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Abstract

The negative impacts of the corona virus 2019 (Covid-19) pandemic did not spare the education sector. The global lockdown due to the Covid-19 pandemic resulted into the closure of schools at all levels. Consequently, governments of various nations gave directives that schools should adopt online teaching/learning to engage their students. The directive by the Federal Government of Nigeria to transit to eLearning had forced the educational institutions to adopt one social media or the other as the eLearning platform, which has resulted to various deficiencies towards meeting the technological educational needs. The transition to e-learning due to covid-19 pandemic outbreak in Nigeria necessitated a previous research work titled: "E-Learning User Satisfaction Survey in Technological Education", carried out to assess user satisfaction of using e-learning as an alternative to face-to-face method of leaning during Covid-19 lockdown. The findings from this previous research revealed that majority of the institutions did not have institutional e-learning platform. The findings in the mentioned research have necessitated further research work. Therefore, the authors of the mentioned research work hereby present A Framework for Universal Hybrid Model of In-Person Online and Offline E-Learning Platform with Embedded Virtual Laboratory Using Technopedagogical Models.

Keywords: E-Learning, Covid-19 Pandemic, *Technopedagogical Models*, Technological Education, Virtual Laboratory.

1. INTRODUCTION

The transition to e-learning due to Covid-19 pandemic outbreak in Nigeria has exposed the deficiencies of Nigeria's educational institutions in the use of ICT for teaching and learning. There is no doubt that e-learning has several advantages compared to disadvantages towards teaching and learning. The number of prospective admission seeker is increasing geometrically, while available space is either stagnant or increasing arithmetically. Some factors are responsible for decline in quality of education and skills acquired by the graduates of higher institution of learning in Nigeria, which deployment of ICT can resolve, if appropriately integrated. E-learning as an educational tool can be used to decongest population in schools and control some unholy behavior of students and teachers, which can hamper the goal and objectives of educational system (Ladipo, Oyeyinka, & Yekini, 2012).

Adoption of e-learning is struggling at government-owned institutions as majority of the institutions do not have policy and strategy in place to meet up with government directive. Covid-19 has really exposed public institutions' inadequacies, as National Open University of Nigeria (NOUN) with open distance Learning license also announced suspension of academic activities following the government shutdown order in March 2020. Majority of the public institutions adopted the use of social media platforms as e-learning tools to meet up with the government directive, while private universities lead the pivot to online learning under the influence of Covid-19 (Abubakar, 2020). The use of e-learning platform must take into consideration the curriculum and students' needs. Hence, the need for e-learning platform that can accommodate the students' specific needs to archive the goal and objectives of educational set-up must be paramount to the adoption of e-learning platform to technological education. In technological education system like Polytechnics, more emphases are placed on practical compare to theoretical aspect of learning.

The focus of this paper is to propose a Framework for Universal Hybrid Model of In-Person Online and Offline E-learning Platform with Embedded Virtual Laboratory Using Technopedagogical Models. The proposed system, if designed and implemented as e-learning tool, will help to meet the goal and objectives of technological education in Nigeria with ODL approach.

2. LITERATURE REVIEW

Adoption of e-learning in educational system will go a long way to achieving the following objectives, among others: wider access to education; guaranteed equity and equality of opportunities in education among citizenry; enhanced education for all and life-long learning; entrenchment of global learning culture; availability of instructional resources using ICT tools; support for flexibility; and reduced cost, inconveniences, and hassles of access to education (Ajadi, Salawu, & Adeoye, 2008; Qteishat, Alshibly, Alqatawna, & Al-Ma'aitah, 2013)**.** There are various factors that need to be considered before adoption of e-learning as tool in educational system; some of the factors are: awareness of its usefulness and ease of use to meet educational goal and objectives; the perception of and support for available ICT resources; prior ICT experience of students and teachers. Also, from the student's perception, there is need for an educational model that optimizes the possibilities of working the transdisciplinary knowledge through a creative and rational use of the basic ICT tools of the learning platform (Qteishat, Alshibly, Alqatawna, & Al-Ma'aitah, 2013; Cacheiro-Gonzalez, Medina-Rivilla, Dominguez-Garrido, & Medina-Dominguez, 2019). Concerted efforts must be made by the stakeholders in education towards providing enabling environment for ICT support learning by addressing limited bandwidth availability to educational institution, enforcing and financing e-library domain, support online seminars, online examination among others (Anene, Imam, & Odumuh, 2014).

Communication over distance via ICT tool like internet could be seen as cybernetic communication. Majority of e-learning platforms require the use of cybernetic communication tool, which is not readily available. Yekini, Oloyede, & Akinwole (2020) opined that, *"it is not too late for Nigeria to leverage on available ICT resources to build strong ethical and global ICT imperatives to detect and respond to pandemic threats"*. The application of e-learning in teaching and learning can leverage on the movement's readiness to support cybernetic communication to build a resource-oriented e-learning platform for teaching and learning in technological education. There is need for e-library domain to support e-learning platform; this can be achieved by developing and integrating mobile library landscape as proposed by Yekini, Onyeka, Ahmed, & Ojo (2020).

Consequent upon the adoption of e-learning due to Covid-19 pandemic, many researches had been carried out and the results of some of the researches exposed the inadequacy of Nigeria's public institutions in the effective use of e-learning as a tool to achieve and enhance educational goals and objectives. In a research work that focused on assessment of E-learning and M-learning adoption during Covid-19 Lockdown in Nigeria, the findings revealed that government's directive to transit to e-learning was not effective due to *"challenges that revolved around non-availability of functional and modern information communication technology (ICT) resources, electricity, and skills to manipulate the digital devices"* (Yekini, Adigun, Ojo, & Akinwole, 2020). Also, in a research that necessitated this work, a survey was carried out to assess user satisfaction in e-learning adoption in technological education. It was observed that, *"The e-learning platform used during the lockdown was not tailored to meet the needs of teaching and learning in technological education; it fell short of satisfactory level of requirements; hence, the need to develop Universal Hybrid model of in-person, online and offline e-learning platform with embedded virtual Laboratory to address technological educational strategy, process, and TVET culture"* (Yekini, Lawal, Akinwole, & Akinade, 2020).

There is no gainsay that practical experience is an important component of the educational process in technological education. If the practical class is not properly considered in the adoption of e-learning for technological education, it will surely have adverse effect on the outcome. Practical learning in technological education can be achieved by using virtual reality technology that will allow creation of virtual laboratory, which will simulate the process and actions that could take place in the real laboratory (Alexiou, Bouras, Giannaka, 2005).

3. METHODOLOGY

Careful examination of reviewed literature shows that platforms available and used during transition to e-learning platform due to Covid-19 were not tailored to address the goal and objectives of the technology education.

Consequently, there is need for alternative e-learning application that will accommodate teaching and learning requirements of technological education.

We visualize the ICT-based learning scenario in technological education to include the following components: e-learning platform, subject matter, teachers, and students.

The proposed e-learning platform will use intranet/internet with embedded virtual reality technologies for practical classes. The subject matter will be decomposed into theoretical and practical, while teachers and students will be seen as major user of the system when developed and put into use.

TPACK idea will be put into consideration as modelled in Figure 1 with careful consideration of Content knowledge (CK), pedagogy (P), and technology (T).

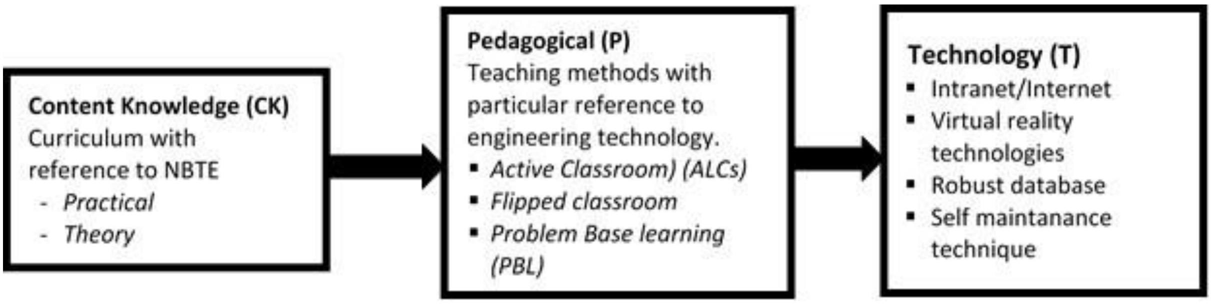

Figure 1: TPACK model of the proposed system

Integrating the TPACK model in Figure 1 with other components of the ICT-based learning scenario is illustrated in Figure 2, which gives the descriptive analysis of the proposed system.

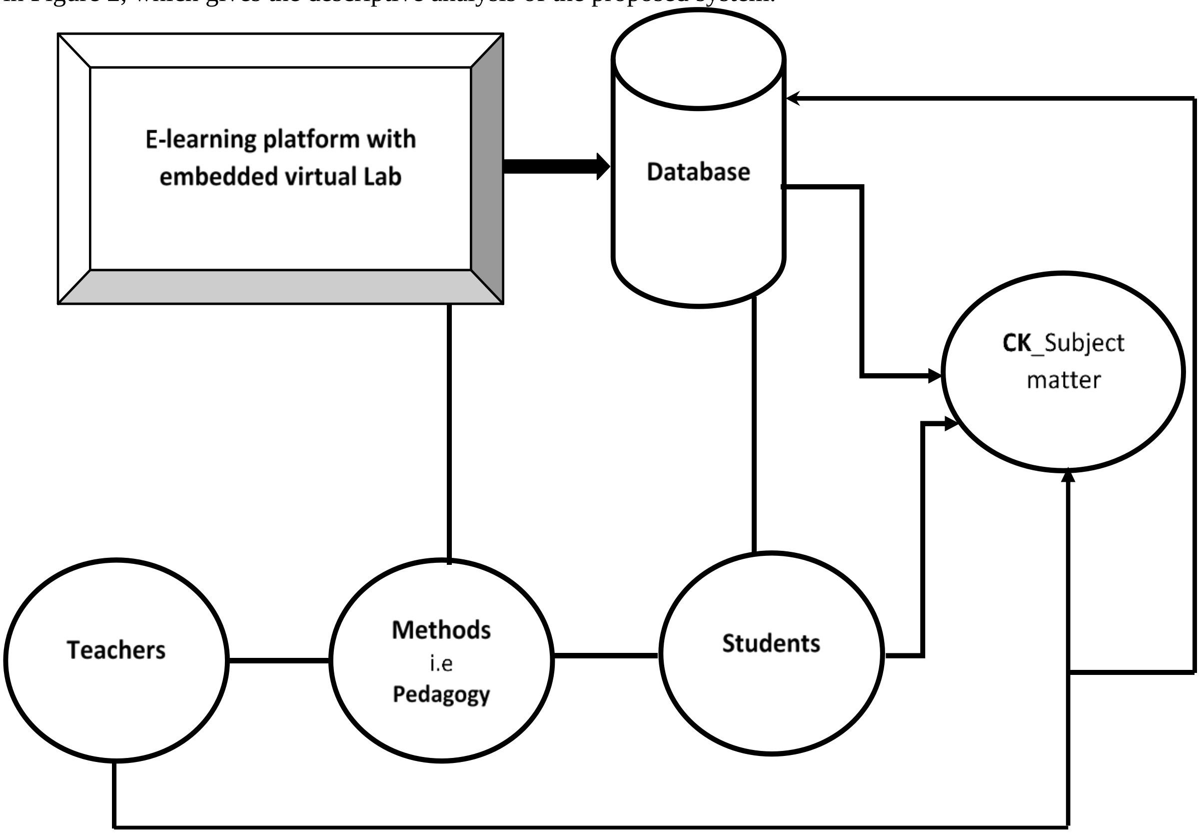

Figure 2: Descriptive Model of the proposed System

In the descriptive analysis of the proposed system, the e-learning platform with embedded Virtual Laboratory can be access through internet or extranet and it is database driven. The pedagogy (method/s) of teaching is integrated into the e-learning platform. The pedagogy is between the teachers and student, meaning that the methods can be students or teachers centered. Teachers and students relate with content knowledge through the database. The system will be program with self-maintenance routine for the system to perform self-routine checks and maintenance of the database. There will be four user agents 3 human, and 1 machine.

4. PROPOSED DESIGN IMPLEMENTATION

4.1. Role of User Agents

The implementation of the design will be done by carefully identifying the roles of each of the user agents and draw a process flowchart that will be coded using appropriate design tools.

User agent 1_administartor

1. Approve users (students and teachers)
2. Set routine checks for machine
3. Manage accounts
4. Backup database
5. Repair and maintain database

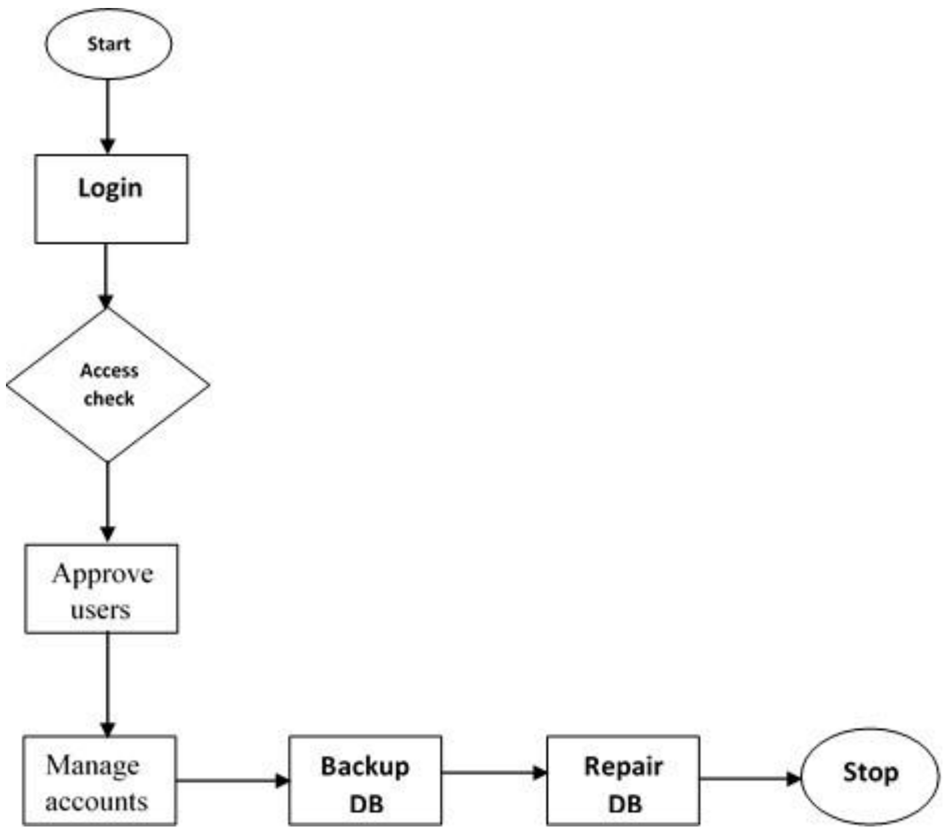

Figure 3:User agent 1_administartor

User agent 2_teachers

1. Manage students' accounts
2. Upload the courseware
3. Anchor class session
4. Generate attendance
5. Fix class
6. Respond to student post

7. Generate and post result
8. Contact administrator

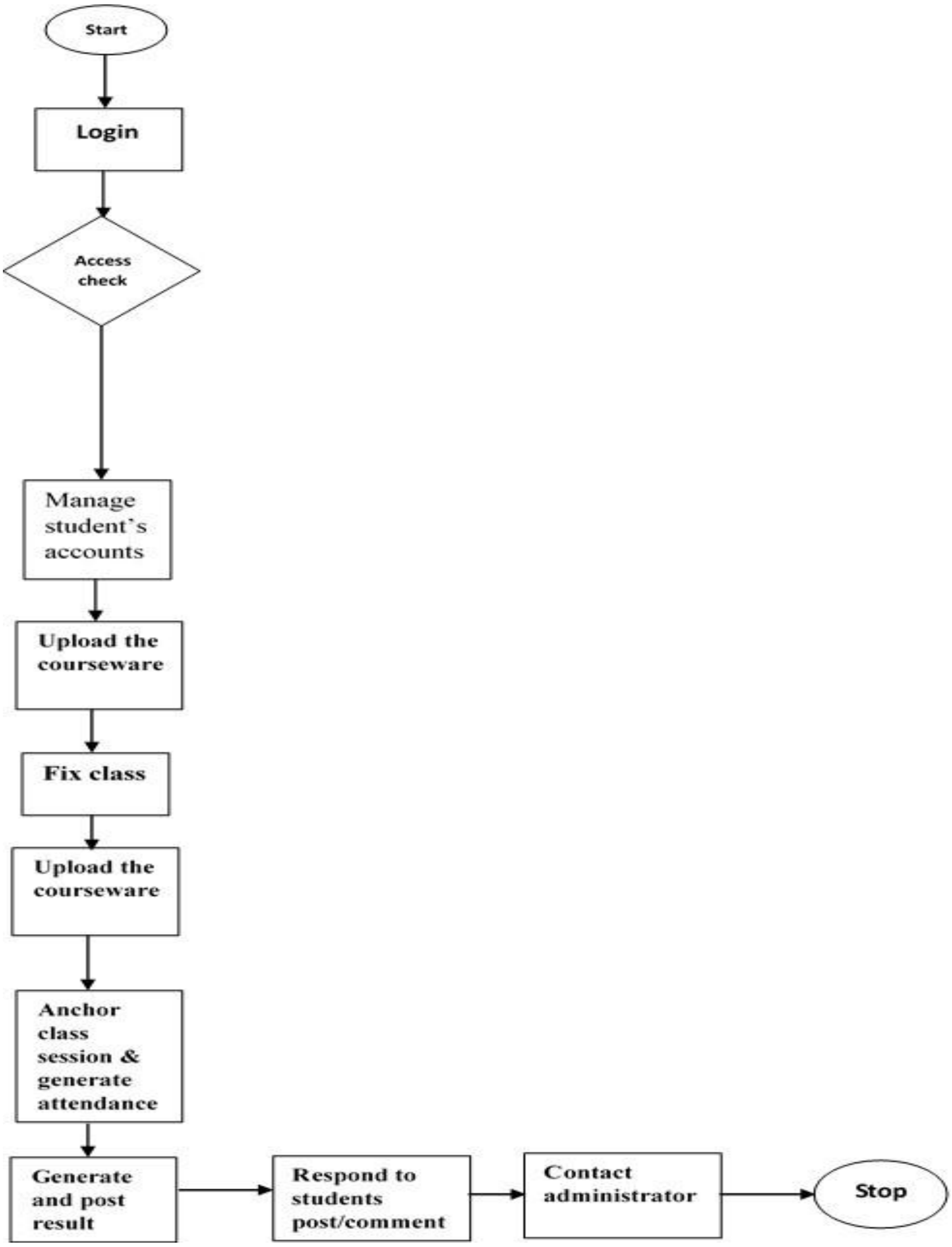

Figure 4: User agent 2_teachers

User agent 3_students

1. Join virtual class (theory or Practical)
2. Download courseware
3. Take Virtual test and examination
4. View/download results
5. Contact lecturer
6. Contact administrator

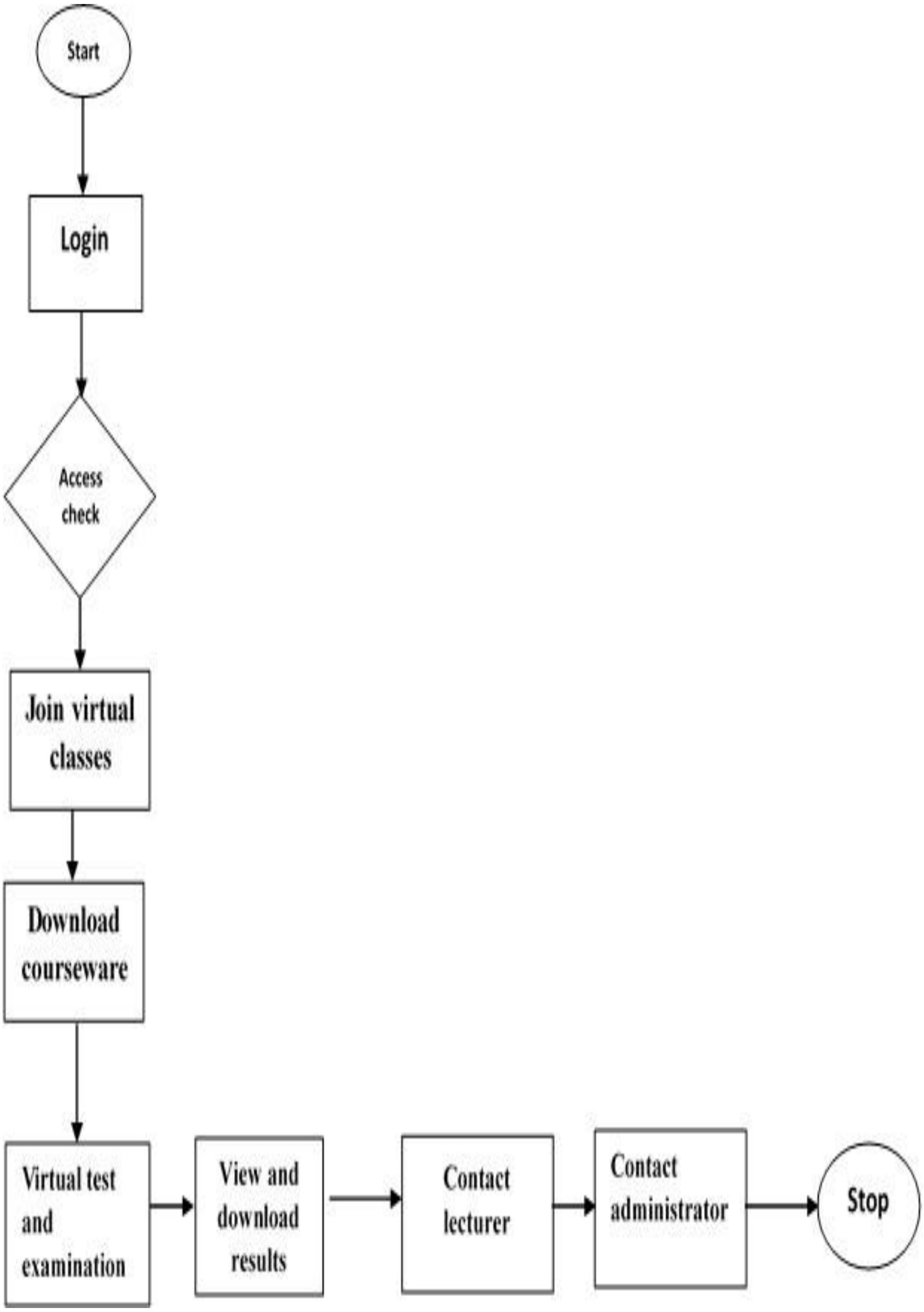

Figure 5: User agent 3_students

User agent 4_machine

Perform self-check and maintenance based on admin setting.

