed to apply for knowledge and application-based programs. Therefore, it is important that the teachers give clear ideas about various issues and challenges of inclusive education like human resource deficit, lack of collaboration between special teachers and regular school teachers, and the most significant is inappropriate training programs in inclusive education. The goal to fulfill the universalization of education is incomplete without inclusive and integrated education for the challenged group of students.

**Recommendation**

The Federal government's efforts in meeting the needs of students with disabilities through the enactment of the National Policy on Inclusive Education is a welcome development. However, for this policy to effectively achieve its primary objectives, the findings from this research work will be needful. Henceforth, founded on the findings, the following recommendations are presented.

1. Teachers should be regularly exposed to training in special education in order to continuously improve their tolerance, skills, knowledge, and commitments toward inclusive education.
2. Adequate modern teaching and learning facilities should be provided to facilitate positive attitudes of teachers toward inclusive education.
3. The government needed to be applauded for the recent upward review of teachers' age of retirement from 60 to 65 years. This tends to improve teachers' attitudes toward inclusive education. Despite this, more still need to be done in the area of special duty allowance for teachers who are involved in inclusive education.

4. The acceptable working condition of service should be put in place for the effective implementation of the national policy on inclusive education in Nigeria.

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