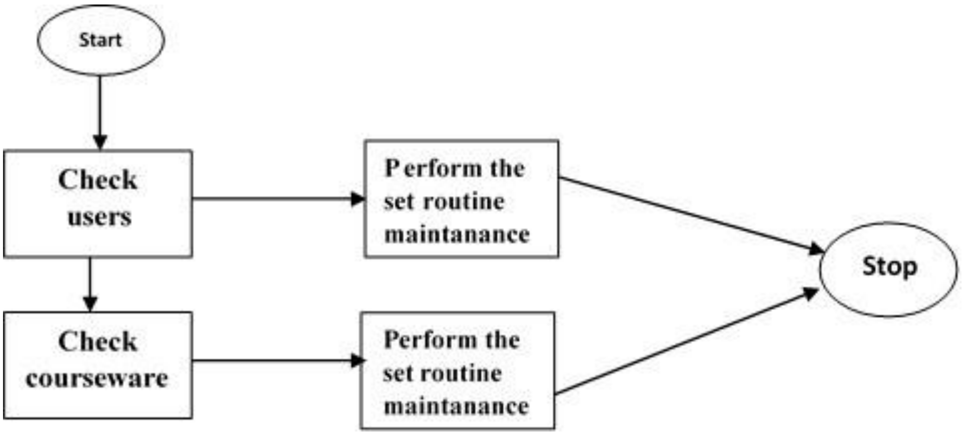

Figure 6: User agent 4_machine

4.2. Anticipated Impact of the proposed system

It is anticipated that the output of the proposed system, if developed, will go a long way to make impact in the following areas:

- support open distance learning
- facilitate e-learning in the institutions
- reduce cost of teaching and learning in technological education
- promote learning culture with the use of ICT tools and modern educational technologies
- facilitate decongestion of students in technological education and consequently reduce problems associated with over population of students in schools.

Conclusion

It is high time stakeholders in educational system synergized towards fully integrating ICT in the process of teaching and learning. The recent transition to e-learning due to covid-19 pandemic outbreak in Nigeria is a signal that e-learning in Technological Education needs to be taken seriously. The availability of the proposed system will enable e-learning in institutions using blended approach of combining face-to-face with online teaching/learning; it will also enable the students and teachers to get prepared for any emergency that may require transition to full online class. The implementation of the proposed system is anticipated to engender the following advantages: enhance teaching and learning, reduce cost of running technological education, decongestion of students in technological education, and consequently reduce problems associated with over population of students in schools. In the long run, it will enable teachers and students to seamlessly and painlessly embrace new ways of working.

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AN APPRAISAL OF THE EFFECT OF COVID 19 ON ENTREPRENEURSHIP ACTIVITIES IN NIGERIA

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Abstract

This study examines the realm of entrepreneurship in Nigeria during the lockdown arising from the covid-19 pandemic. The performance of businesses during this period has been interest to researchers, academics and policy makers. The research employed use of primary and secondary data. The data were collected using a well-structured questionnaire on demographic characteristics of the entrepreneur taking account of the impact of COVID-19 on entrepreneurs, effectiveness of service delivery during COVID-19, deployment technology, profit and finance. A total of 150 questionnaires were distributed and 117 were returned for further analysis. All the 117 questionnaires received were keyed into SPSS version 23, analysed with descriptive and inferential statistics. The paper concluded that the problem associated with entrepreneurship development during COVID-19 can be ameliorated by sincerity of policy makers in the area of programme and capital project implementation, provision of basic infrastructure, and tax reduction of imported machinery during and after COVID19 pandemic for entrepreneurs to increase production to support sustainable development.

Keywords: COVID-19; Development; Entrepreneurship; Environment; Economy; Nigeria

Introduction

The outbreak of coronavirus known as COVID-19 posed a serious challenge to businesses all over the world and by extension to Nigeria. The pandemic was first discovered towards the end of 2019 in Wuham, China before spreading to other countries at early 2020. The measures to further curb the spread of coronavirus were put in place by various government and organisations in form of lockdown, social distancing, and restriction on both national and international travelling. This curtailed the gathering and movement of people from one place to the other thereby having an adverse impact on the economy. Mostly affected by these measures were budding private enterprises. Nigeria being a monolithic economy depends largely on oil exportation; therefore, the absence of demand for oil translates to loss of revenue as a result of decline in prices worldwide.

In the wake of COVID 19 in Nigeria, the lockdown and restriction of movement was total, cutting off all forms of physical contact save for those classified as essential service providers. Hence for the entrepreneurs who were not classified as essential service bracket business transactions were practically impossible, this translated to outright loss or decline in income. In the face of this quagmire, the other option available was the migration to online operations, which may not practicable considering the cost and the lack hi-tech infrastructures in many communities in developing countries such as Nigeria. The capacity of small scale enterprises to survive and sustain their business during this period of pandemic is a major challenge to stakeholders.

The population and the volume of economic activities determine the development of any nation. This increased activities that promotes growth, and evaluated by the rate of investment within the nation and the level of productivity from both private and public investors. Entrepreneurship development play a vital role in a nation's economy, the development globally dictates that government cannot solely own manufacturing industries within the country (Afolabi, 2015). There is need for private sector to actively participate to accelerate economic development to march population growth. The survival of any country depends on the entrepreneurship strategies employed for their survival to function effectively. This is because it helps create avenue for small scale industries to support economic growth, increase in level of employment also adding to number of tax payers to increase nation income to provide infrastructure for entire population.

A direct consequence of the impact COVID 19 on entrepreneurship in Nigeria is that it amplified the several years of failure by government to promote indigenous innovation, most of the strategies applicable in development of businesses focuses more on the foreign enterprises rather than looking inward to indigenous ideas to develop the nation's economy. The entrepreneurship development depends on the quality of the legal structure, the creation of an enabling environment conducive for indigenous small scale business to thrive and a system that supports creativity, diversity, tolerance and continuous innovativeness (Borozan, 2007). Entrepreneurship environment with a nation is a factor to achieve economic development through involvement of small and medium scale enterprises. The importance is well renowned in the area of economic growth and development, employment generation and strategies to develop industries. Entrepreneurship is a way to increase human development to drive the business for both nation development and increase in the living condition. The aim of this paper is to Appraise Entrepreneurship in Nigeria During COVID-19 with following objectives; assessing the impact the pandemic on service delivery, technology deployment, profit and finance in Yewa South Local Government Area of Ogun State.

Literature Review

Entrepreneurship and COVID-19 Pandemic

Entrepreneurship is the process of starting a business, either manufacturing or other activities, it involves innovative process that produce distinct creativity. The concept of entrepreneurship can be described as the activities associated with establishment and operation of business in form of large and small scales enterprises. Many financial systems are facing economic challenges due to advent of coronavirus, Nigeria as a nation is not exempted from its effect, setting it several years back on its economic growth pole. The challenges posed by the pandemic require stringent measure to alleviate the menace but implications have much effect on the individuals. There is increases in demand on available goods and services because the lockdown has affected further production. The small scale enterprises which depends on daily sales find it difficult to meet up due to the lockdown
Since entrepreneurship development is directed to a process of supporting and encouraging people to become entrepreneurs the priority of the government must be to formulate and implement strategies in order to enhance the economic prosperity of the nation (Borozan, 2007). Udefuna and Uzodinma (2017) studied entrepreneurship in Nigeria from the strategic perspective of policy and governance, and concluded that, the development of entrepreneurship within a particular nation depends on the availability of strong institutions and financial aids, they further opined that, the federal government of Nigeria had constituted various policies and programmes to provide solutions to challenges affecting entrepreneurship in the country.

Problems of entrepreneurship development and the COVID-19 pandemic

The pandemic is still with us in developing countries including Nigeria, the level of facilities and vaccine development is low, the rate of contact in high. Presently in Nigeria the total there are 330 ICU facilities, including 30 in Lagos. The Nigeria Centre for Disease Control (NCDC) currently has five testing centres and treatment centres designated for COVID-19. An isolation facility in Lagos is equipped with 100 beds but the capacity outside Lagos is very limited. Based on the recent assessment of eight treatment centres by World Health Organisation, a majority are not well equipped and the capacity to respond is particularly weak in the Northern part of the country (UNDP, 2020). The level of preparedness is low, the available facilities is not adequate compare to the present population, therefore, the country have a long way in meeting the standard requires in combating the pandemic, this long way pose challenges to entrepreneurship environment.

Challenges faced by entrepreneur's in Nigeria is critical, also need be complemented by a time bound action plan for each of the stakeholders that can foster entrepreneurship. Entrepreneurship balance the human capital that Nigeria is endowed with and empowers more people to participate in discovering Nigeria's resources (Okeke and Eme, 2014; Ofili, 2014; Ikeije and Onuba, 2015).). Agu and Ayogu (2015) and Diyoke (2014) assessed the prospect and challenges of entrepreneurship environment in Nigeria, the study reveals that multiple tax and levies, lack of fund, insufficient expertise, insecurity within the country recently especially Borno and Southern Kaduna scare investors. Additionally, poor investment decision and insufficient modern technology are major problems affecting entrepreneurs in achieving their goal. Osemeke (2012) assessed the agencies responsible for promoting entrepreneurship in Nigeria and the study revealed that majority of the institutions and agencies established by the federal government to ensure adequate entrepreneurial development skills are facing challenges ranging from insufficient start-up loans, delays in loan disbursement, and loan diversion by participants, poor loan repayment performance and lack of requisite skills among the beneficiaries to utilised the purpose of the loan are major problems ravaging the agencies and entrepreneurship environment.

An evaluation of entrepreneurship policy is usually qualitative rather than quantitative, and regular changes in programmes have negative effects on the existing prosperity of entrepreneurship strategy to provide a conducive environment for the intervention. (Naudé, 2013). This also affected by inadequacy of data from the government to effect programmes and policies for small and medium scales enterprises. Ignorance and low standard of education also contributed to entrepreneurship development (Okeke and Eme, 2014). Entrepreneurship growth and development suffers from inadequate education, Training and workshops and seminar in Nigeria, the challenges related to accessibility to both local and international markets for optimum disposal of finished goods, changes in government policies and programmes which is not stable has it effects on development of small scale businesses and lack of planning and management of available resources and problem of packaging of finished goods which has been major setback for goods export to developed countries.

Relevance of Entrepreneurship Environment in Nigeria During COVID-19

The population is increasing but level of employment is low. In the past years, high level of entrepreneurship has increases the economic activities in the nation. The concept of entrepreneurship is poorly understood by majority of the people, the perception of people is not just engage in a business for daily activities rather involving in innovative strategy to solve problem of employment and creating value that will enrich the society. Entrepreneurship is the process of engaging in a business and accommodate all the risk involve to make a profits to sustained the existence. The importance cannot be ignored; it plays a bigger role in economic development.

It helps in employment generation, development of small and medium-sized enterprises, increase in gross domestic product and per capita income, wealth creation distribution, improve standard of living. Abdul-kemi (2014) investigated entrepreneurship and economic development through small and medium scale enterprises in Nigeria, the study concluded that commercial and micro finance bank financing of SMEs within the country is significant in influencing entrepreneurship and economic development of Nigeria. Entrepreneurship environment in Nigeria requires formidable strategies from all sectors to enhance economic growth and development. The entrepreneurship activities contribute to the economic and social development aiding job opportunities within the country (Durowoju, 2014). Entrepreneurship development in Nigeria has gone beyond buying and selling approach, it now involves multidimensional approach that cut across all facet of economy that influences the environment.

Study area and Research methodology

The study was carried out among entrepreneurs in Yewa South Local Government Area of Ogun State., it covered Ilaro, Owode, and Oja-Odan, within the local government, the towns were purposely picked as the largest towns with the highest population. They also have high volumes of socio-economic activity. The vocations considered were bead making and wire works, block and interlocking making, catering services, shoe and bag making and soap making. Data were collected with well-structured questionnaires on demographic characteristics of the entrepreneur, COVID-19 impact on entrepreneurs and rate of service delivery during COVID-19, technology deployment, profit and finance. Out of 150 questionnaires distributed, only 117 were good for further analysis because majority of the respondents did not fill the questionnaire appropriately. However, the 117 questionnaires were keyed into SPSS version 23 and was analysed with descriptive statistics and inferential statistics (correlation and regression analysis).

Interpretations and findings

Table 1: Demographic information of the respondents

Variable	**Responses (%)**
Gender	
Male	56(52.3%)
Female	51(47.7%)
Age Group	
20 below	-
21 – 30	24(22.4%)
31 – 40	35(32.7%)
Above 40	48(44.9%)

Marital Status	
Single	39(36.4%)
Married	68(63.6%)
Divorced	-
Widow	-
Educational Level	
WAEC/NECO/WASSCE	-
OND/A LEVEL/NCE	26(24.3%)
HND/B.Sc./BA	35(32.7%)
PGD/MSc/PhD	46(43%)

Source; SPSS Output

The result of the findings as presented in Table 1 indicates that majority of the respondents were male (52.3%) and 40 years above. In addition, majority of the participants were married entrepreneurs (63.6%). Lastly, most of the respondents have postgraduate certificates (43%). This indicates that target population was captured for better understanding of the research.

Table 2: Correlation Coefficient table

		PI	SD	TD	PFT	FNC
PI	Pearson Correlation	1	-.393**	.384**	-.324	.491**
	Sig. (2-tailed)		.000	.000	.803	.000
	N	107	107	107	107	107
SD	Pearson Correlation	.393**	1	.983**	.038	.563**
	Sig. (2-tailed)	.000		.000	.696	.000
	N	107	107	107	107	107
TD	Pearson Correlation	.384**	.983**	1	.014	.548**
	Sig. (2-tailed)	.000	.000		.886	.000
	N	107	107	107	107	107
PFT	Pearson Correlation	. 324	.038	.014	1	.271**
	Sig. (2-tailed)	.803	.696	.886		.005
	N	107	107	107	107	107
FNC	Pearson Correlation	.491**	.563**	.548**	.271**	1
	Sig. (2-tailed)	.000	.000	.000	.005	
	N	107	107	107	107	107

**. Correlation is significant at the 0.01 level (2-tailed), PI - COVID-19 Pandemic Impact, SD - Service Delivery, TD – Technology Deployment, PFT – Profit, FNC – Finance

Table 2 shows the correlation coefficient of variables, it further revealed that, there is a weak positive and significant relationship between pandemic impact and technology deployment (r=0.384, p-value= 0.000) and finance (r=0.491, p-value= 0.000). This shows that as the lockdown continues during the COVID-19 Pandemic, the entrepreneurs could not meet market demand for their products as only few numbers of employees were present at work and supply of raw materials was scarce. Moreover, the entrepreneurs spent much on the few source of raw materials and much extra cost in staff welfare during COVID-19 pandemic. However, there was negative impact of the pandemic on service delivery (r=-0.393, p-value =0.000) and profit (r=-0.024, p-value= 0.803). However, only service delivery felt significant negative relationship with COVID-19 Pandemic. Inadequacy of material also contributed to the shortage due irregularities in transportation and unavailable of raw materials.

Table 3: Model Summary table

Model	R	R-square	Adjusted R-square	Standard error of the Estimate	F-value	Sig.
1.	0.393	0.154	0.146	2.57209	19.163	0.000
2.	0.384	0.146	0.139	2.59800	18.181	0.000
3.	-0.324	0.104	0.102	2.43109	0.062	0.803
4.	0.491	0.241	0.233	1.74929	33.287	0.000

Source; SPSS Output

Table 3 shows the model summary for the analysis indicating that all the models derived were significant except for model 3 with p-value (0.803) > 5% significance level.

Table 4: Coefficients Table

	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
Service Delivery	Constant	9.130	1.337		6.831	0.000
	Pandemic Impact	-0.410	-0.094	0.393	-4.378	0.000
Technology Deployment	Constant	9.223	1.350		6.832	0.000
	Pandemic Impact	0.403	0.095	0.384	4.254	0.000
Profit	Constant	9.580	0.951		10.068	0.000
	Pandemic Impact	-0.017	-0.067	0.024	-0.250	0.803
Finance	Constant	8.081	0.909		8.890	0.000
	Pandemic Impact	0.367	0.064	0.491	5.770	0.000

Source; SPSS Output

The coefficient table shows the model parameters for the impact of pandemic on service delivery, technology deployment, profit and finance to be, -0.410, 0.403, -0.017 and 0.367. This result is an indication that as the pandemic escalates; there is 41% reduction in service delivery, 40.3% increase in technology deployment, 1.7% reduction in profit and 36.7% increase in finance. However, except for profit (p-value=0.803), pandemic impact was significant on other variables with p-values less than significance level of 5%. Furthermore, the impact of the pandemic was felt mostly in-service delivery followed by technology deployment and the least effect was felt in finance.

The way forward in Entrepreneurship development in Nigeria

Entrepreneurship development within a nation needs entrepreneurs with self-confidence, courage, determination freedom, discipline and strategies for adequate implementation of ideas. These qualities are very germane to nation development and also provide rapid industrialization, self-employment, economic growth and development, providing opportunities and development of social amenities. In Nigeria, most of the programmes for entrepreneurship development are not getting to the beneficiaries, also larger percent are repeating of policies that affect the entrepreneurship environment. The programmes should not be based on the premises of political factor, rather, than focus of the main goal of establishment. Therefore, Policy makers needs to address the various policies and strategies to improve small and large scale industries to reduce unemployment in Nigeria (Anyadike, Emeh and Ukah, 2012; Durowoju, 2014). Okeke and Eme (2014) investigated the major challenges facing entrepreneurs in Nigeria, therefore concluded that there is need for adequate analysis of the main challenges usually encounter by entrepreneurs and should be complemented by a time bound action plan for each of the stakeholders that can foster entrepreneurship development within the nation. UNDP (2020) concluded that, post-COVID-19 recovery strategies need to re-establish to better the conditions of entrepreneurship environment to speed up economic growth, improved social contract, and overall human development that can foster more inclusive societies in the future.

Conclusion and Recommendations

The challenges associated with entrepreneurship environment during COVID-19 need to be addressed with all available strategies by policy makers to introduce programmes that will reduce the impact on the economy development. There is need for government to provide conducive environment for entrepreneurship growth through their policies and programmes and urgently address dilapidated conditions of existing and non-available infrastructure to attract more investors to participate and to influence economic turnaround within the country. The impact of the pandemic manifest in every sphere of human life especially the economy, therefore, there should be recovery approaches to revive functioning entrepreneurship environment. The policy makers should affect the strategies towards tax waiver for the particular period experiencing the pandemic to enhance the efficiency and effectiveness performance of small and large industries.
The government needs to help enterprises with necessaries incentives to sustain their organisations and avoid loss of job. This is to reduce the impact on various households.

The outbreak of the pandemic is a big challenge to Nigerian government, it shows that there is need to look inward to other natural resources or agricultural produce to reduce burden on oil export, it increase the impact of COVID-19 in the country, due to falling in price of oil globally. The study also recommends that, government should revisit the country health sector to provide necessary equipment and vaccines to reduce the effect on the total populace.

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DISINFORMATION AND PROPAGANDA ELEMENTS IN HERBAL PRODUCT PROMOTIONS IN NIGERIA

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Abstract

This study assessed the disinformation and propaganda elements in herbal product promotions in Nigeria. The major objectives were to identify the disinformation elements in herbal promotional campaigns; find out the extent to which herbal promoters adopt propaganda tools in their promotional campaigns; and establish the level at which the herbal promoters adhere to professional advertising ethics. Research questions were structured accordingly. The study was hinged on the assumptions of propaganda theory. Content analysis was adopted as research design while herbal products in Southwest Nigeria served as population of study from which ten (10) were purposively selected base on their popularity. Findings showed that the extent of disinformation (deception) in Nigeria herbal products promotion was very high. Puffery, False promises, sexual insinuation, open comparatives were the major disinformation elements found in the promotional campaigns. Propaganda was also in high adoption. Product promoters hid some products facts (side effects and exceptions) while they pronounced the product benefits as "good for all". The promotional campaigns were devoid of advertising ethical adherence and largely flount regulations. Hence, the study concluded that the products promotions were shrouded in propaganda mists and are equally deviant of professional advertising codes.

Keywords*: Propaganda, Disinformation, Herbal Products, Promotional Campaign*

Introduction

The huge success of alternative health practitioners in Nigeria (especially those into herbal products) have drawn the attention of notable communication scholars in the past few decades (Akinfeleye, 2010). According to Ransome-Kuti, much of the success of these herbal products promoters were attributable to media promotions rather than the efficacy of the drugs. (Ransome-Kuti, 2010).

Perhaps the reason for such success lay in the fact that much of herbal medical practices in Nigeria are done in secrecy. People who used herbs would hardly openly admit that they used them. Many would prefer would prefer to go to the herbalist in the night and some others would not readily attribute their successful ailments to the efficacy of herbs.

The promotional efforts of some herbal medicine practitioners from the early 1990s changed this perspective. Manufacturers of herbs such as YemKem International (Lagos) and Defayus (also known as 'OkoOloyun' (Lagos/Ibadan) not only repackaged their products to stand shoulder-to-shoulder with those manufactured by western/orthodox medical practitioners, they also embarked on aggressive communication campaigns on TV, radio, newspapers, magazines and billboards. Gradually, the media helped to pull herbal drugs from the "taboo" status.

However, a cursory examination of the promotional messages of many of the herbal products show little bits of exaggeration to unsubstantiated claims to outright falsehood. Scientists, for instance, doubt if a single tablet can solve up to seven unrelated ailments which some of the herbal products promotions claim to be able to do.

Considering the fact that these herbal drugs manufacturers may not be very well educated, it is doubtful if they engaged in the professional services of marketing communications experts in designing and implementing their promotional campaigns.

This study aims at finding the extent to which herbal products promoters comply with the advertising ethics in promoting their products. Specifically, the researchers seek to establish the extent to which they engaged in disinformation and propaganda in the dissemination of their communication messages.

While propaganda is regarded as deliberate intention to mislead and manipulate, disinformation is used to describe the situation in which the communicator spreads non-deliberately information that is false or partly false. In the latter case, the intention of the communicator is not to mislead or manipulate. Thus, noise in the channel and lack of proper investigation can make a journalist to propagate disinformation.

Study Objectives

1. To identify the disinformation elements in herbal promotional campaigns
2. To find out the extent to which herbal promoters adopt propaganda tools in their promotional campaigns
3. To establish the level at which the herbal promoters adhere to professional advertising ethics.

Research Questions

1. What are the disinformation elements in herbal promotional campaigns in Nigeria?
2. To what extent to do herbal products promoters adopt propaganda tools in their promotional campaigns?
3. To what extent do promoters of herbal products adhere to professional advertising ethics?

Theoretical Framework

Jowett and O'Donnell, (1979) defines propaganda as the deliberate and systematic attempt to shape perceptions, manipulate cognitions and direct behaviour to achieve a response that furthers the desired intent of the propagandist.

Modern propaganda is loosely used to distinguish it from other forms of communication such that propaganda is seen as any conscious and deliberate attempt to influence group attitude. In this regard, almost any attempt to sway public opinion, including lobbying, commercial advertising, and missionary work, can be broadly construed as propaganda. In communication scholarship, however, the term is restricted to the manipulation of political beliefs. Although allusions to propaganda can be found in ancient writings (e.g., Aristotle's Rhetoric), the organized use of propaganda did not develop until after the Industrial Revolution, when modern instruments of communication first enabled propagandists to easily reach mass audiences.

Propaganda also refers organized communication to propagate specific beliefs and expectations. It is the no-holds-barred use of communication to change the way people act and to leave them believing that those actions are voluntary; that the newly adopted behaviours and the opinions underlying them are their own, (Baran and Davis, 2003).

When persuasion becomes deceptive, frightening, unscrupulous and false, it becomes BLACK PROPAGANDA (McQuail, 2004). In its true form, black propaganda is 'deliberate and strategic transmission of lies' (Baran and Davis, 2003), usually against the interest of the receiver but in favour of the source.

Propaganda dates back to 1622, when the Roman Catholic Church set up the sacra congregatio de propaganda fide. It was the branch of the Church responsible for propagating the faith. In this original meaning, propaganda, though truthful, was also covert it persuaded people without seeming to do so and its soul objective was to convert the target audience.

Modern study of propaganda dates from A. Lawrence Lowell's Public Opinion and Popular Government (1913) and Walter Lippman's classic work, Public Opinion (1922). Political leaders in the 1930s and 1940s employed the technique so masterfully that it was widely accepted belief that the media, more than the barrel of the gun, was most vital in warfare in the period. They discovered that political conquest and domination was possible once one could understand and manipulate public opinion (not necessarily influencing public opinion).

What gave the term negative connotation (hence black propaganda) more than anything else was the application of the term to wars and abnormal situations. As Oladimeji (1988) points out, wars are “a matter of life and death” and any means of winning is pursued with vigour. Manipulation, deceit, falsehood and concealed motives proved more lethal than bullets in weakening the morale of soldiers and the populace. There were recorded efforts of the dominant factors in the Greek and Italian city-states to win their political battles by influencing foreigners sympathetic to their political philosophies.

Some key factors that distinguish propaganda from other communication techniques are:

1. It is carried out in the interest of the source or sender, not the recipient.
2. It is usually planned (from inception, codification of messages and dissemination) and does not occur accidentally.
3. In practice, it has little regard for ethical considerations.
4. Its most effective variable is the 'context and disposition of the target audience', rather than the ' message' characteristics.

Most propaganda theories that developed during the 1930s were strongly influenced by theories by theories of behaviourism and Freudianism at the time. Baran and Davis, (2003). While behaviourism suggests that all human action is a conditioned response. Freudiasm states that human being the product of the conflict between and individual's 'Id' (dark side of the self) of the methodology.

As pointed out earlier, black propaganda is systematically and deliberately plotted and implemented. Scholars have been able to articulate methodologies used in propaganda over the years. One of them, the PASID Formula by Lowestein and Merrill (1990:24) is adapted below as MASID (as it applies to black propaganda.)

THE MASID FORMULA

'MANIPULATION'

We have substituted Lowestein& Merrill's P- ('Persuasion') with 'M' Manipulation here. Black propaganda covertly converts its audience, often through discreet and selective use of truth and untruth; hence we cannot accurately call it persuasion. It is more of manipulation. S/he manipulates, confuses and even distorts the audience's reflective thoughts and beliefs and replaces them with his/her own ready-made thoughts and beliefs. This is cleverly and deceitfully done, hence it is, in real sense, not persuasion.

'ACTION ORIENTED'

The black propagandist wants his/her audience to take an action. Often, the action comes as a natural consequence and it is not directly suggested. For instance, the United States recently printed free posters of former Iraq dictator, Saddam Hussein being dug out of hole. This is a propaganda ploy to get the Iraqi soldiers and civilians to support its invasion of that country. Herein lies the efficacy of black propaganda: making people take actions that seem their own original initiative.

'SELFISH'

Most times, black propaganda contains some truth and very rarely does it contain wholly false information. The 'little truth; is the steam that powers the turbine of the propaganda network. For example, the resignation letter signed by former Anambra State governor, Chris Ngige that was aired on television was true to the extent that he wrote and signed it. The hidden untruth was that it was signed under duress and before he assumed office. The propagandist, for his selfish interests, concealed this latter part.

'INTENTIONAL'

The message and delivery are planned, predetermined and created systematically in order to bring about the desired results.

'DECEPTIVE'

Black propaganda is totally deceptive. This is one quality that sets it apart from 'White' and 'Gray' propaganda. The overall aim of black propaganda is to seduce, trick, coerce, even blackmail, although it tends to assume that progressive order: if seduction fails, it tricks; if trickery fails to deliver, it coerces; and when coercion fails, it resorts to blackmail.

According to Lasswell (1972), the power of propaganda was not so much the result of the substance or appeal of specific messages but rather, the result of vulnerable state of mind of average people

General Definitions of White, Black & Grey Propaganda:

What classifies propaganda, as black, white and grey are the intent, intensity and method/style of the propagandist.

When persuasion becomes deceptive, frightening, unscrupulous and false, it becomes BLACK PROPAGANDA (McQuail, 2010). When the propagandist truthfully states its origin and uses more gentle methods of persuasion such as standard public relations and advertising techniques in presenting his one-sided argument, it is WHITE PROPAGANDA.. When propaganda comes from an adversarial source pretending to be friendly or neutral and presents misleading information in a more insidious manner, it is GREY PROPAGANDA. (Lamprecht, 2002).

According to Lamprecht (2002), "white" propaganda is the propaganda of the truth. This is when putting out the truth serves somebody's purpose. Generally speaking, this is the type of propaganda the Western world has practised mostly. It is actually a very powerful form of propaganda. By simply putting out the full facts of a story one can hurt the opposition. However, in the real world, both sides play this game. Then there is "black" propaganda, which is the propaganda of the lie. As a rule, this is the most difficult propaganda to practise. However, the Russians are probably the ones most practised at playing this. Then there is "grey" propaganda, which is a mixture of the truth with carefully selected lies. At its finest, grey propaganda works like this. You disseminate a story, which contains verifiable facts. Then you weave into it credible sounding lies which the opposition can't verify. Those reading or hearing it tend to believe it because they can verify part of the story. So then they believe the part, which they can't verify. Grey propaganda has considerable usefulness in the world and is used by everyone.

Propaganda was originally white. When negative connotations and lies infiltrated the system, especially as necessitated by the war years, the white turned black. Modern communication and rhetoric have made brazen lies and misleading communication unethical and distasteful (especially in peace time) hence we often have a mixture of white and black, which is what grey propaganda is all about, as shown the matrix below:

Table 1: Kinds and Techniques of Propaganda

Propaganda method	**White Propaganda**	**Black Propaganda**	**Grey Propaganda**
Message	More truth; sometimes total true	False; hardly true	Mixture of truth and untruth
Source	Stated	Hidden	May or may not be disclosed
Presentation format	Only the side of the propagandists is presented	Both sides are presented from the side of the propagandist	Both sides are presented from the side of the propagandist
Intent	To persuade	To deceive	To manipulate
Vehicles	Media/political institutions owned by the propagandist	Any media institution the propagandists can lay hands on	Highly-organized and coordinated institutions/media owned by the propagandist.

Source: Folayan, B.J. (2019). An introduction to communication theories. Lagos: LASU Publishers (in press).

Akinfeleye, (2010) lists the following communication techniques and tools for effective use of the media to promote healthy living:

1. Use of same and/or familiar language
2. Use of local examples
3. Relating messages to the prevailing cultural outlook of the society to be mobilized'
4. Being credible and usage of credible sources for the message
5. Being brief, accurate, coherent, concise, clear and simple
6. Avoiding information overload

7. Avoiding information underload'
8. Use of inter-sectarian approach
9. Avoiding misinformation
10. Avoiding over-mobilisation
11. Use of drama
12. Use of family

Methodology

The quantitative approach will be adopted for this investigation, using the Content Analysis Method. Twenty advertisements of herbal products on TV, radio, billboard, newspapers and product packs would be randomly selected for content analyses. For each product, the following content categories:

- Name of product
- Healing claims of the product
- Message source (hidden or indicated)
- Presentation format
- Intent (to manipulate, deceive or inform?)
- Graphics and illustration
- General packaging

Findings from the content analysis would be analyzed qualitatively along with their content discovery.

DATA ANALYSIS AND DISCUSSION OF FINDINGS

RQ1: What are the disinformation elements in herbal promotional campaigns?
Table 1: Herbal Product Appearances and Disinformation Elements

	Product name	Product Claim	Disinformation elements
1	FIJK	Body cleanser/ All rounder	False product claim
2	Super Bitters	Sexual stimulant	Open comparative
3	Sexy Megato	Sexual stimulant	Offensive
4	Blood of jesus	Cure for various ailment	False promise, Distasteful
5	Mokole	Sexual stimulant	Sexual insinuation
6	Xtra Large Size	Penile energy	False promises
7	Great Tonic	Blood purifier	Puffery
8	Pakurumo	Energy booster, Sexual stimulant	Preempting a product claim
9	Alomo Bitters	Sexual stimulant	False product claim
10	Yoyo Cleanser Bitters	Body cleanser	Puffery

Source: Content analysis, 2019.

In the table above, ten different herbal products were content analyzed. The analysis was done along the product claim, brand suggestions, promotional campaigns, promotional strategies and deceptive (disinformation elements). The ten herbal products include: FIJK, Super Bitters, Sexy Megato, Blood of jesus, Mokole, Xtra Large Size, Great Tonic, Pakurumo, Alomo Bitters, Yoyo Cleanser. All the products have one or two products claim. FIJK claim to be a body cleanser and a solution to myriads of health challenges. This is called "gbogbonise in the local parlance- meaning multi-functional. Super bitters claimed to be enhancing sexual performance. Sexy megato claimed to boost sexual energy, Blood of jesus claimed to be a cure for various ailment; mokole claimed to be a sexual stimulant; Xtra Large Size claimed to be boosting penile energy, and size, Great tonic claimed to be blood purifier, Pakurumo claimed to be boosting sexual energy, Alomo Bitters claimed to be giving sexual appetite, while Yoyo Bitters claimed to be a body cleanser and all rounder (gbogbonise) performance.

RQ2: To what extent do herbal products promoters adopt propaganda tools in their promotional campaigns?

Table 2: Herbal Product and Propaganda Elements (Message)

	Product name	Product Claim	Message	Propaganda type
1	FIJK	Body cleanser/ All rounder	False; hardly true	Black propaganda
2	Super Bitters	Sexual stimulant	Mixture of truth and untruth	Grey propaganda
3	Sexy Megato	Sexual stimulant	Mixture of truth and untruth	Grey propaganda
4	Blood of jesus	Cure for various ailment	False; hardly true	Black propaganda
5	Mokole	Sexual stimulant	Mixture of truth and untruth	Grey propaganda
6	Xtra Large Size	Penile energy	False; hardly true	Black propaganda
7	Great Tonic	Blood purifier	False; hardly true	Black propaganda
8	Pakurumo	Energy booster, Sexual stimulant	Mixture of truth and untruth	Grey propaganda
9	Alomo Bitters	Sexual stimulant	Mixture of truth and untruth	Grey propaganda
10	Yoyo Cleanser Bitters	Body cleanser	Mixture of truth and untruth	Grey propaganda

Source: Content analysis, 2019.

In the table above, analysis was done along the propaganda content in terms of messages presented to the public, promotional campaigns and promotional strategies. FIJK was found to have adopted black propaganda, claiming to be an all rounder cure for tens of. Super bitters' messages was found to be grey propaganda. Sexy megato' messages was found to be grey propaganda; Blood of jesus' message was found to black propaganda also claiming to be a cure for many ailment; mokole' message was found to be grey propaganda; Xtra Large Size was found to be black propaganda claiming to be a molder of penis sizes; Great tonic was found to be black propaganda, Pakurumo was found to be grey propaganda in its claim to boost sexual energy, Alomo Bitters was found to be grey propaganda while Yoyo Bitters was also found to be grey propaganda.

Table 3: Herbal Product and Propaganda Elements (Source)

	Product name	Product Claim	Source	Propaganda type
1	FIJK	Body cleanser/ All rounder	Stated	White propaganda
2	Super Bitters	Sexual stimulant	Stated	White propaganda
3	Sexy Megato	Sexual stimulant	Stated	White propaganda
4	Blood of jesus	Cure for various ailment	Stated	White propaganda
5	Mokole	Sexual stimulant	Stated	White propaganda
6	Xtra Large Size	Penile energy	Stated	White propaganda
7	Great Tonic	Blood purifier	Hidden	Black propaganda
8	Pakurumo	Energy booster, Sexual stimulant	Stated	White propaganda
9	Alomo Bitters	Sexual stimulant	Stated	White propaganda
10	Yoyo Cleanser Bitters	Body cleanser	Stated	White propaganda

Source: Content analysis, 2019.

In the table above, analysis was done along the propaganda content in terms of source disclosure; all the herbal products disclosed their message sponsor identity, except for "Blood of jesus' whose source was hidden.

Table 4: Herbal Product and Propaganda Elements (Presentation)

	Product name	Product Claim	Presentation	Propaganda type
1	FIJK	Body cleanser/ All rounder	No side effect stated-	Black propaganda
2	Super Bitters	Sexual stimulant	No side effect stated-	Black propaganda
3	Sexy Megato	Sexual stimulant	No side effect stated-	Black propaganda
4	Blood of jesus	Cure for various ailment	No side effect stated-	Black propaganda
5	Mokole	Sexual stimulant	No side effect stated-	Black propaganda
6	Xtra Large Size	Penile energy	No side effect stated-	Black propaganda
7	Great Tonic	Blood purifier	No side effect stated-	Black propaganda
8	Pakurumo	Energy booster, Sexual stimulant	No side effect stated-	Black propaganda
9	Alomo Bitters	Sexual stimulant	No side effect stated-	Black propaganda
10	Yoyo Cleanser Bitters	Body cleanser	No side effect stated-	Black propaganda

Source: Content analysis, 2019.

In the table above, analysis was done along the propaganda content in terms of presentation of facts about the herbal products. All the herbal products were found to be practicing black propaganda as they fail to present the side effects and the exceptions of their products claim. They presented their messages with ultimate goal of leading the consumer to buy without respect for the understanding of the consumer in terms of products content, user exceptions and side effects.

Table 5: Herbal Product and Propaganda Elements (Intent)

	Product name	Product Claim	Intent	Propaganda type
1	FIJK	Body cleanser/ All rounder	To manipulate	Grey propaganda
2	Super Bitters	Sexual stimulant	To manipulate	Grey propaganda
3	Sexy Megato	Sexual stimulant	To manipulate	Grey propaganda
4	Blood of jesus	Cure for various ailment	To manipulate	Grey propaganda
5	Mokole	Sexual stimulant	To manipulate	Grey propaganda
6	Xtra Large Size	Penile energy	To manipulate	Grey propaganda
7	Great Tonic	Blood purifier	To manipulate	Grey propaganda
8	Pakurumo	Energy booster, Sexual stimulant	To manipulate	Grey propaganda
9	Alomo Bitters	Sexual stimulant	To manipulate	Grey propaganda
10	Yoyo Cleanser Bitters	Body cleanser	To manipulate	Grey propaganda

Source: Content analysis, 2019.

In the table above, analysis was done along the propaganda content in terms of intention to either persuade, deceive or manipulate. All the herbal products were found to be practicing grey propaganda in this regard. They all appear to be working towards the same goal, manipulating the consumer into believing the product was all that he/she needs to live a pleasurable sexual life or to live a healthy life.

Table 6: Herbal Product and Propaganda Elements (Vehicle/ Media of message)

	Product name	Product Claim	Vehicle	Propaganda type
1	FIJK	Body cleanser/ All rounder	All possible media	Black propaganda
2	Super Bitters	Sexual stimulant	All possible media	Black propaganda
3	Sexy Megato	Sexual stimulant	All possible media	Black propaganda
4	Blood of jesus	Cure for various ailment	All possible media	Black propaganda
5	Mokole	Sexual stimulant	All possible media	Black propaganda
6	Xtra Large Size	Penile energy	All possible media	Black propaganda

7	Great Tonic	Blood purifier	All possible media	Black propaganda
8	Pakurumo	Energy booster, Sexual stimulant	All possible media	Black propaganda
9	Alomo Bitters	Sexual stimulant	All possible media	Black propaganda
10	Yoyo Cleanser Bitters	Body cleanser	All possible media	Black propaganda

Source: Content analysis, 2019.

In the table above, analysis was done along the propaganda content in terms of intention to vehicle/media of message. All the herbal products were found to be practicing black propaganda in this regard. They all adopt all possible media including the ones that underage and minors could access. They used radio, bill board, leaflets, outdoor publicity, sales promotion, personal selling, itinerant advertising, experiential marketing (taste and see) celebrity endorsement and special events to drive their messages.

RQ3: To what extent do promoters of herbal products apply professional advertising ethics?
Table 7: Herbal Products and Adherence to Advertising Ethics

	Product name	**Professional Ethics**	**Act of Violation**
1	FIJK	Violating	Therapeutic claim
2	Super Bitters	Violating	Guaranteed Efficacy
3	Sexy Megato	Violating	Superlative claim
4	Blood of jesus	Violating	Superlative claim
5	Mokole	Violating	Therapeutic claim
6	Xtra Large Size	Violating	Deceptive
7	Great Tonic	Violating	Therapeutic claim
8	Pakurumo	Violating	Therapeutic claim
9	Alomo Bitters	Violating	Therapeutic claim
10	Yoyo Cleanser Bitters	Violating	Misleading

Source: Content analysis, 2019.

The table above presents the extent of ethical adherence of the various herbal products. This is examined in the light of advertising code and NAFDAC Act on Herbal Medicines and Related Products (1996) AS AMENDED. The products promotion were analyzed in terms of labeling, consumer aided information, implied claims, expressed claims with no evidences of effectiveness, misleading/ disinforming; etc. All the herbal products violated APCON and NAFDAC codes. In the first place, they were not allowed to be advertised on the various platforms in which they are being found. FIJK violated the NAFDAC code with its therapeutic claims, so is Mokole, Great Tonic and Pakurumo. Super Bitters, violated APCON and NAFDAC code by its attitude of guaranteeing efficacy. Sexy Megato and Blood of jesus violated in their Superlative claim as against the APCON and NAFADAC (1996) amended code.

Discussion of Findings

Virtually, all the products have names that are suggestive of deceptions. Names such as: 'Super Bitters", Sexy Megato, Blood of jesus, Mokole, Xtra Large Size, Great Tonic, Pakurumo, Alomo Bitters, Yoyo Cleanser are all indicative of product to confer on individuals- sexual prowess, superior attributes, and libido powers. Many of them gave outright promise of healthy living (therapeutic claim) as though they had been medically and scientifically proven to be effective for the consumption of all humans.

In essence, all the herbal products were found to be deceptive in intent. Osunbiyi (2009) identified the various disinformation elements that are possible in promotional campaigns. These included: puffery, false product claim, open comparative, distasteful, offensive, and preempting a product claim. The point of such disinformation were built on manipulating consumers into buying the products- with little regards for the long term effects on the health of the consumers. For example, FIJK claimed to be a body cleanser and a solution to a myriad of health challenges. This is misleading, so to say as no single product could logically be a cure for all diseases. The popular term in Yoruba parlance "gbogbonise" is a mere language in general usage that make little or no medical sense at all.

Many of the herbal products claim multi-functional efficacy; high sexual performance; stimulant; boosting penile energy etc. This must be the basis why Ransome-Kuti (2010) says that much of the success of these herbal products promoters were attributable to media promotions rather than the efficacy of the drugs.

Meanwhile, Osunbiyi (2009) warns against deception and disinformation in advertising; that "advertising must have the confidence of consumers if it is to be effective. Deliberate deception is self-defeating because, in time, it makes consumers to turn against a product.

Further the level of propaganda adoption in the herbal product promotion was found to be very high. Many of them adopted black propaganda and grey propaganda. Some information were utterly hidden while some others were partially hidden. The propaganda elements were structured and analyzed along the outline of Folayan (2019)- the message, the source, presentation format, intent and vehicles or media of presentation.

In the analysis of the messages, propaganda elements littered the message contents. Majority of the herbal products adopted Black propaganda. For example, FIJK was found to have adopted black propaganda, claiming to be an all rounder cure for many diseases just like- Blood of jesus' Xtra Large Size and Great tonic. Super bitters, Sexy megato' mokole' Pakurumo, Alomo Bitters and Yoyo Bitters was also found to be of grey propaganda coloration in their claim to boost sexual energy.

In sort, Xtra Large Size herbal products claimed to be a molder of various penis sizes as the consumers may want. So this means that the level of propaganda in the message for the products were high. However, all the products declared the source (sponsor) of the promotional messages except for "Blood of jesus".

Similarly, in terms of presentation, the level of propaganda adopted was found to be very high. It appeared that the herbal products were by tradition shrouded in deceptive techniques. In their message presentation, all the herbal products were found to be practicing black propaganda as they fail to present the side effects and the exceptions of their products claim. They presented their messages with ultimate goal of leading the consumer to buy without respect for the understanding of the consumer in terms of products content, user exceptions and side effects. They presented their messages one-sided only and with no respect to present alternative facts about the products, warning and side effects were also buried.

All these point to another propaganda technique which is the intention to manipulate. Though the products may have been certified by some consumers to have fulfilled their sexual needs and energy, but since they had no way of knowing how the products work and what effects they have on other parts of the body, they were manipulated into believing the products claims; they mentally submitted themselves to repeated purchase of the product and have no way of auditing the good and bad of what they consume.

It is even more manipulative in the sense that many of the products have high alcohol concentrates (etanol) which is a form of stimulant for excessive behavior in humans. In essence, all the herbal products were found to be practicing grey propaganda; they all appear to be working towards the same goal, manipulating the consumer into believing the product was all that he/she needs to live a pleasurable sexual life or to live a healthy life.

The last of the propaganda measure outlined by Afolayan was the vehicle/media of messages. Analysis showed that the propaganda content in terms of intention to vehicle/media of message was also high. All the herbal products were found to be practicing black propaganda. They all adopt all possible media including the ones that underage and minors could access. They used radio, bill board, leaflets, outdoor publicity, sales promotion, personal selling, itinerant advertising, experiential marketing (taste and see) celebrity endorsement and special events to drive their messages.

The most amazing revelation in this study was that the herbal medicine were not suppose to be advertising through any of these means in the first place, according to NAFDAC and APCON regulations.

So, the extent of ethical adherence of the various herbal products was low. They rarely adhere to ethical and professional guidelines in their product promotions and campaigns. Their ethical adherence was examined against APCON regulations and NAFDAC Act on Herbal Medicines and Related Products (1996) as amended. All the herbal products violated APCON and NAFDAC codes, since they were not allowed to be advertised on the various platforms in which they are being found. In the first place FIJK violated the NAFDAC code with its therapeutic claims, so is Mokole, Great Tonic and Pakurumo; while Super Bitters, violated APCON and NAFDAC code by its attitude of guaranteeing efficacy; and Sexy Megato and Blood of jesus violated in their superlative claims.

In essence, the herbal products practiced disinformation to a high extent, adoption of propaganda tools were very high, and they were in no way adherent to professional advertising ethics and NAFDAC regulations.

Conclusions

Herbal products are in high demand in Nigeria, and especially in Southwest Nigeria, where many of these analyzed products are based. The reason for their high demand is viewed to be connected with their localized scope, stance and content. It was observed that they have been for many years and have proliferated highly in the last decade, with new generations of herbal products replacing the old ones in the market. A number of them are being produced by the same manufacturer, eg. Oko Oloyun manufactures, Sexy magato, Gbe bodi e and a number of others, same with Yemkem, Nigerian breweries etc.

Majority of the herbal products have high alcohol concentrates and are often contain of bitter extracts which gave consumers the sense of efficacy about them; since Africans believe in the potency of bitter roots holding that they are possessive of healing powers.

These assumptions form the basis for the product promotion of the herbal products. But then, far from being efficient, the herbal manufacturers relied heavily on the use of disinformation/deceptive techniques, propaganda and elements in pushing their products into the hands of the consumers. These they did with sole intent to manipulate the audience into buying the highly competitive brands and with the believe that they derive healing utilities from the products; though they are oblivious of the product content, use and side effects. Hence the products promotions are shrouded in propaganda mists and are equally deviant of professional advertising codes.

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E-GOVERNANCE MANAGEMENT AND ADMINISTRATIVE EFFICIENCY OF THE PUBLIC SECTOR IN DELTA STATE

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Abstract

This paper examined the issues of E-Governance Management and Administrative Efficiency of the Public Sector in Delta State. The paper also examined the role of E-governance and its administrative efficiency in the nation's economy, the concept of E-governance management, its relevance to the nation's economy, the challenges of E-governance management and its administration, issues of ICT and E-governance, E-participation and E-governance as it enhanced the speedy development and efficiency of public service delivery, and its implications on the nation's economy, E-records and E-governance, E-communication and E-governance, E-control and E-governance. Thus, it is concluded that ICT is a potential tool of efficient public service delivery. E-governance can provide essential tools and mechanism for poor communities to hold both policy makers and service providers accountable for a sustained supply of services. In this light, it is therefore recommended that the government and the private sector of the economy should strive to identify ways to deliver public services more effectively through strategic objective of supporting and simplifying the governing processes for government, citizens, and businesses. Develop programmes and workshops on ICT and E-governance, thereby sensitizing the citizenry on the relevance of E-governance.

Key words: *E-governance, E-management, ICT, Public Sector, E-records, Efficiency, Administration.*

Introduction

The world has become a global village where every nation including Nigeria is striving to attain a high level of electronic governance. E-governance is a two way communication process which deals with the use of information and communication technology to deliver government services and ensuring the availability of such services to citizens. The application of e-governance has become an important mechanism in enhancing citizen's participation, monitoring and evaluating government projects, ensuring government accountability and transparency as well as transferring information from one sector to another (Palvia and Sharma, 2007). Sunday (2014) stated that e-governance has become a necessary political mechanism in evaluating government performances in many developed parts of the world. In fact, the use of information and communication technology in government businesses through promoting government's role in delivering services, public administration and promoting active participatory democracy has been gaining an impelling force in the global community (Heeks, 2002). In other words, governments through the globe are striving to identify ways to deliver public services more effectively through strategic objective of supporting and simplifying the governing processes for government, citizens, and businesses. According to UNESCO (2005), e-governance deals with the adoption of new leadership style, new methods of making decisions on policies and investment, new ways of making education available to citizens, new ways of listening and attending to citizens s well as new ways of organizing and delivering information and services. Thus, assessing e-governance status and nature in any part of the world, requires analyzing several parameters and factors. According to Palvia and Sharma (2007), few indices have been deployed by the international community to assess the status of e-governance in nation states; one of such indices is prescribed United Nations Department of Economics and Social Affairs. The assessment is based on the progress which United Nation's member countries have made in providing and ensuring the availability of e-government services. Thus, this paper carefully examined the prescribed indices so as to ascertain the current status of e-governance in Nigeria, with particular reference to Delta State.

E-Government (Definition and Concept)

Many authors defined e-government indifferent perspectives, but all are truly defined based on the time of that period. According to Danfulani (2013), the scope and concept of e-governance revolves around e-registration, e-participation, e-taxation, e-mobilization, e-education, e-service delivery, e-feedback, e-policing, e-debate, and the analysis of public financial statements. Thus, e-government is a network of organizations such as the government, non-profit organizations, and private intuitions who work together to achieve a common goal.

Backus (2001) views electronic governance as the process of delivering government services and information to the public through devices which operates on electronics principles. Davidow and Malone (2019) defined e-government as a government that provides innovative services on internet, in other words, it digitizes the activities of the government and provides information without geographical or time constraint through information and communication technology. Sprecher (2000) opined that e-government can simplify and automate government process to the requirement of the citizens. Abramson and Means (2001), e-governance can be defined as the electronic interaction (transaction and information exchange) between the government, the public (citizens and businesses) employees. This idea has brought many changes in the operation of e-government concerning with the people, government and private organizations. World Bank (2001), e-government is the government owned or operated systems of information and communication technologies that transform relations with citizens, the private sector and/or other government agencies so as to promote citizens, empowerment, improve service delivery, strengthen accountability, increase transparency, and promote government efficiency. Fraga (2002) explains e-government as the transformation of public sector internal and external relationships through net-enabled operations, IT and communications, in order to improve government service delivery, constituency participation, and its utility improved to an appreciable degree in all public, private sectors and the society. Thus, these technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and cost reductions. E-government is an activity using information and communication technology to increase efficiency, penetrability and responsibility.

ICT and E-governance

ICT is an integral part of development strategies of both developing and developed countries. It has great potential to bring in the desired social transformations by enhancing access to people, services, information and other technologies (Dutton 2004). In Nigeria for instance, e-government research is in its nascent stages (Gupta and Jana 2003) and a country with huge population can hardly afford to be left behind in harnessing the benefits of implementing e-government (Bhatnagar, 2002). Application of ICT in the processes of governance can be considered in two **cate**gories via for improving government processes and secondly for building interaction with and within civil society. The examples of the former category are; dissemination of public information grievance redresser mechanisms, utility payments and billing services (Mitra and Gupa, 2003). With the advancement of ICT e-governance helps to solve the citizen’s day-to-day problem effectively and efficiently with a considerable reduction in cost, time and skill.

E-participation and E-governance

According to the broad definition offered by Macintosh (cited in Medimorec, 2011:7), e-participation is the usage of ICT in order to enhance and deepen the political participation of citizens. The use of electronic technology in all public activities and societal processes, including participation in political opinion shaping, decision-making and the provision of public services (e-services) is able to strengthen constitutional principles and public engagement by individual citizens as well as interest groups. Ideally, this increased level of interaction between citizens and politicians can strengthen democracy. Thus, citizen’s participation in decision making brings about sense of belonging and effective service delivery.

E-records and E-governance

Electronic record implies the creation, use, maintenance and disposal of electronically created records for the purposes of providing evidence of business activities. Like the maintenance of paper records, the maintenance of electronic records depends on the use. There are many types of storage media for electronic records, namely magnetic media, optical disks, CD-ROM, and DVD. Magnetic media, commonly used for storage of state records, include had disks, external drives, and magnetic tape. Currently, there are also UBS memory disks. Electronic records can either be stored in network attached storage devices such as CD/DVD-ROM towers and in separate storage area networks. The United Nations is of the opinion that whichever method chosen; the following should be kept in mind when constructing a storage system:

- Prevent data loss
- Offer adequate capacity that can easily be increased as storage needs grow
- Provide fast access to data without interruptions
- Be prepared for equipment failures
- Use cost effective technologies

An effective electronic record management system ensures that the movement and location of records are controlled in a way that any record can be retrieved when needed and that there is an auditable trail of recordable transactions. Therefore, storage accommodation for the records should be clean, tidy and secure. This prevents the damage to the records and provides a safe working environment for the staff. Furthermore, there is a need for planning for disaster recovery through backup and migration to new platforms.

E-communication and E-governance

Developments in the communications field indicates how the knowledge gaps between the information-poor and the information-rich have enlarged over time thereby excluding certain parts of the globe from enjoying the benefits of what is known as a Global Village. Olasanmi, Ayoola and Kareem state that ICT is a computer systems, telecommunication networks, and multi-media applications that augment knowledge for carrying out a given task, which implies skills and processes essential for conducting business operations in a specific way. Ducombe and Heeks stated that ICT is an electronic means of information dissemination that improves an interaction between providers and users of information through application of information processing system. Thus, the input mechanism of its device can assist public organizations to arrive at a decision that can promote interpersonal relationship between them and the citizens, which involves automation of controls, processes, and information production using telecommunications, computers, software and ancillary tools such as automated teller machine and debit cards. According to Applegate, Cash and Mills, technology is revolutionizing how business is being conducted in the world.

CHALLENGES

1. **Inadequacy of IT facilities –** Information technological devices is fast advancing and developing seconds by seconds. The technology of few months back might be obsolete in another few months ahead, thus most of the developing nations are crowded with obsolete IT technologies, which invariably affects the processes of e-governance in the public sector for efficient and effective service delivery. For e-government to be fully achieved and actualized, adequate IT facilities must be in place, functional and up-to-date. The progress in Africa is relatively slow and uneven, as stated by the United Nations e-government report (2014).

2. **ICT Literacy –** The presence of computer literacy of the citizens of a State or Nation is of paramount importance to the success and efficient management of e-governance. In a State where 45% of its citizens are computer/IT illiterate, then they might be slim chances of achieving maximal efficiency of e-government. As state in the European Union (EU) States in its Digital Revolution Agenda for Europe, that Europe will only benefit from this digital revolution if all EU citizens are mobilized and carefully participate in the new digital society (2015.eu). This implies that the citizens of a State must be must be IT and computer literate for e-governance to move in the expected direction.

3. **Lack of Technical Expertise/Maintenance Culture –** This is a major challenge in the public sector of the economy. Though these equipment or IT facilities might be in place and properly installed, they lack the technical expertise and maintenance culture to handle these facilities, thereby culminating into obsolesce of these facilities and truncating the original intentions of the public service delivery, creating a gap between the government and its main stakeholders or citizens.

4. **Reliability of Internet Service Providers (ISP)** – The reliability of internet service providers no doubt cannot be over-emphasized. For e-governance to be efficient and effective, the services of internet

providers must be 90% or 100% reliable. Where this is failing, then it becomes practically impossible to maximally achieve the objectives of e-governance and its administrative management (Goppar 2018).

5. **Shortage of Power Supply –** E-government is an electronically propelled system or style of leadership. Power supply is one of the pre-requisite to the success and efficiency of e-governance. Where there is constant shortage of this factor, e-governance may not thrive smoothly (Goppar 2018). The government should ensure that there is 80% or more of electricity supply if the efficiency and effectiveness of e-governance is to be accomplished to the public and its citizens.

Parameters for Measuring the Status and Nature of E-governance

Information and communication technology and its application in recent times has offered many opportunities for economic and human development within various nations in the global community. The reports of Economic Commission for Africa (2012) observed that within the framework of World Summit on the Information Society (WSIS), national governments, together with the stakeholders at the national, regional, and international levels are engaged in conceptualizing and deploying ICT in governance so as to support development. It is on this note that scholars have agreed that a global comparative e-government indicators can assist individuals to understand the status and nature of e-governance in nation-states. Since the establishment of the United Nations e-government survey, the programme has taken up a comprehensive method of analyzing e-governance status based on the extent which online service delivery are made available in a nation, the level of telecommunication infrastructure and the state of human capital index of a nation (Backus, 2001).

According to Palvia and Sharma (2007), the online service delivery index can be analyzed using a five stage framework of e-government development. They are; the emerging stage, the enhanced stage, the interactive stage, the transactional stage, and the internet stage. The emerging stage is a stage where the presence of basic government information is small in scope and pertains to only specific issues. In this stage, the e-governance online presence consists of an official website which links to ministries, departments, parastatals, and regional/local governments. Some important documents such as the constitution and certain policy statements are also uploaded online in this stage. Under the enhanced presence stage, the government ensures that certain selected public policy documents such as an e-government policy statements, specific education and health policy statements, as well as government sources of current and anchored information are made available to the citizens. The interactive stage ensures that government's internet services are capable of influencing and acting on each other, while providing services that will be suitable for each citizen. Such downloadable documents as forms for payment of taxes, license renewal, and bills payment are found in this site. The site is expected to be updated regularly so as to ensure the presence of more recent information and statistics.

The transaction stage allows a dual interaction between government and citizens. This stage creates avenue for the citizens to pay for important government services online, while those who are responsible for providing goods and services are given the opportunity to bid their goods online through links that are adequately secured. The final stage of online service delivery is the stage of network presence which represents the most sophisticated level in e-governance. Under this stage, the government and its agencies provide citizens, businesses and other civil organizations the opportunity to participate, deliberate and make important decisions, and at the same time, the government is ready to involve every sector of the society in a dual discussion with the aim of promoting unity amongst members of the society. Through the process of interactions, the government persistently request for citizens view on certain governmental procedures such as policy making process, law making process, democratic process and finally in the decision making process of government.

Recommendations

The successful achievement of e-governance management and its administrative efficiency depends largely on the ministry or organization in question; what they do and their mode of operations, their style of administrative system, the style of leadership attain in the ministry or organization, and what and how they perceive the potentiality of e-government. Thus, the following recommendations are made:

1. The government should create an Information Department. This department should be a separate entity and be independent of all other department. They are solely responsible for disseminating information and all other forms of control measures as decided by the decision making body of the ministry or

organization. Here major ICT tools are placed and installed, besides those installed in other departments of the ministry or organization.

2. The government should focus on implementing ICTs in basic public/private services. This can play an important role in improving key services and procedures such as Justice, Health care, Social services, Education, Revenue management etc. With this, awareness will be created and citizens will not shy away from it.

3. Efforts should be focus on efficient ICT processes in public/private organizations, experiences of other public/private institutions shows that there is still a long way to go when it comes to improving the management of ICTs within administrations to increase the efficiency, hence they study and learn from those who are successful with the system to know th pros and cons for an effective follow-up.

4. For e-governance to efficient and realistic, the government should put the customers, workers and citizens in the centre. This means the administrative processes should be redefined to really involve the public/citizens, in this e-governance tools should be easy to use, its interface should be optimized and the corresponding formalities should be simplified.

5. The use of digital services by the public/private organizations should be encouraged. In this sense, the public/workers in the ministry or organization should be encouraged to embrace digital service tools.

6. The government, private agencies, etc should ensure that citizens and businesses need to be fully aware of the new managerial control system and be taught the required skills and offer total access to high speed internet connection.

Conclusion

In conclusion, the implementation of any e-administration in public/private organizations and the larger society is of paramount importance, considering the present technological advancement and evolution. Also it is important as it is measured to improve public/private services, and democratic processed to aid compliance with public policies, and to introduce total transparency and accountability, leading to better e-governance within any ministry or organization, which undoubtedly has great potential to increase productivity, as it simplifies and make faster the daily processes of any organization.

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THE ROLE OF SCIENTIFIC AND TECHNOLOGICAL INTERVENTIONS IN THE MANAGEMENT OF POST COVID 19 PANDEMIC IN NIGERIA: A SOCIO-PHILOSOPHICAL EVALUATION

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Abstract

Prior to COVID-19, apart from a major dependence on oil for public revenues and foreign exchange earnings, Nigeria's economy was susceptible to inflationary pressures characterized by a high debt service portfolio, a weak infrastructural base and unsatisfactory human capital development factors. In the face of these emerging challenges, the onslaught of COVID-19 has also meant radically increased demand for resources in the health sector, for mounting personnel costs, hazard pay, and emergency equipment, such as personal protective equipment, ventilators, and oxygen tanks, testing facilities, isolation centres and drugs. This paper argued, that for the appropriate level of response, the Federal Government of Nigeria would have to significantly increase the country's health care expenditure. The immediate challenge for Nigeria is that of business continuity, especially how the country protect as many of her Micro, Small, and Medium Enterprises as is possible while keeping the economy competitive. Nigeria have a large informal workforce, usually daily wage earning, consisting of street vendors, petty traders, artisans, roadside motor mechanics, etc., who have now been deprived of their income. Therefore, this paper recommended that the way forward is for the government and citizens to inculcate public health responses and to strengthen resilience against the spread of the Covid-19. The establishment of a viable Science and Innovation ecosystem for the country especially by integrating the use of science and technology in the agricultural, housing, roads and solar power projects should also be introduced and implemented by the government across the country.

***Keywords:* COVID-19 Pandemic, Challenges to Businesses, Health Responses, Insured Resilience.**

Introduction

The sudden appearance of Coronavirus disease in 2019 was firstly reported in Wuhan city in China, which is caused by severe acute respiratory syndrome (Hui et al., 2020). The disease is infectious and has been spreading drastically all over the world and considered by the World Health Organization (WHO) as a pandemic (WHO, 2020). The COVID 19 pandemic has had by far-reaching very severe consequences since it has spread to all the countries. The economy, in general, faces a direct impact in the mid of COVID 19 outbreak. Many countries face recession and economic downturn. All the business activities have been shut down unless it falls under the essential categories as necessary supplies and medical sectors, in addition to a few vital projects which are necessary to support the health system and safety of the people. Relatively, it has limited the business around the world and companies have shifted to work Work-From-Home (WFH) concept remotely to accommodate and run the business and services. This paper aims to identify the impact and assess them based on their level of severity.

There are five main ways through which the COVID-19 pandemic negatively impacted Nigeria. One, the COVID-19 pandemic affected borrowers' capacity to service their loans, which gave rise to non-performing loans (NPLs)that depressed banks' earnings and eventually impaired banks' soundness and stability. Subsequently, banks were reluctant to give additional loans to borrowers as more and more borrowers struggled to repay the loans granted to them during the COVID-19 outbreak. Two, there were oil demand shocks which was reflected in the sharp decline in oil price. The most visible and immediate spill over was the drop in the price of crude oil, which dropped from nearly US$60 per barrel to as low as US$30 per barrel in March. During the pandemic, people were no longer travelling and this led to a sustained fall in the demand for aviation fuel and automobile fuel which affected Nigeria's net oil revenue, and eventually affected Nigeria's foreign reserve.

Three, there were supply shocks in the global supply chain as many importers shut down their factories and closed their borders particularly China. Nigeria was severely affected because Nigeria is an import-dependent country, and as a result, Nigeria witnessed shortage of crucial supplies like pharmaceutical supplies, spare parts, and finished goods from China. Four, the national budget was also affected. The budget was initially planned with an expected oil price of US$57 per barrel. The fall in oil price to US$30per barrel during the pandemic meant that the budget became obsolete and a new budget had to be formed which to be had repriced with at a low oil price Adenomon, M. O., & Maijamaa, B. (2020).

Finally, the COVID-19 pandemic affected the Nigerian stock market. Major market indices in the stock market plunged when investors pulled out their investments into so-called safe havens like US Treasury bonds. Stock market investors lost over NGN2.3 trillion (US$5.9bn) barely three weeks after the first case of coronavirus was confirmed and announced in Nigeria on January 28, 2020 Adeniran, A. O., & Sidiq, B. O. (2018).

The COVID-19 outbreak is likely to cause bankruptcy for many well-known brands in many industries as consumers stay at home and economies are shut down (Tucker, 2020). The travel industry was deeply affected; 80% of hotel rooms were empty (Asmelash & Cooper, 2020), airlines cut their workforce by 90%, and tourism destinations are likely to see nonprofits in 2020.

Furthermore, expos, conferences, sporting events, another large gatherings as well as cultural establishments such as galleries and museums have been abruptly called off. Consulting in general and personal services, like hairdressers, gyms, and taxis, have also come to a standstill due to lockdowns. People have also changed their consumption patterns, increasing the demand for takeout, snacks, and alcohol as well as cleaning products as we spend more time in our homes. Other industries that are doing well are those related to healthcare and medication as well as herbs and vitamins.

Typically, when studying markets, it is assumed that they are static, a natural conclusion since they tend to change slowly. However, if there is one thing the COVID-19 outbreak has shown us, it is that markets are dynamic (Jaworski, Kohli, & Sahay, 2000) and can move rapidly. Furthermore, a market is not just a firm; it is a network of actors (i.e., firms, customers, public organizations) acting in accordance with a set of norms. These systems are sometimes referred to as dynamic ecosystems that exist to generate value (Vargo & Lusch, 2011).

Problem Statement and Justification

This paper argued that Nigeria is currently faced with perhaps the most challenging economic downturn in her history just as the global economy is also confronting its sharpest reversal in a generation. With every country dealing with varying degrees of the same problem, there are few places to turn for help. In addition, several other State Governments took similar steps to slow the spread of COVID-19 in their respective territories. These have cumulatively resulted in supply chain disruptions, suspension of commercial activities and large-scale job losses. The depletion of Nigeria's dollar earnings also depreciated the Naira, and pushed up prices, especially of imported goods. This is a cause for concern, coming at a time when the average household purchasing power is falling sharply on account of loss of income.

Objectives of the Study

1. Investigate the present level of the impact of covid-19 on the health, social and economic life on Nigerians in general.
2. Investigate the factors and possible roles of scientific and technological interventions in the management of post Covid-19 in Nigeria.
3. Suggest solution towards sustainable preservation of the social and economic life of Nigerians.

Literature Review

As of 13 April, more than 1.7 million people have been infected, and almost 85 000 people have lost their lives. WHO grieves with all families who have lost a loved one, and salutes health workers all over the world who have put themselves in harm's way every day to save lives. The global spread of the virus has overwhelmed health systems, and caused widespread social and economic disruption. By putting societies and economies on hold, the world have curtailed the ability of the virus to spread through our communities (WHO 2020).

These defensive measures have helped to limit some of the short-term impacts of the virus, and bought Nigerian time to translate what have be learnt about the virus into solutions so that we can get back to a more normal way of living: a new normal. Nigerians have learnt so much about this virus, and are still learning. This strategy update is based on the evidence the world has accumulated in the past three months about how COVID-19 spreads, the severity of disease it causes, how to treat it, and how to stop it. One of the main things we've learnt is that the faster all cases are found, tested and isolated, the harder we make it for this virus to spread (WHO 2020).

This principle have saved lives and mitigated the economic impact of the pandemic. These reactions guides the public health response to COVID-19 at national and subnational levels, including practical guidance for strategic action, tailored to the local context. This pandemic is much more than a health crisis. It requires a whole-of-government and whole-of-society response. The resolve and sacrifice of frontline health workers must be matched by every individual and every political leader to put in place the measures to end the pandemic. Over the decades, the world has become enamoured with the transformative power of technology, and the belief that it can be the panacea for all human challenges.

The COVID-19 pandemic has upended this narrative, however. In spite of all the hype, digital technology could not prevent nor control the spread of the coronavirus. Instead, sound policy interventions, accessible healthcare, devoted professionals and good common sense are what have flattened curves. The technology that controlled the infection wasn't a fancy contact tracing app, but instead the simple face mask.

The tech scene has been buzzing for a few years about the Fourth Industrial Revolution, a supposed technological transformation characterised by big data, artificial intelligence and automation.

But the last thing the world needs is another 'revolution' that ignores the external cost to society of human unchecked obsession with economic growth at all cost. Technology won't solve the climate crisis, prevent the recurring wildfires in the US, heal social divides or resolve social inequality. Only a concerted effort to reset our economic systems and a willingness to make hard choices about priorities will do that.

The seriousness of the foregoing had made action plans at the global state in imperative. The world today needs a different insured resilience'. The word 'insured' means to secure or protect someone against a possible contingency; in this case, the economic, social and climatic trends Nigeria faces in the 21st century, particularly those arising from unsustainable resource overexploitation, the crisis of consumption-led capitalism, biodiversity losses, and climate change.

'Resilience', in contrast, denotes society's ability to withstand and recover from these shocks when they occur. Together, insured resilience frames a society designed to both prevent and protect against crisis, and to recover quickly from damage.

What should Nigeria's priorities be?

Safety and security are the basis of insured resilience. An approach to human progress that insures society against shocks in order to build safe and secure communities. This is not a stockpile of goods or a reserve of funds, but rather an economic restructuring so that everyone's basic needs are met, natural systems are preserved, and social safety nets are established.

Insured resilience means that a country must be able to provide for itself in times of need, such as when global supply chains are disrupted. The pandemic has shown that those at the bottom-of-the-pyramid are often disproportionately affected by shocks. Governments need to step in with economic policies to ensure that common public goods, like healthcare, housing, education, food, water and energy, are provided equitably. Some rights cannot be left to market forces.

Then there are the external impacts directly caused by technological development. In places with persistently high rates of unemployment and underemployment, automation and artificial intelligence cannot be allowed to be endlessly 'disruptive'. Governments need to offer people proper alternatives and opportunities to reskill and up skill. We should not see technological advancement and human progress as the same thing; after all, billions of people in many parts of the world still lack stable electricity, clean water, and homes with sanitary toilets. For example, the pandemic has shown us that good sanitation and waste-treatment systems should be implemented in both urban and rural areas as a top priority.

Food security is of utmost importance in an increasingly crowded world. A vibrant rural economy must be maintained to prevent people from leaving the countryside in search of better jobs in the city. China knows this lesson better than any other nation in the world, as shown by their recent campaign to tackle food waste, which will have a significant effect on how it grows, processes and consumes food (Nair 2020).

But insured resilience needs more than just government efforts. Instead, a viable society is the product of social contracts built between the different pillars of society, such as the government, the private sector, civil society and ordinary citizens. In these societies, there is an acute understanding of when and how to best put collective welfare ahead of individual rights.

To support collective welfare, society must protect the commons – the air, the fisheries, forests, rivers and all other natural resources — for future generations, and insure the world against natural shocks like climate change and pandemics.

Methodology

This study uses descriptive and qualitative analysis to examine the socio-economic impact of COVID-19 in Nigeria. The analysis in this study was conducted using information obtained from several reputable sources such as the World Health Organization (WHO), (SDGs Agenda 2030), (UNESCO) and information obtained from the media and other public sources. Additional information for this paper were obtained from wellsprings of newspaper and online publications, researches.

Some of the potential impacts of COVID-19 on the SDGs are summarized in Figure 1.

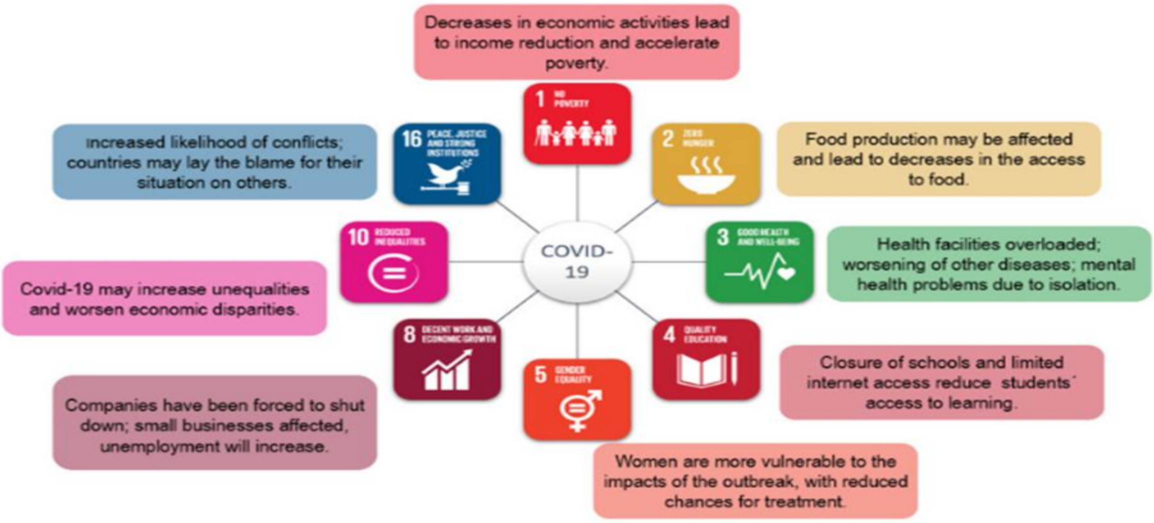

Figure 1. Some of the main impacts of COVID-19 on the Sustainable Development Goals.

Discussion and Findings

The COVID-19 pandemic will have economic consequences for many countries. In Nigeria, the country's lockdowns froze economic activities, causing job losses and supply chain disruptions. And its dependence on oil for revenue and foreign exchange has made it particularly vulnerable to the unprecedented oil price crash triggered by a collapse in de

Some analysts suggested that Nigeria's unemployment rate could rise to 33.6% (or 39.4 million people) by the end of the year if urgent steps are not taken. At the end of 2018 it stood at 23.1% (or 20.9m people). In addition, a recently released National Bureau of Statistics household survey showed that over 40% of Nigerian households could be classified as poor. It projected that the economy could shrink by anything from 4.40% to 8.91%. This would depend on the length of the lockdown period, the potency of economic plans that are put in place, and, in particular, the amount of stimulus spending.

To try and avert a drastic decline in economic growth, the government announced a stimulus package as part of its post COVID-19 economic sustainability plan. It also promised a stimulus spending package of N2.3 trillion (about $5.9 billion) with the aim of keeping economic contraction to minus 0.59%.

The Government's plan

On the face of it, the general objectives of the plan appear laudable. The plan seeks to:

- Stimulate the economy by preventing business collapse and ensuring liquidity,
- Retain or create jobs in key areas like agriculture and housing,
- Undertake growth enhancing and job creating infrastructural investments,
- Promote manufacturing and local production, and
- Extend protection to the very poor and other vulnerable groups.

A number of key projects are also included in the plan. Some of the biggest are:

- a mass agricultural programme that is expected to bring between 20,000 and 100,000 hectares of new farmland under cultivation in every state,
- an extensive public works and road construction programme,
- a mass housing programme that is expected to deliver up to 300,000 homes annually,
- the installation of solar home systems for up to 5 million households, and
- a strengthening of the social safety net.

Also proposed is support for micro, small and medium enterprises, an 80% reduction in the registration fees for food, drugs, cosmetics, medical devices, and chemicals by the National Agency for Food and Drug Administration and Control (NAFDAC) as well as a waiver of administrative charges for product license renewals.

The government also plans to set up a survival fund to give payroll support to small and medium-sized enterprises, and to promote the use of domestic gas as well as technology hubs.

Ministers whose portfolios these fall under will be responsible for supervising implementation of the plans.

The problem is that these broad objectives sound like the typical campaign promises of successive Nigerian governments. This is true of the current one too. As with plans of this nature, the questions are: are they sensible? Will they be implemented?

Gaps

As usual, the Nigerian government has ignored the fundamental problems that have plagued previous economic plans.

Crucial sectors, such as power and education, have not been adequately considered. These are major omissions.

Electricity in Nigeria is both erratic and expensive. Consistent power supply would boast the productivity of businesses as well as improve the country's economic outlook.

Investing in the power sector would also help in the storage and processing of agricultural produce, another major problem plaguing the Nigerian agricultural and manufacturing sectors.

In addition, investing in the education of Nigerians (particularly in terms of entrepreneurship and practical skills) could help reduce the unemployment rate.

There is also the problem of implementation. Successive Nigerian governments have spent huge sums on various economic programmes in the past with very little to show for them due to ministerial corruption and mismanagement. This problem has stymied countless initiatives.

Another problem is that some features of the plan are very vague. For example, how exactly will the social safety net be strengthened? Who will be the beneficiaries and how will it work in practice?

Also, how can small and medium enterprises access the support that is being proposed? And why isn't there any mention of support for the health sector ?

Conclusion and Recommendations

To build resilience in the post- COVID-19 economy in Nigeria the following measures must be adopted by the federal government of Nigeria:

1. Digital identification of every Nigerian, this will help improve the provision of cash transfers and other benefits;
2. Broadband connectivity to help school children access digital education across the entire country;
3. Local production of all that we can: shoes, steel fabrication, ceramics, plastics, furniture and building materials;
4. Promoting strategic investment in the local manufacture of generic medicines to reduce importation of expensive drugs;
5. To establish a national research fund for medicine and pharmaceuticals funded by contributions from TETFUND and Corporate Social Responsibility expenditure of private companies;
6. To promote the uptake of the FGN Savings Bond to encourage all Nigerians to save a portion of their income no matter how small.

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INTERNATIONAL PUBLIC SECTOR ACCOUNTING STANDARDS (IPSAS) ADOPTION AND ACCOUNTING EDUCATION IN SELECTED TERTIARY INSTITUTIONS IN NIGERIA

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Abstract

This study examined the adoption of International Public Sector Accounting Standards (IPSAS) in the curriculum of accounting education in selected tertiary institutions in Ogun State, Nigeria. The objectives of this study are determining the impact of IPSAS adoption on Accounting Education by both the students and lecturers and the contribution of IPSAS adoption towards enhancing best practices at the international level. Data were collected from primary and secondary sources. Seven tertiary institutions were selected for the administration of Fifteen questionnaires each given to the students and lecturers in the department of Accounting and Finance across the state. The study used regression analysis method to examine the impact of IPSAS adoption on Accounting Education in tertiary institutions in Nigeria. Regression analysis result show that IPSAS adoption has a significant positive impact on Accounting Education and enhance the best practices globally. This study recommends that regulatory authorities (Nigeria University Commission (NUC) and National Board for Technical Education (NBTE)) should ensure the adoption of IPSAS in the curriculum of tertiary institutions and ensure adequate measures for compliance by those charged with the responsibility of teaching, learning and examining IPSAS in their examination.

Keywords: IPSAS, Accounting Education, Tertiary Institutions, Curriculum, Ogun State, Nigeria.

1. Introduction

In recent times, public sector accounting (PSA) and the process of preparing a reliable and comparable financial reporting by Nigerian government has being a major problem which has tend to be increasing the inconsistency in the public sector. The introduction of International Public Sector Accounting Standards (IPSAS) by the International Public Sector Accounting Standard Board (IPSASB) has gained recognition and acceptance by the developed countries around the globe, while the Nigerian government could not converge to the IPSAS. The IPSAS was introduced to provide unified accounting standards which has been the main driver for the public sector financial reporting. While the profit-oriented entities (private entities) across the world are adopting International Financial Reporting Standards (IFRS). Adams (2004) in his book "Public Sector Accounting and Finance Made Simple" defines public sector accounting as a process of recording, communicating, summarizing, analyzing and interpreting government financial statements and statistics in aggregate and details; it is concerned with the receipt, custody, disbursement and rendering of stewardship on public funds entrusted. In the years back the Nigerian public sector adopted the cash basis of accounting system to record and prepares its financial statements. This basis though easy to use, recognized revenue and expenditure only when they are realized and was criticized on the basis that it leads to waste, inefficiency, poor service delivery, overspending, lack of accountability and transparency (Ofoegbu, 2014). The Nigeria Government introduced and adopted the IFRS and cash basis of IPSAS in 2010 and aimed to adopt fully the accrual basis of IPSAS in the year 2014 now shifted to 2015 with the aim that this will ensure transparency and accountability in the public sector in Nigeria (Baba, 2013). However, it is probably perceived that the Nigeria accounting education authoritative bodies needs to review the curriculum of accounting education in tertiary institutions and introduce IPSAS so that it awareness, desirability, adoption and practice can be taught at that level. Therefore, the research seeks to examine the impact of IPSAS adoption on accounting education curriculum by the Nigerian tertiary institutions. This paper has been divided into five (5) parts the first portion take care of the introduction followed by literature review after the methodology, result and discussion. The last parts contains the conclusion and recommendations.

2. Literature Review

IPSAS Adoption and the Nigerian Public Sector

IPSAS are a set of accounting standards issued by the IPSASB for use by public sector entities around the world in the preparation of financial statements (IPSAS Handbook, 2015). The accrual IPSAS is based on International Financial Reporting Standards (IFRS) issued by the International Accounting Standard Board (IASB) where the requirements of those standards are applicable to the public sector. They also deal with public sector specific financial reporting issues that are not dealt with in IFRS.

The Federal Executive Council (FEC) in Nigeria approved the roadmap for the adoption of IFRS and IPSAS for both private and public sectors respectively in July, 2010. The primary aim of this adoption is to enhance and strengthen the country's financial reporting standards in line with international best practice (Otunla, 2012). A sub-committee was set up in June, 2013 by Federal Account Allocation Committee (FAAC) to work out a blueprint for the implementation of IPSAS in the three tiers of government. PricewaterhouseCoopers (2012) posits that the objective of IPSAS adoption is to ensure that public interest is served and protected by developing high quality public sector financial reporting standards and by ensuring the convergence of both national and international standards, thereby enhancing the quality, transparency and uniformity of financial reporting throughout the world. All public entities are expected to start the implementation of accrual IPSAS by January, 2014.

Objectives of the IPSASB

The main objective of the IPSAB is to serve the public interest by developing high quality public sector financial reporting standards. IPSASs are the authoritative publications including studies, research reports and occasional papers that deal with particular public sector financial reporting issues.

Membership of IPSASB

The member of IPSASB are appointed by IFAC Board to serve on the IPSASB. The IPSASB comprises 18 members, member bodies of IFAC nominate 15 of whom and three of who are public members. Any individual or organization may nominate public members. In the public sector, financial reporting accountants are appointed to IPSASB. These observers have the privilege of the floor by are not entitled to vote.

The Objectives of Professional Pronouncements

These may be discussed, as followed:

a) To develop and harmonize public sector financial reporting, accounting and auditing practices;

b) To put into practice the same accounting standards throughout the world, in order to make comparisons possible and meaningful;

c) To make guidelines available for practitioners, in order maintain high reporting standards.

Some Observations on Government Accounting (Public Sector Accounting) System in Developing Countries

Unlike the advanced countries, where research work has been documented and published, the records of general practice in the individual countries in the developing countries are difficult to obtain.

The general features of public sector accounting (PSA) system as published by the United Nations are as follows:

a) Relatively little has been given to social government accounting and budgetary control system;

b) Accounting procedures in government department, which reflect complicated system of checks and balances, tend to hamper the efficacy and timeliness of the accounting information and statistics produced;

c) Public sector accounting is seen mainly as an accountability device for public receipts and expenditure. Efficiency, effectiveness and economy of the operations tend to be neglected;

d) Bookkeeping or administrative legal compliance procedures are more common than modern accounting approaches;

e) Accounting tends to be identified with expenditure control. The fact is that expenditure is subject to multiple checks;

f) The amount of paper work is much, but no efficiency, accountability or financial control is achieved;

g) The accounting data upon which government budgets and plans are based are frequently inaccurate and incomplete.

h) Financial reports are delayed and generally in arrears. They consequently become obsolete at the point of implementation.

Features of a Good System of Public Sector Accounting as contained in a United Nations manual on Public Sector Accounting.

The system must:

a) Comply with constitutional, statutory and other legal requirements of the relevant country;

b) Be related to budget classifications. Budgetary financial management must be closely integrated;

c) Be maintained in a manner that will clearly identify the objects and purposes for which funds have been received and expended, and the executive authorities who are responsible for custody and use of funds programme/budget implementation.

d) Maintain records in a way that will facilitate audit by external review authorities and readily furnish the information needed for effective audit;

e) Be developed in a manner that will administrative control of funds;

f) Be developed so that it effectively discloses the economic and financial results of programme operations, including the sources of revenue, identification of costs and determination of the operating results of government programmes and organization;

g) Be maintained in a manner that will provide financial data useful for economic analysis an identification of governmental transactions and also assist in the development of the country's accounts.

Benefits of Adopting IPSAS

Balogun (2016) noted certain benefits the IPSASs adoption will generate such as political and economic benefits.

Political benefits of adoption of IPSASs include:

a. Accountability: IPSAS requirement for increased disclosure in accounting reports increases the level of accountability in government.

b. Transparency: where IPSAS is adopted, full disclosure become an imperative of public sector accounting government.

c. Improved Credibility/Integrity: government accounting/reporting cannot be credible if government itself decides the rules. Hence, the need for a body, like IPSAS that will set the rules.

d. Political Leverage: Government may be required to provide accounting information by higher or legal authority like the United Nations.

e. International Best Practice and Comparability: IPSAS seeks to ensure that financial statements prepared in the basis of it are internationally comparable.

f. Comparable information assists the stakeholders in assessing how well their resources have been utilized.

g. Greater Disclosures: IPSAS encourages full disclosure, which hinges on transparency, integrity and accountability.

h. Increased control of public agencies: the increased disclosure, transparency and comparability IPSAS engenders will permeate the public sector in turn yielding greater accountability.

Economic Benefits of Adoption of IPSASs include:

a. Building confidence in donor agencies and lenders: adoption of IPSAS increases the country's eligibility to access economic benefits from donor agencies (USDP, USAID etc.), private sector financial institutions (Bonds and Bonds rating agencies), and official institutions (IMF and World Bank).

b. Improved services delivery: As a result of greater accountability and transparency, adoption of IPSAS will improve Value for Money (VFM) expenditure.

c. Aggregate Reporting: Adoption of IPSAS will ensure a holistic reporting of government financial transactions and positions.

d. Enhanced public-private partnership arrangements: Collaborative efforts between the public and Private Sectors is enhanced with both running on similar set of accounting standards (IPSAS and IFRS).

e. Economic leverage: Sovereign nations are induced with the prospect of commensurate benefits. Government susceptible to economic leverage is more likely to adopt IPSAS.

Characteristics of Public Sector Accounting

a) There are distinct aspects of accounting information, classification and procedures, which apply only to transactions made by the government. Example are the budgeting system and applicable procedure, fiscal policy, accounting methods and sources of revenue. The peculiar nature of government transactions make it desirable and indeed mandatory measurement approaches and rules.

b) In view of the requirement to obtain view of the requirement to obtain legislative approval for government revenue and expenditure, budgeting largely determines the structure of Public Sector Accounting. The government sometimes finds it necessary to segregates its resources into specific or special purpose compartments, a set-up or receipts and expenditure known as 'Funds'. The method of accounting adopted in recording and measuring the funds is referred to as 'fund accounting'.

c) Another peculiarity of government operations is that the accounting system is maintained on "cash basis." Only transactions involving the movement or cash come reckoning. Although the approach has its inadequacies, the general practices is to adopt 'cash -basis of accounting. All assets are written off as they are regretted consumed at the point they paid for. Accordingly government's statement of assets and liabilities do not contain information on tangible assets and neither is depreciation charged in the revenue and expenditure accounts.

Brief History of Nigerian Accounting Education System

The training and production of accountants in Nigeria is anchored by both academic institutions and professional accounting bodies. Thus, a clear distinction exists between the professional mode and the academic mode of education, training and professionalization of Nigerian accountants. A professional accounting body, the Institute of Chartered Accountants of England and Wales pioneered the development of the profession in the country even before independence in 1960. Though the training of the pioneer indigenous accountants was handled locally by the Nigerian affiliates of foreign accounting firms, the examination and certification was carried out by the Institute of Chartered Accountants of England and Wales.

The first indigenous accountant`s certification body – the Institute of Chartered Accountants of Nigeria (ICAN) was incorporated in 1965. ICAN enjoyed the monopoly of accounting professionalization for well over two decades but could not rise up to the challenge of bridging the ever widening gap between the national demand for and supply of qualified and certified accountants. Such failure not only encouraged the incursioni of other professional accounting bodies but also paved the way for rivalry, and struggle for supremacy (even litigation), between ICAN and other professional accounting bodies (Uche, 2007).

The Association of National Accountants of Nigeria (ANAN) was incorporated in 1993. Three other professional bodies have since joined the fray namely the Chartered Institute of Taxation of Nigeria (CITA), the Chartered Institute of Cost and Management Accountants (CICMA) and the Institute of Certified Public Accountants of Nigeria (ICPAN) which was incorporated in 2005.

The professional mode of accounting education places emphasis on in-house, on-the-job training based on a programme of internship in approved accounting firms. The academic mode of accounting education prevails in polytechnics and universities. This mode places emphasis on a mix of broad based accounting education incorporating core accounting skills development courses as well as related ancillary courses drawn from other disciplines in the management sciences.

3. Methodology

The purpose of this study is to find out the level of IPSAS adoption in Nigerian tertiary institutions accounting education within Ogun State, Nigeria. The Accounting and Finance (Accountancy) Department of each institution were considered the targets and respondents to the questionnaire administered for data collections. The questionnaire was given to the students and lecturers in the department. Ogun State Government has fourteen (14) tertiary institutions (both universities, polytechnics and colleges of education) in the state, all were considered as population for this research work while the study targeted institutions are universities and polytechnics in the state, 50% of the population was considered as the sample size. A sample of seven (7) tertiary institutions (that is four (4) universities and three (3) polytechnics), 15 questionnaire were purposively distributed in each institution totaling 105 questionnaire to lecturers and final students of the Accounting and Finance Department in which 95 were returned in total, all the institutions are accredited by the regulatory authorities to teach accounting and finance. The questionnaire was constructed using a five-point likert scale. The data collected were analyzed using Ordinary least square (OLS) regression method.

4. Analysis and Discussions

Regression Tables for Effect of IPSAS adoption on accounting education curriculum by tertiary institutions in Ogun State

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.856[a]	.733	.727	.62150

a. Predictors: (Constant), IPSAS training assist in aligning with international Accounting Standards, IPSAS enhance comparative analysis of accounting ratio

Author's fieldwork, 2020

Model table shows the strength of the relationship between variables we are considering. R value is used to determine the linear regression between the variables involved. Since R value is equal to 0.856. The result shows a strong relationship between variables tested. Therefore, the result affirm that there is strong relationship between IPSAS adoption and Accounting education curriculum in tertiary institution in Ogun State.

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	97.685	2	48.843	126.450	.000[b]
	Residual	35.536	92	.386		
	Total	133.221	94			

a. Dependent Variable: IPSAS prepared accounting student for global economic challenges
b. Predictors: (Constant), IPSAS training assist in aligning with International Accounting Standards (IPSAS) enhance comparative analysis of accounting ratio.

The ANOVA table is used to accept the null or alternate hypothesis. The sum square of regression is 97.685 with degree of freedom of 2, on residual is 35.536 with degree of freedom of 92. Mean square on regression is 48.843 and 0.386 on residual. F value on regression is 126.450 with a significant value of 0.000. Since the significant value is less that 0.05 (level of significance), the null hypothesis is rejected and alternate hypothesis is accepted. Therefore, the study affirm that there is a significant effect of IPSAS adoption on accounting education curriculum in tertiary institutions in Ogun State.

5. Conclusion and Recommendations

The study sought to examine the impact of IPSAS adoption and accounting education of selected tertiary institutions in Ogun State, Nigeria.

Hence, it is concluded that the adoption of IPSAS in Nigeria by the public sector organisations will increase accountability level, it will also enhances the students and lecture knowledge and awareness of the IPSAS standard if is included in their academic curriculum and encourage comparability and international best practice, which is a significant imperative in the Nigerian public sector organizations reporting process and practices. Based on the result of the analysis, the following recommendations were made:

- Government should as a matter of necessity ensure that the regulatory authorities NUC and NBTE review the curriculum of Accounting Education and make sure the IPSAS is taught by the Nigeria tertiary institutions. This will prepared the students and lecturer to counter the standards future challenges.
- Government should engages the services of professional accounting practitioners and accounting personnel to train the academic lecturers on IPSAS application continually.
- The regulatory authorities should put proper measures in place to check compliance of IPSAS teaching by the affected institutions punished and violators and ensure the test of the standards in the students' examination regulatory.

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COINTEGRATION ANALYSIS OF MULTIVARIATE TIME SERIES MODEL FOR INFLATION MOVEMENT IN NIGERIA

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Absract

This paper attempt to study the co-integration analysis of multivariate time series model for inflation movement in Nigeria. The data used for this study was extracted from abstract of statistics of Central Bank of Nigeria (CBN) Spanned a period of 10 years (i.e. from 2008-2017).The Johansen co-integration test suggests that there is at least one co-integration vector, which describes the long run relationship between CPI, FPI and NFPI. Furthermore, the accuracy of the model with use of RMSE, MAE, MAPE and Theil's U statistic shows that the model is accurate for n-step forecasting. Over the time period considered, all the three series showed an increasing pattern, that is, there is sign of non-stationary in each of the series. In order to examine the VAR model, the unit root tests (ADF test), and co-integration analyses were conducted. Unit root tests indicated that all indices are non-stationary at level and are stationary at first difference at 5% significant level. The Johansen co-integration test suggests that there is at least one co-integration vector, which describes the long run relationship between CPI, FPI and NFPI. Furthermore, the accuracy of the model with use of RMSE, MAE, MAPE and Theil's U statistic show that the model is accurate for n-step forecasting.

INTRODUCTION

The maintenance of price stability is one of the macroeconomic challenges facing the Nigeria government in our economic history. This exclusive factor is known as inflation in economics and defined as the continuous rise in prices. There are 3 approaches to measure inflation which are Gross National Product (GNP), Consumer Price Index (CPI) and Wholesale or Producer Price Index (WPI or PPI). There is no single one of this three that rather uniquely best measure inflation.

Therefore, Consumer Price Index (CPI) approach is employed in this research work which according to CBN, 1991 is currently and easily available on monthly, quarterly and annual basis

The national economic development aspiration in Nigeria have remained that of altering the structure of production and consumption activities so as to diversify the economic base, reduce dependence on oil and on imports all in a bid to [put the economy back on a path of self - sustaining, inclusive and non – inflationary growth thereby reducing poverty.

In considering the Nigerian economic development experience, therefore, it should be instrumental to examine the growth and structural changes in certain major aspect of the economy during the last decade of the 1990's.

AIM AND OBJECTIVES

The aim of the research work is to fit the appropriate multivariate time series model for Consumer Price Index CPI, Food Price Index FPI and Non Food price Index NFPI, which are all indicator of inflation movement rate in Nigeria.

Objective of the study are as follow;

1. To test for the stationary of the series and the existence of counteraction in the series.
2. To test for the significant of the model.

3. To check for the adequacy of the model.

PURPOSE OF THE STUDY

The purpose of this research work is to show and formulate the model of significances of multivariate time series data on CPI, FPI and NFPI on the Inflationary movement in Nigeria.

LIMITATIONS OF THE STUDY

The data for this project work is limited to 10 years yearly data from 2008 to 2017

RESEARCH INSTRUMENT

COINTEGRATION: Is a statistical property of a collection (X1, X2, ….,Xk) of time series variable. First, all of the series must be integrates. Next, if a linear combination of this collection is integrated 0f order zero, then the collection is said to be co-integrated.

COINTEGRATION AND JOHANSEN TEST

If the Time Series (variable) are non-stationary in their level, they can be integrated with integration order 1. When their first difference are stationary. These variables can be co-integrated as well if there are one or more linear combinations among the variables that are stationary. If these variables are being co-integrated then, there is a constant long-run linear relationship among them.

METHODOLOGY

STUDY AREA

The data use in this study is a time series data and the method used is co-integration analysis. In any time series analysis, it is inevitable to obtain or plot the time plot of the observation against time. The independent variable viz, time is taken along the X – axis and the dependent variable is taken along the Y – axis. The various points so obtained are joined by straight lines to get the plot.

Hypothesis:

H_0: $\delta = 0$ i.e. $\rho = 1$ that is, we have unit root meaning the time series is non-stationary

H_1: $\delta \neq 0$ i.e. $\rho \neq 1$ that is, we have no unit root meaning the time series data collected is stationary

DATA COLLECTION

The data used for this research work was obtain and extracted from the Annual abstract of statistics of Central Bank of Nigeria (CBN) Covering the period of 10 years between 2008 to 2017with the link www.gov.ng/data base. The data was collected on monthly basis from 2008 to 2017 as shown in table below.

MEASUREMENT OF VARIABLES

The procedures employed for the analysis include: time-plot of the variables (CPI, FPI and NFPI), test of unit root using the Augmented Dickey-Fuller test, co-integration analysis, model estimation, test of autocorrelation, and check for accuracy of the model for forecasting. We take the log of variables to help us remove the exponential trend in the series and to simplify and better explain the behavior. The data used are on inflation indices based on consumer price index (CPI), food price index (FPI) and non-food price index (NFPI) for the period of January, 2008 to July, 2017 obtained Central Bank of Nigeria (cbn.gov.ng) database.

Unit root test at significance level: H_0: the series is non-stationary against H_1: the series is stationary

Table 2: Table showing result for unit root at level.

Series			Level with intercept and trend	
	Test statistic ADF	P-value	Test statistic ADF	P-value
LCPI	0.276050	0.9761	-0.975712	0.9425
LFPI	-0.064392	0.9497	-1.580523	0.7948
LNFPI	0.540063	0.9874	-2.131077	0.5227

At conventional significance level α = 0.05, the respective p-values are greater than α, which indicate that the null hypothesis that the series in levels with intercept and with both intercept and trend contain unit root could not be rejected for all the three series from the test results presented in table 2.
Since the null hypothesis cannot be rejected, in order to determine the order of integration of the non-stationary time series, the same test was applied to their first difference.

At first difference.

Table 3: Table showing result for unit root at first difference

Series	Level with intercept		Level with intercept and trend	
	Test statistic ADF	P-value	Test statistic ADF	P-value
LCPI	-7.839036	0.0000	-7.804244	0.0000
LFPI	-5.611744	0.0000	-5.574831	0.0000
LNFPI	-7.505948	0.0000	-7.421820	0.0000

Since the p-values are less than 0.05 at both tests with intercept but no trend and with intercept and trend which indicate that the null hypothesis is rejected for the first differences of the three indices from the result in table 3. This implies that the three series are integrated of order one ($I(1)$)

VAR Model Specification

Co integration Analysis

H_0: there is no co integration against H_1: there is co-integration

Table 4: Table showing Johansen co integration test results

Number of co-integrating vectors	Eigenvalue	Trace test			Maximum Eigenvalue test		
		Statistics	0.05 critical value	p-valve	Statistics	0.05 critical value	p-value
None*	0.224154	44.20187	29.79707	0.0006	28.67950	21.13162	0.0036
At most 1*	0.128345	15.52238	15.49471	0.0495	15.52182	14.26460	0.0315

At most 2	4.89E-06	0.000552	3.841466	0.9831	0.000552	3.841466	0.9831

Normalized co integrating coefficient (standard error in parentheses)

LCPI	LFPI	LNFPI
1.000000	-0.448883	-0.549895
	(0.03665)	(0.03997)

*denotes rejection of the hypothesis at the 0.05 level
*MacKinnon-Haug-Michelis(1999)p-values

The results of Co integration tests for FPI, NFPI and CPI are reported in Table 4. The trace statistic indicates that at least one co integrating vector ($r \geq 1$) exists in the system at the 95percent confidence level. In order to cross check the specific number of co integrating vectors, the maximal eigen value statistic is further employed. This statistic confirms the existence of only one co integrating relationship at the 95 per cent confidence level in this system. It was determined that the rank of co integrating matrix to be equal to one. Consequently, the co-integrating vector is given by

$$\beta \ = (1, -0.448883, -0.549895)$$

It can be expressed as follows:

$$CPIt = \ -0.448883FPIt - 0.549895NFPIt$$

Model Estimation: Having concluded that variables in the VAR model appeared to be co-integrated, we proceed to estimate the short run behavior and the adjustment to the long run models, which is represented by VECM. Coefficient estimates of the VEC model are presented in Table 3.4. The table consists of two parts; the first part contains the detail of the Co-integration vector which is derived by normalizing the consumer price index. The result indicates that, the long run coefficients of consumer price index has a positive long run relationship with food price index and non-food price as expected in the theory. The long run equation is given as follows:

$$CPIt = \ -0.003865 \ - 0.448883FPIt \ - 0.549895NFPIt$$

$$CPIt + 0.003865 + 0.448883FPIt + 0.549895NFPIt > 0$$

The value 0.448883 suggests that a one unit increase in food price index induces, on average, an increase of about 0.45 units in consumer price index. Similarly, one unit increase in non-food price index leads to an increase of about 0.54 units in CPI.

The second part of Table 3.4 contains the coefficients of error correction terms (cointEq1) for co-integration vector. These coefficients are called the adjustment coefficients. This measures the short-run adjustments of the deviations of the endogenous variables from their long- run values.

Table 3.4: Vector Error Correction Estimates

Date: 03/08/18 Time: 03:57

Sample (adjusted): 2008M03 2017M07

Included observations: 113 after adjustments

Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LCPI(-1)	1.000000
LFPI(-1)	-0.448883

	(0.03665)		
	[-12.2463]		
LNFPI(-1)	-0.549895		
	(0.03997)		
	[-13.7578]		
C	-0.003865		

Error Correction:	D(LCPI)	D(LFPI)	D(LNFPI)
CointEq1	0.043006	-0.130607	0.713282
	(0.14592)	(0.19325)	(0.17621)
	[0.29472]	[-0.67586]	[4.04796]
D(LCPI(-1))	0.127953	0.532270	-0.126361
	(0.22103)	(0.29271)	(0.26690)
	[0.57890]	[1.81841]	[-0.47343]
D(LFPI(-1))	0.209416	-0.183826	0.344156
	(0.12707)	(0.16829)	(0.15345)
	[1.64798]	[-1.09234]	[2.24281]
D(LNFPI(-1))	-0.047145	-0.099693	-0.053783
	(0.11624)	(0.15394)	(0.14037)
	[-0.40557]	[-0.64760]	[-0.38316]
C	0.006678	0.008303	0.006643
	(0.00109)	(0.00145)	(0.00132)
	[6.10617]	[5.73294]	[5.02994]
R-squared	0.129153	0.051692	0.214735
Adj. R-squared	0.096900	0.016570	0.185652
Sum sq. resids	0.004652	0.008160	0.006784
S.E. equation	0.006563	0.008692	0.007926
F-statistic	4.004302	1.471767	7.383314
Log likelihood	410.1823	378.4415	388.8714
Akaike AIC	-7.171368	-6.609583	-6.794185
Schwarz SC	-7.050687	-6.488903	-6.673504
Mean dependent	0.009693	0.010638	0.008566
S.D. dependent	0.006907	0.008765	0.008783

Determinant resid covariance (dof adj.)	3.28E-14
Determinant resid covariance	2.86E-14
Log likelihood	1280.926
Akaike information criterion	-22.35268
Schwarz criterion	-21.91823

Vector Error Correction Model.

VAR Model - Substituted Coefficients:
===============================
D(LCPI) = 0.0430060001071*(LCPI(-1) - 0.448883142318*LFPI(-1) - 0.549895019036*LNFPI(-1) - 0.00386450550708) + 0.127953108355*D(LCPI(-1)) + 0.20941585148*D(LFPI(-1)) - 0.0471445955027*D(LNFPI(-1)) + 0.00667815441164

D(LFPI) = - 0.130606558673*(LCPI(-1) - 0.448883142318*LFPI(-1) - 0.549895019036*LNFPI(-1) - 0.00386450550708) + 0.532269599582*D(LCPI(-1)) - 0.183826221471*D(LFPI(-1)) - 0.099692670954*D(LNFPI(-1)) + 0.0083033758584
D(LNFPI) = 0.713281583699*(LCPI(-1) - 0.448883142318*LFPI(-1) - 0.549895019036*LNFPI(-1) - 0.00386450550708) - 0.1263609876*D(LCPI(-1)) + 0.344155590311*D(LFPI(-1)) - 0.0537830841017*D(LNFPI(-1)) + 0.00664285194184

Model Checking

Test of Autocorrelation

H_0: there is no autocorrelation Against H_1: there is autocorrelation
Table 5: Table showing result for the test of autocorrelation.
Decision rule: reject H_0 if p-value < α=0.05

Lag	Q-stat	Prob	Df
1	5.292012	NA*	NA*
2	16.65980	0.3396	15

Since the p-value=0.3396 is greater than α=0.05, then we conclude that there is no autocorrelation.

Accuracy of Model for Forecasting

The mean square error (MSE), root mean square error (RMSE), mean absolute error (MAE), mean absolute percent error (MAPE) and Theil's U statistics were used to assess the forecasting performance.

Table 9: Table showing result for the test of accuracy of the model for forecasting.

Forecast sample: January 2008 to December 2017			
Accuracy measure	Variables		
	CPI	FPI	NFPI
RMSE	4.924393	4.929362	4.924018
MAE	4.914139	4.917307	4.915176
MAPE	99.80232	99.78248	99.82614
THEIL INEQUALITY COEFFICIENT	0.995641	0.995084	0.995789

The lower the RMSE, MAE, MAPE, and Theil U statistic, the better the forecasting accuracy. Since the values of RMSE, MAE, MAPE are small which indicates the difference between the actual value and the predicted value is small. That is, the predictive powers of the models are better and are suitable for the 7-steps ahead forecasting.

DISCUSSION OF RESULTS

Discussion of Results

After performing the necessary analysis for this study, the following can be inferred from the results obtained from the data analysis:

1. The time plot for the three series (CPI, FPI and NFPI) shows that the series have increasing trend.

2. From the unit root test using Augmented Dickey-Fuller test shows that at all levels that the three series do not contain unit root while at first difference, it shows that the three series contain unit root.
3. In the co-integration analysis to know which model (VAR or VECM) to use in multivariate time series using Johansen's methodology which suggest that there is at least one co-integration vector and that the Vector Error Correction Model is the appropriate model to be used.

4. For the test of autocorrelation, it shows there is no autocorrelation between the series.
5. Using root mean square error (RMSE), mean absolute error (MAE), mean absolute percent error (MAPE) and Theil U statistics were used to assess the forecasting performance.

CONCLUSION

The aim of this study is to fit a multivariate time series model for CPI and its components which can be used to forecast the rate of inflation in Nigeria. The analysis was based on the monthly data from January 2008 to December 2017. The series used in this study are Consumer Price Index, Food Price Index and Nonfood Price Index.

Over the time period considered, all the three series showed an increasing pattern, that is, there is the sign of non-stationarity in each of the series. In order to examine the VAR model, the unit root tests (ADF test), and co-integration analyses were conducted. Unit root tests indicate that all indices are non-stationary at level and are stationary at first difference at 5 percent significant level. The Johansen co-integration test suggests that there is at least one co-integration vector, which describes the long run relationship between CPI, FPI and NFPI. Furthermore, the accuracy of the model with use of RMSE, MAE, MAPE and Theil's U statistic show that the model is accurate for n-step forecasting.

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OPTIMIZATION OF TRANSPORTATION COST AT INTERNATIONAL BREWERIES PLC, ILESHA, OSUN STATE

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Abstract

This project examined the costs of transporting the products of International Breweries Plc, Ilesa, Osun State from four major sources (main depots) to the six major destinations (sub-depots) in Nigeria. The transportation costs from each source to each destination as at August 2018 were obtained and analyzed, using Northwest corner rule, Least cost rule and Vogel's Approximation rule respectively. The total transportation costs from the three methods respectively are ₦918,200, ₦627,850 and ₦742,750 per trip. The optimal solution total transportation costs from the three methods respectively are: ₦ 881750, ₦ 718250 and ₦ 718250. Both least cost method and Vogel approximation method gives the same result. The optimum distributions are 225,000 and 152,000 pallets from Ilesha to Isolo and Ilorin sub-depots respectively, 22950 and 138,000 pallets from Onitsha to Ilorin and Ibadan sub-depots respectively, 67,500 and 146,250pallets from Lagos to Ibadan and new bussa sub-depots respectively, while 70,000, and 54,000 pallets should be moved from Portharcourt to New Bussa and Benin city sub-depot. This project discovered that the sub-depot at Ore is not economically viable for the company and hence should be closed.

Key Words: MODI Modified Distribution; SS Stepping Stone; TOC Total Opportunity Cost TOM Total Opportunity-cost Method; TTC Total Transportation Cost; VAM Vogel Approach Method

INTRODUCTION

Transportation is the process by which people, goods and services can be moved from one place to another. Transportation plays an important role in the economy of a nation and it enhances the development of various sectors of the economy. In manufacturing industries, transportation problem is often used in transportation planning on how to distribute their goods from one main depot to the sub-depot at minimum cost. Transportation also plays a connective role among the several steps that result in the conversion of resources into useful goods for the ultimate consumer. However, transportation problem is a special type of linear programming problem. It is used when all the resources are homogenous and concerned with the distribution of a certain product from several sources at minimum cost. Optimality of transporting goods is very important in manufacturing industries in the sense that the system result in the highest value of economic criteria.

The role that transportation plays in logistics system is more complex than carrying goods for the proprietors. Its complexity can take effect only through highly quality management. By means of well-handled transport system, goods could be sent to the right place at right time in order to satisfy customers' demands. It brings efficacy, and also it builds a bridge between producers and consumers. Therefore, transportation is the base of efficiency and economy in business logistics and expands other functions of logistics system. In addition, a good transport system brings benefits not only to service quality but also to company competitiveness.

International Breweries Plc, Ilesha, Osun State, founded in 1971, produces a range of beer and non-alcoholic drinks such as Betamalt, Trophy etc, and has warehouses in some parts of the country from where the products are moved to depots and sub-depots.

STATEMENT OF PROBLEM

Distribution costs of manufacturing products usually constitute a major production cost and hence eat up most of the profits. Therefore, determination of minimum transportation cost will assist the company to increase her profit hence, that is what prompted this study.

AIM OF THE STUDY

The aim of this research work is to determine the minimum cost for transporting the products of International Breweries Plc, Ilesha, Osun State from factory to designation depots..

OBJECTIVES OF THE STUDY

The objectives of this study are to:

1. Reduce cost of transporting goods from the source to the depots.
2. Determine the optimum allocation from sources to destinations.
3. Estimate the minimum transportation cost.
4. Make the goods available where they are mostly needed.

RESEARCH INSTRUMENT

Transportation problems are generally concerned with the distribution of a certain product from several sources to numerous locations at minimum cost. Suppose there are m warehouses where a commodity is stocked, and n markets where it is needed, and let the supply available in the warehouses be $a_1,a_2,\ldots,a_m$ and the demands at the markets be $b_1,b_2,\ldots b_n$, then the unit cost of transportation from warehouse i to market j is $\$c_{ij}$. If a particular warehouse cannot supply a certain market, we set the appropriate c_{ij} at $+\infty$. We want to find an optimal shipping schedule which minimizes the total cost of transportation from all the warehouses to all the markets.

To formulate the transportation problem as a linear program, we can define x_n as the quantity shipped from warehouse i to market j. Since i can assume value from 1,2,….,m, and j from 1,2,……n, the number of decision variables is given by the product of m and n. The complete formulation is given below:

Minimize Z = $\sum_{i=1}^{m} \sum_{j=1}^{n} c_{ij} x_{ij}$ (Total cost of transportation).

Subject to: $\sum_{i=1}^{m} x_{ij} \le a_i$ (supply restriction at warehouse i)

$\sum_{j=1}^{n} x_{ij} \ge b_j$ (Demand requirement of market j).

$x_{ij} \ge 0$ [Negative restrictions for all pairs (i, j)]

Linear programming formation of transportation problem

Let x_{ij} quantity be transported from plant P_i to warehouse W_j and similarly, C_{ij} is the per unit transportation cost from plant P_i to warehouse W_j. The objective is to minimize the total transportation costs.

Minimize Z = $\sum_{j=1}^{n} \left(C_{ij} X_{ij}\right)$

$$Min\, Z = \sum_{j=1}^{n} C_{ij} X_{ij}$$

i = 1, 2 ….m
j = 1, 2, …..n

Subject to constraints:

$$\sum_{j=1}^{n} X_{ij} = S_i \qquad i = 1,2,\ldots.,m\left(capacity\ constra\,\mathrm{int}\right)$$

$$\sum_{i=1}^{m} X_{ij} = d_j \qquad j = 1,2,....,n\,(requirement\ constraint)$$

$$X_{ij} \geq 0 \text{ for all } i, j$$

For a feasible solution to exist, it is necessary that $\sum_{i=1}^{m} S_i = \sum_{j=1}^{n} d_j$ *(Rim Condition)*

SOLUTION PROCEDURE OF TRANSPORTATION PROBLEMS

Step 1	Define the objective function to be minimized with the constraints imposed on the problem.
Step 2	Set up the transportation table with m rows representing the factories, plants etc and n columns representing the destination (warehouses, stores, markets, etc).
Step 3	Develop an initial feasible solution to the problem.
Step 4	Examine whether the initial solution is feasible or not. The solution is said to be feasible if the solution has allocations in (m + n - 1) cells with independent positions (if it is not possible to allocate any individual allocation without either changing the positions of cells having allocation are known as occupied cells and the remaining cells are known as empty or unoccupied cells)
Step5	Test whether the solution obtained in step 4 is optimum or not. This is done by computing opportunity cost associated with the empty cells. Positive opportunity costs for all empty cells signifies optimum solution (opportunity cost of empty cell = what will be the cost reduction, if the particular cell is included in the solution).
Step6	If the solution is non optimum, modify the shipping schedule by including empty cell whose inclusion in the programme results in largest savings.
Step7	Repeat step 5 and 6 until an optimum solution is obtained.

METHODOLOGY

FINDING AN INITIAL FEASIBLE SOLUTION

The standard transportation problem has (m+n) constraints and (mn) variables. In general, the number of basic variables in a basic feasible solution is given by the number of constraints. But in the transportation problem, the number of variables that can take positive values is limited to (m+n-1) since one of the constraints is redundant. To get this, add up all the supply constraints. This gives $\sum_{i=1}^{m}\sum_{j=1}^{n} x_{ij} = \sum_{i=1}^{m} a_i$. summing up the demand constraints, we get, $\sum_{i=1}^{m}\sum_{j=1}^{n} x_{ij} = \sum_{j=1}^{n} b_j$. Since $\sum_{i=1}^{m} a_i = \sum_{j=1}^{m} b_j$., these two equations are identical, and we have only (m+n-1) independent constraints.

The initial basic feasible solution of the simplex method can be easily found without the use of artificial variables, because of the special structure of the transportation matrix. This can be explained with the examples below

DATA FOR THE STUDY

The data used in this research work is secondary. It includes the demand per trip of each destination (sub-depots) and the capacity of each warehouse (main depot) in thousand pallets. The data was collected from the Logistics department of International Breweries Plc, Ilesha, Osun State. The main depot considered are situated in Ilesha (Osun State), Onitsha (Anambra State), Lagos State and Portharcourt (Rivers State) while the sub-depots considered are those in Isolo (Lagos State), Ilorin (Kwara State), Ibadan (Oyo State), New Bussa (Niger State), Benin City (Edo State) and Ore (Ondo State) hence, there are four sources (main depots) and six destinations (sub-depots).

To formulate the transportation problem as a linear program, we define x_n as the quantity shipped from warehouse i to sub-depot j, i = 1, 2, 3, 4 and j = 1, 2, 3, 4, 5, 6.

MEASUREMENT OF VARIABLES

Average Cost of transportation (#'000) per trip from main depots to the sub-depots

		SUB-DEPOTS					
		Isolo	Ilorin	Ibadan	New Bussa	Benin-City	Ore
MAIN DEPOTS	Ilesha	1500	1520	1100	2200	1600	1650
	Onitsha	1480	1530	1200	2400	450	1300
	Lagos	300	1250	900	1950	950	1450
	Port-Harcourt	1690	1650	1200	2000	900	1700

Source: Logistics Department, International Breweries Plc, Ilesha, Osun State

The sources and destinations, with their respective capacities ('000 pallets) and requirements ('000 pallets)

	Isolo	Ilorin	Ibadan	New Bussa	Benin City	Ore	Supply
Ilesha	1500	*1520*	*1100*	*2200*	*1600*	*1650*	*250*
Onitsha	1480	*1530*	*1200*	*2400*	*450*	*1300*	*130*
Lagos	300	*1250*	*900*	*1950*	*950*	*1450*	*150*
Port-Harcourt	1690	*1650*	*1200*	*2000*	*900*	*1700*	*120*
Demand	*150*	*115*	*190*	*110*	*60*	*25*	

Source: Logistics Department, International Breweries Plc, Ilesha, Osun State

So final optimal solution is arrived

	Isolo	Ilorin	Ibadan	New Bussa	Benin City	Ore	Supply
Ilesha	1500	*45* *1520*	*190* *1100*	*2200*	*1600*	*15* *1650*	*250*
Onitsha	1480	*70* *1530*	*1200*	*2400*	*60* *450*	*1300*	*130*
Lagos	150 300	*d* *1250*	*900*	*1950*	*950*	*1450*	*150*
Port-Harcourt	1690	*1650*	*1200*	*110* *2000*	*900*	*10* *1700*	*120*
Demand	*150*	*115*	*190*	*110*	*60*	*25*	*650*

The minimum total transportation cost = 1520 x 45 + 1100 x 190 + 1650 x 15 + 1530 x 70 + 450 x 60 + 300 x 150 + 2000 x 110 + 1700 x 10 = ₦ 718250

SUMMARY OF KEY FINDINGS

This project examines the possible distributions of the products of International Breweries Plc, Ilesha, Osun State with the aim of minimizing the transportation cost, which in turn will increase the profit of the company. Four major depots, from where the products are distributed to six major sub-depots are considered. Data collected as at August 2018 were analyzed using North-West Corner method, Least-Cost method and Vogel Approximation method to facilitate comparison. The total transportation costs from the three methods respectively are ₦918,200 ₦627,850 and ₦742,750 per trip. The optimal solution total transportation costs from the three methods respectively are: ₦ 881750, ₦ 718250 and ₦ 718250. Both least cost method and Vogel approximation method gives the same result.

CONCLUSION

For initial feasible solution, the analysis shows that the least cost method gives the minimum transportation cost per trip with a cost of ₦ 627,850 per trip. For optimal solution: The analysis shows that the least cost method and Vogel approximation method gives the minimum transportation cost with a cost of #718250 per trip.

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PATTERN OF LIBRARY AND INFORMATION SERVICES FOR POST COVID-19 ERA IN NIGERIAN TERTIARY INSTITUTIONS

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ABSTRACT

This paper is an attempt to explore the expected nature and pattern of library and information services in post COVID 19 era in Nigerian tertiary institutions. The manual system of service delivery in academic libraries in Nigerian tertiary institutions affected their operations during the peak period of the pandemic. It is a fact that academic libraries are part of tertiary institutions that need holistic adoption, application and use of ICTs in service delivery systems, covering e-learning systems, digital records management practices, electronic-based management systems, e-libraries and virtual or online information services. These should dominate the thinking and priority attention of management teams of tertiary institutions. Specifically, librarians are expected to be proactive in this post pandemic era and battle for continuous relevance and satisfactory service delivery to users, by putting in place mechanisms for managing both onsite and online library services. Most importantly, users need to be served at the comfort of their environments using computing systems, the Internet and social media platforms. Online information services, robust websites with high bandwidth, digitization and digital preservation are also areas librarians should make more impact in this post COVID 19 era in their respective tertiary institutions. Possible challenges of funding, management attitude, poor infrastructure and poor digital skills among library staff will be there as impediments. However, regulatory agencies of the tertiary institutions should establish solid consortiums where critical issues would be addressed including sharing resources and delivering online services.

Keywords: Academic Libraries, Online/Virtual Information Services, Tertiary Institutions, Nigeria

Introduction

The education and training programmes facilitated by tertiary institutions are inevitable for laying solid foundation for national development. Tertiary institutions are agencies for the development of high level manpower that would contribute to the growth and advancement of the society. Through teaching, learning, research and community services, tertiary institutions are driving their mandate towards the growth and development of communities they are located and the society at large. Technological education is part of tertiary education system for driving the technological development of the country through education and training as found in polytechnics, colleges of technology, universities of technology, and technical colleges. The execution of the mandates of these tertiary institutions requires functional library systems and services.

Meanwhile, this conference is emphasizing on technological education playing the role of tools and strategies for the management of pandemics with particular reference to Nigeria. Polytechnics, colleges of technology and other technology-based institutions that are championing technological education have been playing critical roles, and at the same time are doing excellently well towards technological growth and development of Nigeria. No doubt, Nigeria as a country has made significant progress in managing the corona virus disease of 2019 (COVID-19), which is a pandemic that is wasting so many lives across the universe. So far, hand washing machines and other devices are been produced from technological education institutions, all geared towards mitigating the spread of the virus. In addition, with the steady decline in the new infection cases of the COVID 19 in the country, there is hope of managing the pandemic thoroughly, which all stakeholders should be part of, including libraries of tertiary institutions, which are information management centres that should be factored in overall national planning and development programmes (Diso, 2010).

No doubt, the digital era with sophisticated components of information and communication technologies (ICTs) is having unprecedented influence in all sectors of the society. In other words, there is usually the adoption, application and utilization of ICTs in all operations and engagements of man. Thus, it is rare to see a human endeavour or activity that is not ICT-compliant. Unfortunately, many things are taken for granted in Nigeria due to poor policy implementation, leadership crises, attitude to human development, and selfish interests that dominated the national landscape. Assuming the educational sector in Nigeria had taken advantage of ICTs in driving its operations and services, the effects of COVID 19 on education and training would have been insignificant. The same is applicable to libraries where there have been serious arguments for provision of online information services before now (Gbaje, 2007).

Be that as it may, the decline in the index cases of COVID 19 shows that the direction now should be on putting in place measures and strategies for managing the post COVID 19 pandemic for a healthy world for all. For tertiary institutions, and specifically their libraries, there should be paradigm shift in the pattern and mode of service delivery using well equipped and trained personnel to drive the process. Thus, this paper looks at the nature and pattern of library services for the post COVID 19 era, the expectations from librarians in supporting the mandate of their tertiary institutions, and the likely challenges in the course of service delivery.

Nature of Library and Information Services

Libraries are institutions responsible for delivery of information services for addressing the information needs of man in the society. There are various types of libraries. For libraries established in tertiary institutions, they are known as academic libraries with emphasis on the academic mission of their host institutions, be it universities, polytechnics, colleges of education, colleges of technology, colleges of agriculture, and the likes.

Services in libraries are categorized into technical services and readers'/users' services. Technical services are out of the scene responsibilities undertaken by librarians and other categories of library staff to prepare for readers' services. The users of libraries are not aware of technical services because they are carried out behind closed doors in libraries. That is to say the success or otherwise of services rendered to users of a library depends on the level of preparation, efforts put in place and extent of works done by professional and non-professional staff at the technical services division. Under technical services, we have resources acquisition and development, resources description, organization of knowledge, indexing and abstracting services, and the like. On the other hand, readers' or users' services are those services with direct contact to users for meeting their diverse information needs. Such covers reference and information services, charging and discharging, selective dissemination of information, current awareness services, user education and information literacy instructions, translation services, among others. The delivery of these services is facilitated with the availability and accessibility of requisite information resources. This entails that satisfactory information services in libraries are facilitated by robust collections with sophisticated collection development and management system.

Unfortunately, the services of these academic libraries to users are mostly done traditionally without taking advantage of digital technologies and systems. In the words of Michael (2015, p.20) academic libraries have been developing and changing strategies in order to meet up with the current trends of satisfying the needs of users. Various services have been put in place, such as introduction of digital services such as online reference services, current awareness service, online discussion forum/ group, online selective dissemination of information, online exhibition services, electronic theses and dissertation (ETDs), Online Public Access Catalogues (OPAC), among others, so as to build confidence in their users. However, the expansion and sustainability of these digital services have remained as challenges due to attitude of management to academic libraries, inadequate funding, poor infrastructure and inadequate human resources. The emergence of COVID 19 has shown that pattern of service delivery requires change in line with emerging technologies.

Pattern of Library and Information Services in Post COVID 19 Era

The emergence and gradual decline of COVID 19 is a pointer to the fact that the usual ways of doing things in Nigeria needs to change. Academic libraries are part of tertiary institutions that need holistic adoption, application and use of ICTs in service delivery systems. E-learning systems, digital records management practices, electronic-based management systems, e-libraries and virtual or online information services should dominate the thinking and priority attention of management teams of tertiary institutions.

Academic libraries should accommodate functional hybrid library systems, with the already existing physical libraries to be supported by standard and robust e-library systems and virtual library services (online information services). Such e-libraries are libraries with digital information resources and service delivery system that can be accessed by anyone no matter the location across the universe, provided the user has legitimate access to the collections. The nature of the collections in e-libraries, according to Igwe (2012), are online information resources that are digitally-based such as e-books, e-journals, e-monographs, e-encyclopaedia, e-dictionaries, e-zines, e-newspapers, e-theses and dissertations, digital repositories, among others. These e-resources facilitate the delivery of virtual library services or online information services.

Online information services can be defined as those activities concerned with ensuring the availability, accessibility and use of information by users remotely, with the adoption of information and communication technologies (ICTs) (Michael, 2015). According to Elonye (2017), online information services are information services presented and made available in digital binary formats over computer networks and are accessible on the Internet from any location across the world. Online information services offer access to information via the internet, online databases and digital collections. These online information services include access to databases, Online Public Access Catalogues (OPAC), digital collection of libraries, electronic theses and dissertations. There are many types of electronic resources that provide users with access to online information services and they engage in online literature search with the support of e-books, e-journal, e-monographs, e-magazines, e-theses and dissertation, e-reports, e-pamphlets, etc. In addition, librarians in such environment are usually referred to as digital librarians or cybrarians and they provide diverse online services to users such as digital reference services via library portals, online user education and information literacy instructions, online current awareness services, online selective dissemination of information, online documents and database delivery services, online referrals, digital translation services, digital subject gateways, online lecture course materials, open educational resources and mobile online open courses (Kumar, 2010; Ilo & Ifijeh, 2010; Uzuegbu, 2016; Igwe, Ugwuogu & Okechukwu, 2019). These online cum virtual library services are expected to dominate the pattern of service delivery in academic libraries of tertiary institutions in this post COVID 19 era across Nigeria.

Meanwhile, the delivery of functional online information services requires that the academic libraries should have robust websites. Such websites will host the e-resources and provide links for online services. For a library website to be effective and meet the information needs of library users, such websites must conform to certain best practices which includes providing a single point of access to library resources, allowing teaching staff to direct students to useful resources more easily, promoting the resources held by the library including subscriptions and gifts, improving navigation of library resources, improving access to scholarly and educational web-based resources, providing more efficient access to e-resources, improving information services delivery, provide library services 24/7, and facilitate access to library and information services remotely (Gbaje & Kotso, 2014). The availability of such library website, which should be functional and continuously updated with electronic resources, will facilitate the provision of online information services to users as afore-described.

Expectations from Academic Librarians in Post COVID 19 Era

Librarians in academic libraries are expected to be at the forefront in the application of ICTs in delivering educational and library services thereby supporting the mandates of their host tertiary institutions. The e-learning systems of tertiary institutions usually work together with learning resources which are in electronic formats. At the same time, use of learning resources requires information literacy knowledge and skills which librarians have been championing all over the years. So, the learning management system that would drive the teaching and learning process in e-learning mode should accommodate information literacy instructions which contribute to higher academic performance of students (Soleymani, 2014; Banik & Kumar, 2019).

It is of essence that librarians push for ICT-based services in their institutions. The online information services expected from academic libraries especially those in public tertiary institutions so as to remain relevant and productive during the peak of COVID 19 were not there due to lack of commitment towards e-based services. This is where the proactive nature and determination spirit of librarians were not displayed towards service delivery for societal advancement. Thus, the afore-stated fact reiterate the submission of Emezie and Nwaohiri (2013) that in repositioning academic libraries for effective information services delivery, the role of the 21st century librarian will include advocacy, use of social media, mobile phones, information packaging and repackaging, quality reference services, and partnership with other academic units for information literacy programmes.

Librarians are also expected to embark on aggressive deployment and use of library websites and social media platforms for service delivery to the users. According to Ukaegbu and Owunezi (2019), the type of websites for libraries should not just be having just a web-page from the institution's website. Rather, a complete website with essential and complete features, or with a homepage that may emanate from the main website of the institution. Such website will be hosting the institutional repository, with rich content that reflect the mission of the institutions and their contributions to knowledge. A functional library website that is robust with diverse components of multimedia and interactive digital elements, is inevitable for the delivery of online information services, such as digital reference services, online document delivery, resources sharing, online help and information skill tutorials, online current awareness bulletins, online reference services, electronic journals, online circulation services, electronic selective dissemination of information (SDI) services, among others.

Furthermore, librarians should consolidate on digitization and digital preservation of grey literature and indigenous publications emanating from their institutions. Digitization leads to creation of digital repositories and digital libraries which are facilitating e-learning programmes. It offers many benefits such as convenient access to information resources, saving spaces in library buildings, and serving as the major avenue for preservation of information resources, for easy and unlimited accessibility. Now that many reliable open source software for digitization and management of library routines (integrated library management systems) especially DSpace and Koha (Omeluzor, Olugbenga, Madukoma, Bamidele & Umahi, 2012; Ukachi, 2015; Urhiewhu & Joseph, 2017) are available and accessible in the cyberspace, the major challenge of software adoption and use is almost a thing of the past. Stepping up the extent of digitization of local research findings and scholarly publications of the academic staff and students of tertiary institutions in Nigeria needs to be aggressively pursued. This contributes to local content development and facilitates webometric ranking of tertiary institutions.

The issue of continuous professional development is also not left out especially in the areas of acquisition of digital skills. Israel and Edesiri (2016) reiterated the importance of such skills for driving online or virtual library services. So many digital skills like coding, web design, blogs development, content development, networking, digitization, digital preservation, and the like, are in top demand in for the delivery of virtual library services. In addition, social media platforms like Facebook, Twitter, blogs, and the like, are used for different kinds of online information services for the benefits of library users. This is an area librarians cannot trade their proactive passion and commitment for continuous satisfaction of the information needs of users.

Conclusion

The emergence of COVID 19 pandemic is a clear indication that all sectors of the economy should device means of survival, possible thriving and sustainability. Unfortunately, many organizations and institutions were stagnant during the peak of the pandemic due to lockdown and ban on interstate movements. Thus, there are many expectations from post COVID 19 era in Nigeria. From the angle of library services in tertiary institutions, they are enormous. Librarians that are drivers of library services should put in place mechanisms for virtual and online library services thrive alongside the existing traditional library system. Users need to be served at the comfort of their environments using computing systems, the Internet and social media platforms. Online information services, robust websites with high bandwidth, digitization and digital preservation are areas librarians should make more impact in this post COVID 19 era in their respective tertiary institutions.

Challenges of funding, management attitude, poor infrastructure and poor digital skills among library staff will be there as impediments that can be addressed. However, regulatory agencies of tertiary institutions should establish a solid consortium where critical issues would be addressed including sharing resources and services. Management of tertiary institutions should place e-libraries and online library services at the forefront of the policies in this post COVID 19 era. No doubt, libraries remain relevant and librarians are in charge to make its service align with the expectations of the society.

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POST COVID-19 PANDEMIC LOCKDOWN ASSESSMENT OF RESIDENTS' COMPLIANCE TO PUBLIC OPENSPACE STANDARD IN LAGOS METROPOLIS

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ABSTRACT

The aim of this paper is to verify compliance to regulation of public open space standards after COVID-19 pandemic lockdown for sustainable development in the study area. This is achieved through collection of primary data as a compliment of secondary data in Sabo-Yaba. Questionnaire administration for primary data collection was carried out using stratified random sampling technique. The total population of buildings in Sabo-Yaba was made up of 614 buildings on 19 streets, from where a selection of 27% or 167 residential buildings was made for sampling. Therefore, a total number of 167 questionnaires was administered randomly to household heads of sampled residential buildings in the study area. Findings from the study show that desperation of residents to survive after COVID-19 pandemic lockdown has led to encroachment on setbacks and open spaces in the study area. This results to such challenges as non-conformity with planning standards, uncontrolled waste, no airspace, insufficient setback, environmental pollution, depletion of landscape, no tree, no sidewalk, dirty environment, bad/no drainage, bad road, and parking problems in sampled areas. Recommendations for the adoption of a more inclusive, approach to urban regeneration for sustainable development in Lagos metropolis.

Keywords: Public Open space (POS), COVID-19 pandemic, Development Control, Sustainable development, Social Inclusion.

INTRODUCTION

Studies of the environment in recent times, show an alarming rate of encroachment on public open spaces due to economic slowdown resulting from the covid-19 pandemic. According to Chakraborty and Maity (2020), coronavirus disease 2019 (covid-19) has spread rapidly around the world, posing enormous health, economic, environmental and social challenges to the entire human population. United Nations Convention to Combat Desertification (UNCCD, 2020), expressed that, land use change is the primary transmission pathway for emerging infectious diseases, and the rate of land conversion is accelerating. Moreover, the foundation for building back better face of climate change and the wake of the covid-19 pandemic will be centered upon future land use decisions.

In addition to the above discussion, (The Netherlands Land Academy (LANDac, 2020) explained that the covid-19 crisis and the measures taken to curb the pandemic impact urban poor heavily. From a land rights perspective, the most worrying immediate effects include the following: Loss of livelihood options, especially in the informal sectors and deepening levels of poverty and food insecurity; Suspension of democratic controls and the use of violence against environmental and human rights defenders; The closing of land administration services as part of lockdown measures. The fear is that these developments lead to increased risks of irregular land acquisition, resource grabbing and loss of assets and land access for the poor.

According to World Bank (2020), the Nigeria development update, Nigeria in times of covid-19: Laying foundations for a strong recovery says the global spread of the pandemic and subsequent collapse of international oil prices are destabilizing Nigeria's macroeconomic balances. Before covid-19, the number of Nigerians living in poverty was expected to increase by about two million, largely due to population growth. Without bold reforms, strong fiscal and monetary policy actions, the report warns that the macroeconomic implications of covid-19 in 2020 and 2021 will be severe- including loss of life and the possibility of five million more Nigerians being pushed into poverty- even if Nigeria manages to contain the spread of the virus.

Hence, the impact of the covid-19 pandemic on the study area includes; increase prices of goods and services due to restriction in importation of food and raw materials, loss of jobs and livelihood for the urban poor due to the lockdown measures. Risk of non-achievement of sustainable development goal 11, target 11:7. These are manifest in the rapid proliferation of the informal economic sector and shrinking public open spaces, damage to public utilities and the recent violent protest in Lagos metropolis.

From this discussion, this paper seeks to uphold the implementation of development plans to protect public open spaces and recreational facilities. This is also necessary to enhance the attractiveness of the study area and encourage compatible future development. This in place also prompts government in creation of awareness for property owners and stakeholders on adherence to development plans and statutory enactments. This paper contributes to studies of preservation of public open spaces, through assessment of the link between covid-19 pandemic and the continuous shrinking public open space in the study area. Thus, providing an option of inclusive upgrade as a development control measure in the achievement of sustainable development goal 11 Target 11:7 during recovery from covid-19 pandemic in Lagos metropolis.

The aim of this paper is to verify compliance to regulation of public open space standards after COVID19 pandemic lockdown for sustainable development in the study area. In order to achieve this aim, the paper examines the following objectives:

i) Identify existing residential land use in the study area;

ii) Verify the level of compliance of property owners to open space standards in the study area;

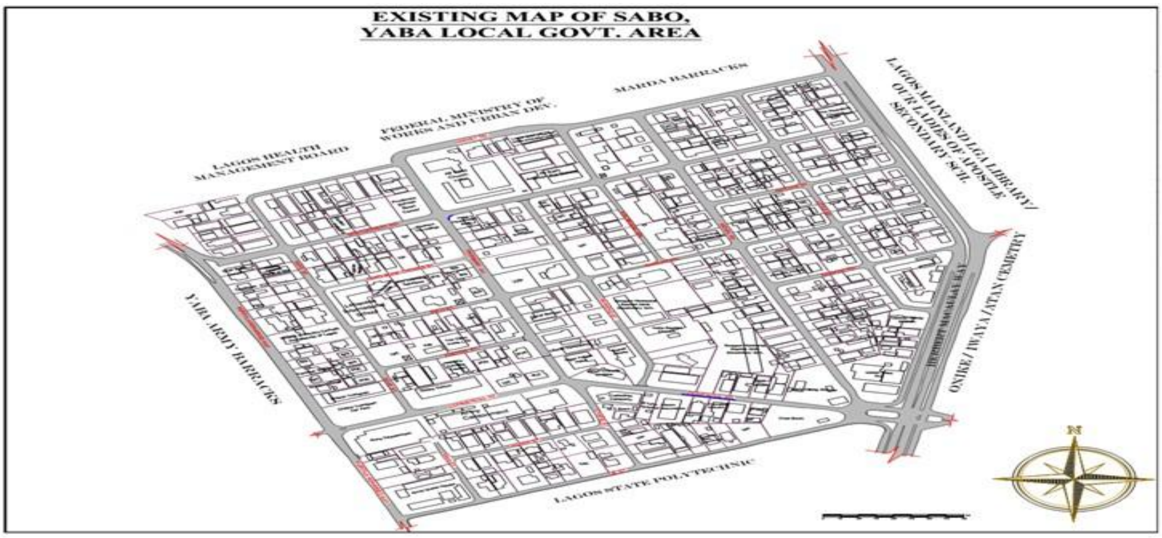
iii) Examine the factors responsible for the level of compliance in the study area;

iv) Assess the environmental effects of encroachment on open space in the study area;

v) Social Inclusion in Smart development control and monitoring of environmental system and open spaces in the study area.

THE STUDY AREA

The study area Sabo in Yaba, Lagos metropolis is a prominent medium density area and one of the first developed areas in Nigeria. The choice of Sabo is because it is first the seat in which foreign dwellers settled and consequently became a major residential area in Lagos state after the colonial reign. This however brought about developments such as the emergence of the first tertiary institution in Nigeria which is Yaba College of Technology. The centralization of the Lagos Mainland however brought about conversion of some residential land use to commercial land use thereby making it serve as a business district (Lagos Mainland Local Government, 2012). Sabo area being a medium density zone in Lagos metropolis, has some residential areas, and serves more as a seat of commerce and administration playing hosts to a lot of Private Firms, Government Agencies, and Establishments.



Source: Yaba-Lagos Mainland Local Government, (2016)

METHODOLOGY

In collecting data for this study, the sample frame was 614 buildings which is the total number of buildings in the study area. A sample size of 167 residential buildings or 27% of building use in the study area. Questionnaire administration for primary data collection was carried out using stratified random sampling technique. The sample selection was made from stratification or zoning of the total building use in the study area. The total building use in the study area was made up of 614 buildings on 19 streets. A total number of 167 questionnaires was administered randomly to household heads of residential buildings in the study area.

LITERATURE REVIEW

Literature review provides a platform for survey of literature and secondary data collection. The link between covid-19 pandemic and encroachment by the urban poor on public open spaces is discussed here to reveal the importance of inclusive post covid-19 lockdown regulation of public open space, as follows:

The covid 19 pandemic is considered as the most crucial global health calamity of the century and the greatest challenge that the humankind faced since the 2nd World War. In December 2019, a new infectious respiratory disease emerged in Wuhan, Hubei province, China and was named by the World Health Organization as covid-19 (coronavirus disease 2019). A new class of corona virus, known as SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) has been found to be responsible for occurrence of this disease…. According to the report of the World Health Organization (WHO as of April 18 2020), the current outbreak of covid-19, has affected over 2164111 people and killed more than 146,198 people in more than 200 countries throughout the world. Till now there is no report of any clinically approved antiviral drugs or vaccines that are effective against covid-19 (Chakraborty and Maity, 2020). In Nigeria, the covid-19 pandemic has affected the nation's economy by slowing it down and causing increase in poverty rate.

According to LANDac, (2020), growing concern for the urban poor due to measures taken to curb covid-19 pandemic is summarized as under the following headings: Loss of assets and land access, and growing inequality; Lack of due diligence in land-based investments; Reduced quality of land governance services; and Suspended democratic controls on land governance. In conclusion to this report, the fear expressed is that covid-19 develops into a severe land rights and land governance crisis. The serious risk that the gains of two decades of investing in land governance for sustainable and equitable development are undone. Hence, recommendations amongst others include, that the impact of the covid-19 crisis need to be placed squarely on the agenda of regional, national and international policymakers.

Furthermore, World Bank (2020) stated that the report of Marco Hernandez, World Bank Lead Economist for Nigeria, and co-author of the report, discusses policy options in five critical areas that can help Nigeria recover from the impact of Covid-19 pandemic: Containing the outbreak and preparing for a more severe outbreak; enhancing macroeconomic management to boost investor confidence; safeguarding and mobilizing revenues; reprioritizing public spending to protect critical development expenditures and stimulate economic activity; protecting poor and vulnerable communities.

Koohsari, et al (2015), defines Public Open Space (POS) stating that there is lack of consensus in its definition. For example, Edwards et al (2013, 23) defines POS as spaces reserved for the provision of green spaces and natural environments, accessible to the general public free of charge. In contrast, another definition by National Heart Foundation of Australia (2014), is spaces within the environment that are readily and freely accessible to the wider community, regardless of size, design or physical features and are intended primarily for amenity or recreation purposes- whether active or passive.

Eduardo (2015) in a UN Habitat paper presentation stated the sustainable development goal 11; make cities and human settlements inclusive and safe, resilient and sustainable. Target 11.7; by 2030, provide universal access to safe, inclusive and accessible, green and public spaces, particularly for women, children, older persons and persons with disabilities. Proposed indicator; the average share of the built up areas of cities in open space in public ownership and use.

Concomitantly, the preservation of open spaces have become an important topic in many regions. Policy tools that have been used include: cluster zoning; transferable development rights; proposed land taxes to fund purchases of remaining open spaces; and private organizations that buy land (Geoghegan, 2002-2017). Therefore, benefits of public open space indeed have marked effect on environmental quality and its regulation is imperative to sustainable development. In order to regulate public open space to sustain its mark in urban design for sustainable development, the effective tool is an inclusive and participatory urban upgrade after the covid-19 lockdown. According to Lekwo et al (2013), development control as an effective instrument for urban management ensures that the persistent growth and management of settlements can be such that make for orderliness, improved settlement reflection, healthy and aesthetics. It is also seen as the mechanism to maintain standards. It is a process laid down by legislation, which regulates the development of land and building. It is the professional activity carried out by town planners in order to ensure compliance with approved master plan thereby ensuring orderliness. Basically, there are two instruments or tools often used in the development control process, these are: Enforcement notice and Stop work notice.

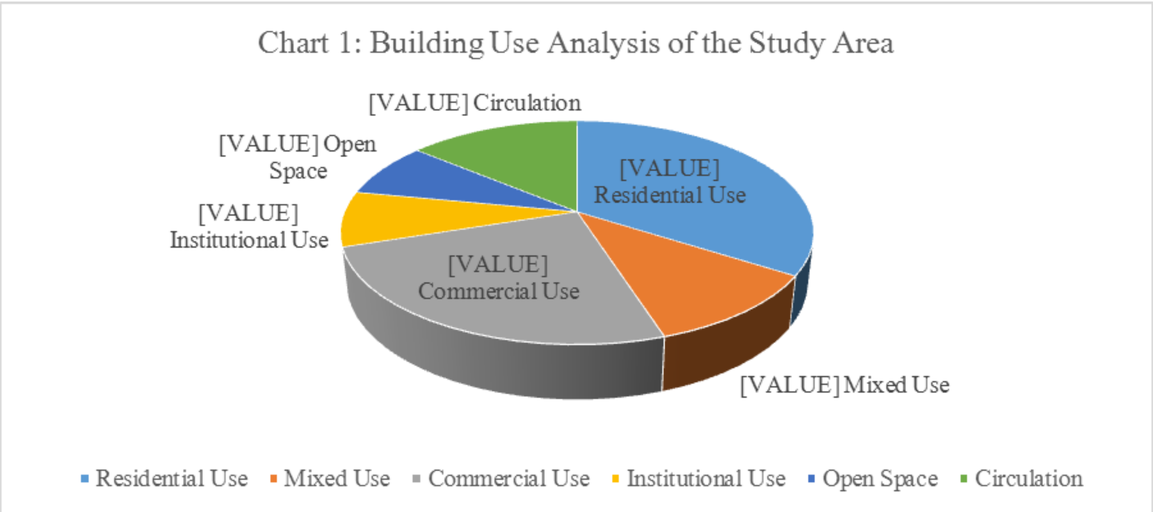
However, social inclusion is imperative for the achievement of sustainable development. World Bank (2020) defines social inclusion as the process of improving the terms on which individuals and groups take part in society-improving the ability, opportunity and dignity of those disadvantaged on the basis of their identity.

Lesson from literature review and further studies includes that, regulation of public open space aims at sustainable development. This paper suggests that regulation of public open space is achievable through recognition of stakeholders for an inclusive and participatory post covid19 pandemic lockdown upgrade Programme. Therefore, regulation of public open space to prevent or check shrinking public open space and urban blight should go beyond physical indicators to gain more understandings about the diversity of users' preference. Also, this study identifies development control as a regulative town planning tool and has highlighted its principles utilized in the correction of examined non-compliance with development plans and statutory enactment for the study area. It therefore requires collective action of all stakeholders in the public and private sector of the study area as well as government in creation of awareness and collective decision making for reduced forced eviction and sustainable development in metropolitan Lagos, Nigeria.

FINDINGS

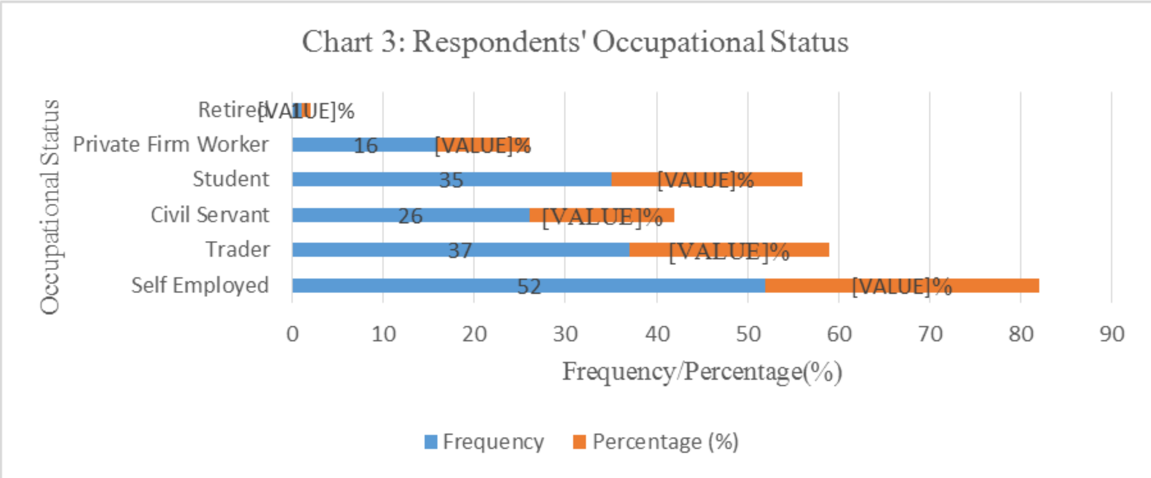
The foregoing discussion of findings reveal the derivative of sustainable urban regeneration of the study area after the covid19 pandemic lockdown:

Chart 1 shows the existing building use in the study area, such as; residential use which makes 34%, while commercial use stands at 25%, whereas mixed use remain at 8%, while institutional use makes 11%, open space stand at 8% and circulation stands at 14%. Therefore, residential building use is predominant in the study area. This indicates that the study area is residential and most likely contain residential facilities and open space.



Source: Authors' Field Work, (2020)

Chart 2 shows respondents' occupational structure, where 30% are self-employed whereas 22% of the respondents are traders, civil servants stand at 16%, while 21% are Students, and private firm workers in for example estate agent, town planning and architectural firms make10%, however 1% of respondents are retired. Therefore, majority of respondents are self-employed mostly owning outlets for distribution of goods or services for multi-international companies in the study area. This suggests likelihood of job loss for employees in this type of establishment during covid-19 pandemic lockdown measure. Also, there might be desperate need to survive after job loss in the study area.



Source: Author's Field Work, (2020)

Table 1 shows analysis of major reasons for non-compliance to open space standards in the study area, 79% of respondents are non-compliant because of desperate need to survive poverty after the covid19 lockdown; 18% of respondent are not compliant because of illiteracy and ignorance to open space standard; while 3% of respondent are non-compliant because of indifference to open space standard. Therefore, majority of respondent in the study area, are non-compliant to open space standard because of desperate need to survive poverty after the covid19 lockdown. This confirms job loss by employees in private firms due to covid-19 lockdown pandemic measure.

Table 1: Respondents' Reasons for Non-Compliance to Open Space Standard

Reason	**Frequency**	**Percentage**
Desperate need to survive	133	79
Ignorance/Illiteracy	30	18
Indifference	4	3
Total	**167**	**100**

Source: Authors' Field Work, (2020)

Table 2 shows respondents' perception of effect of non-compliance with open space standard in the study area, as 1% stand at air pollution, noise pollution makes 7%, while 41% perceives low quality environment and 51% stand at filth. Therefore, filth is the predominant effect of non-compliance with open space standard in the study area. This implies encroachment or non-compliance with open space standard resulting from covid-19 lockdown measure, may be a major hindrance to the achievement sustainable development goal 11 target 11:7. It is worthy of note that LASPARK respondents confirmed these effects as challenges confronting monitoring and management of public open space, parks and gardens in Lagos state.

Table 2: Respondents' Perception of Effect of Non-Compliance with Open Space Standard on the Study area

Effects	**Frequency**	**Percentage (%)**
Air pollution	2	1
Noise pollution	12	7
Low environmental quality	68	41
Filth	85	51
Total	167	100

Source: Author's Field Work, (2020)

Table 3 shows ranking of inventory of environmental facilities which could determine if the study area is a blighted area for post covid 19 pandemic lockdown upgrade. Dapo-Bode Thomas street ranks first, Maye street ranks second, while Sawyer street ranks third and McNeil street ranks fourth. Oyekan street ranks sixth, while Thorbon street ranks seventh, Turton street ranks eight, Ado-Ibrahim street ranks nineth, Harvey road ranks eighteenth, Aje street ranks nineteenth and last. Therefore, Dapo-Bode Thomas street needs immediate attention, as well as all other streets according to ranking for regulation and upgrade.

Table 3: Ranking Inventory of Environmental Facilities in the Study Area for Post Covid19 Pandemic Upgrade

SAMPLED AREAS	Unplanned Area Not Conforming with Planning Standards	Uncontrolled Development	Squatter Settlement	Not Landscaped	No Trees	Floodable Areas	Environmental Pollution	Dirty Environment	Congestion of Squatter Settlement	Low Income Earners	Overcrowded Dwellings	No Piped Borne Water	No Public Taps	No Sewage System	Bad / No Drainage	No Electricity	Uncontrolled Waste	No Public Toilets	Bad Roads	Unplanned Road Network	Difficult Access	Traffic Congestion	No Sidewalks	Parking Problems	Insufficient Schools	No Clinics	Insufficient Recreational Facilities	Poor or Bad Building Codes	No Air Space Setback	Insufficient Setbacks	Unauthorized Construction	Poor Building Materials	TOTAL	RANKING
Ireti streets				×																		×	×						×	×			5	17
Hebert Macauley way	×																		×				×	×					×	×			6	16
Little road	×		×						×		×			×			×			×			×	×						×	×	×	12	5
Sawyer street	×		×	×		×	×							×			×		×	×			×	×						×	×	×	14	3
Montgomery road	×			×					×			×		×		×							×	×						×			9	12
Charles Majekodunmi str	×															×						×	×	×				×					6	14
Maye street	×					×	×				×			×		×		×		×	×		×	×			×		×			×	14	2
Ado-Ibrahim str		×					×		×			×						×						×			×		×			×	9	11
Dapo Bode Thomas street	×	×			×	×			×			×	×	×			×	×					×	×						×	×	×	15	1
Turton street	×		×			×	×			×		×		×		×								×						×			10	9
Thorborn street		×		×	×		×		×				×	×	×					×										×			10	10
Oyekan street		×	×	×			×	×		×				×	×	×		×			×									×			12	6
Akintoye street	×		×	×				×						×			×					×	×	×		×				×			11	7
Aje street			×	×							×								×														4	19
Agard street		×	×	×									×	×		×											×	×	×	×	×		11	8
Harvey road				×	×														×									×				×	5	18
Raymond street		×		×		×						×													×				×				6	15
Mc neil road	×		×	×			×				×			×	×								×			×	×		×	×	×	×	14	4
Chapel street			×					×						×				×			×				×					×			7	13

Source: Authors' Field Work, (2020)

RECOMMENDATION

Having established that sampled areas in the study area have become areas of urban blight due to non-compliance to public open space standards after covid 19 pandemic lockdown, the following recommendations are hereby suggested for sustainable development:

Inclusive Urban regeneration to upgrade and improve sampled area according to ranking for effective treatment of urban blight which has eaten into its environmental quality. This should be implemented through social inclusion, ensuring all stakeholders of the study area are adequately sensitized alongside concerned agencies such as Lagos state parks and gardens, LASPARK and Lagos state urban renewal agency, LASURA. Stakeholders' sensitization through mass media, seminars, and symposium on the danger of encroachment on public open space will enhance sustainability of development in the study area.

Implementation of Smart Development Plans and Smart Monitoring

Smart development plans and current public open space/environmental models must be utilized in order to regulate elements of urban design contained in the study area development plan and ensure its accessibility in the built up environment. Urban squares and plazas, urban parks, and community gardens, these types of public open space commonly found within or adjacent to urban built up areas with an ultimate aim to fulfill urban population's recreation needs. Public open space regulation therefore, must take into consideration attributes of target population such as demographic variables, density, values and preferences.

Smart monitoring is essential to ensure sustainability of public open space. Optical devices/cameras for digital city surveillance, ICT (internet based technologies) and e-government services should be encouraged to ensure sustainability of green environment for improved health and quality of life in smart metropolitan Lagos.

CONCLUSION

This paper reveals a link between the covid-19 pandemic and encroachment on public open spaces. It identifies the urban poor's need for survival after the covid 19 pandemic lockdown as the major reason for non-compliance with public open space standards and encroachment on public open space. Other reasons for encroachment on public open space in Metropolitan Lagos, Nigeria may include urbanization and non-security of tenure. Also, that an inventory of environmental facilities after the covid-19 lockdown which revealed Sabo-Yaba, is an areas of urban blight and requires an upgrade, are as follows: unplanned area, not conforming with planning standards, uncontrolled development, squatter settlement, not landscaped, no trees, floodable areas, environmental pollution, dirty environment, congestion, low income earners, overcrowded dwellings, no piped borne water, no public tap, no sewage system, bad/no drainage, no electricity, uncontrolled waste, no public toilets, bad roads, unplanned road network, difficult access, traffic congestion, no sidewalks, parking problems, insufficient schools, no clinics, insufficient recreational facilities, unplanned markets, poor or bad building codes, no air space setbacks, insufficient setbacks, unauthorized construction and poor building materials. Also non-compliance with public open space standards is confirmed and its major effect is filth in the study area. Hence, the necessity for implementation of smart development plans and statutory enactment through a humane town planning regulatory tool. For a participatory urban regeneration, identification, sensitization and inclusion of stakeholders is required for prevent shrinking public open space due to encroachment and blight, for reduced forced eviction and ensure sustainable development in Lagos, Nigeria.

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LITERARY INDICES AND VALUES TO LITERARY COMPOSITION IN TERTIARY INSTITUTION

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ABSTRACT

Literary elements are diverse in nature with diverse contribution to the evolution and development of literary composition across the classes in the polytechnics, colleges of education and the university. These are particularly interesting as such elements as figures of speech, idiomatic expression as well as proverbs elivens and generate unimaginable value to literary compositions such as missive, essay, article, and summary, comprehension and interpretation including other forms of writing for publication. Others are epithet, purgation, peripetia, hamatia, epilogue, monologue, prologue and catharsis. However, the quartet and triumvirate of figure of speech, idioms and proverbs are the feelings of this paper.

KEY WORDS: Literary, Composition, Institution, Values, Indices

INTRODUCTION

Literary elements or indices are values added to literary composition across tertiary levels of education in Nigeria. Such elements also encapsulate embellishments, coloration and direction to composition across the levels. Figures of speech are countless in nature and each of every aspect is specifically distinctive and diverse. Some examples of such figures of speech are simile, metaphor, personification, irony, euphemism, hyperbole, including pun and others.

Idioms are subject to intuitive interpretation and analysis. Idioms are embedded to some extent in overlapping concept with related figures of speech. Idioms as one of the literary indices are universal in nature while proverbs to a large extent are embedded in local, environmental and regional coloration and content.

The problem
How can literary indices be integrated into the teaching of literary composition?
What are the values to be derived from literary devices?
What can be derived from the teaching of literary indices?

TEACHING OF LITERARY INDICES IN TERTIARY INSTITUTION

Figures of speech abound in every aspect of human endeavor and subject of interactive sessions between class mates, colleagues, friends, neighbors and family members. Prose journalist, lawyers, broadcasters, lecturers and other professionals also apply figures of speech to deepen and emphasize interactive sessions within and outside their jurisdiction as well as to the pleasure of members of the public. Some of such figures of speech also improve the mind of sender and receiver alike in a communication equation. Simile is about indirect comparison between two or more objects. The comparison in the area of simile compare to metaphor is specifically 'mild'

Examples are:

- *The husband of Bosede is as a pig.*

- *John was like a lion in the football match between Nigeria and Ghana Yesterday.*

A decoded analysis and perusal of the above examples of simile show that 'AS'and 'Like' as used above are indicator.

More examples of simile are as follows:

My father is as fast as an horse
Oluwole is as brave as a lion.

Metaphor is about indirect comparison between two or more objects. However, the comparison in the area of metaphor is highly striking.

Some examples are
- *The children of our president are palm trees.*
- *Jumoke the wife of Akeem is an elephant.*
- *Jack is a lion*

From the metaphoric examples paraded above 'AS' and 'Like' are conspicuously eliminated. These are the differences between simile and metaphor.

Hyperbole tilted towards the direction of the grapevine. There is overlapping concept between metaphor and hyperbole. Aspect of metaphor may also subsist for hyperbole. Examples of such aspects may subsist in both environment without bias. Scholars are to take cognizance of this so as to avoid unnecessary hype and confusion. For instance, elementary biology indicate that elephant is the biggest animal on land. So, the comparison that indicates somebody is an elephant is metaphor and hyperbolic in content and substance.

This is the opposite of the surface value of the statement **Irony** is about comparison that deals with subject to contextual interpretation. This is when a speaker says one thing and means the opposite of it.

For example :

- *The two sons of zebedee are gentlemen of the road.*
- *Sandra`is an intelligent girl who has never passed any examination.*
- *The lazy team will be given a meritorious award.*
- *The girl that arrived late came too early.*

Contextually, the two sons of Zebedee can't be gentlemen as armed robbers. Again, intelligent girl should pass exams always. So Sandra is an opposite of the surface value of the above statement. Furthermore, the lazy team cannot be given a meritorious award.

Euphemism tends to ameliorate a highly grave situation. *Death* is a heavy word in human existence. *Death* is very harsh. However, diction or choice of words reflected in euphemism are sympathetic and not harsh.

Examples below are Euphemistic in nature.
- *The woman has joined her ancestors at the ripe age of ninety five (95') years.*
- *The old jerry has kicked the bucket*

A perusal of the above examples show that the word *Death* is astutely avoided.
Another interesting aspect of figures of speech is what is known as pun.
Pun is specifically to play with words and play on words in different contextual appreciation. From the surface level, pun may sound tautological and repetitive from a thorough examination, pun is highly reasonable and there is element of sense encoded to be decoded by a discerning mind. Pun specifically enlivens, didactic and holds the audience spell-bound. Some instances of pun are below.

- *Michael was at the bar beach, he stole a bottle of wine from the bar, was arrested by the police and kept behind the bar.*
- *A plantain planter, planted plantain in a plantain plantation.*

From the above submission in the area of pun, words have been rolled-together and inter-mixed contextually.

Personification ascribes human qualities to inanimate objects. It may be used consciously and unconsciously. It is a situation where inanimate objects, ideas or things of abstract qualities are made to behave as if they are human beings. In other words human characteristics of actions, feelings thoughts e.t.c. are given to lifeless objects.

Instances are:

- The trees are dancing
- The sun is smiling
- Walls watch in silence
- Heaven is crying
- The moon is awake.
- The wind whispers behind the curtains.

Proverbs are literary elements that localities and environment appreciate specifically in African context. There are elements of oratory in proverbs. Orators deploy proverbs to drive-home their points and subject the audience to feelings of intrigues and happiness.
Chinua Achebe applied proverbs extensively in most of his classics particularly Things fall apart, Anthills of the savanna, There was a country, A man of the people and No longer at ease.

For instance, cola is a fruit that is specifically Symbolic to celebration contextually in African milieu. Traditionally, marriage cannot be contracted without colanut. Also, cola is a conspicuous item in naming ceremony, thanks giving, town hall and other general meetings. *So, in things fall apart*

Chinua Achebe says that:
- *He who brings cola brings life.*

So, there is a nexus between cola and human existence in African context particularly in the eastern part of Nigeria.

- Many hands good for work and not good for feeding

  Intuitively, it means large portion of work can be accomplished with many hands (labour) while large portion of food (meal) can be costly with many mouths to feed.

- *The child is the father of the man*.

  This means that the child will eventually grow up to take care of the father in his old age.

- *Next market day discourages deification in the market today.*
  This means that tomorrow is relevant to discouragement of evil practice.
  In Shakespeare's Julius Caeser:

- *He that is blind may not forget the sight of eyes lost*

Idiomatic expressions as well as proverbs and figures of speech are very vital to teaching and learning in tertiary institutions. Idiomatic expression make the language very rich. It is a phrase whose meaning is different from the literal meanings of the individual words it contains. They improve our speech and writing.

Idioms are universal in nature and content. Some examples of outstanding idioms are
John is a bolt from the blues: this means that john is from non important background but now important

- To pull the rug from one's feed: This means to discourage somebody
- To take the wind from the sale of somebody, this is to keep somebody in a disadvantage
- From grass to grace: This is about struggle from retched background to success.
- To eat from hand to mouth. This is about somebody in difficulty.
- In a rat race: chasing of invaluable ideals
- To kick the bucket. This is about death.

That means that the scar of an injury is indelible.

BACKGROUND TO THE STUDY

The researchers have been teaching *communication skills, use of English* and literary appreciation in the polytechnic across the levels of National Diploma(ND) and Higher National Diploma (HND). Formal and informal correspondence, summary, comprehension and interpretation, continuous writing, which is about written communication are heavily expressed as aspects of communication skills. So, elements of literature such as figures of speech, idiomatic expression including proverbs are ingredients that scholars apply as raw materials to drive home points, deeper explanation, add value, coloration and embellishment in a class room environment and purpose of research.

AIM AND OBJECTIVES

Very important to draw the attention of scholars to the fact that every piece of writing that is about literary composition devoid of idiomatic expression, proverbs and figures of speech is like soup without Salt. These literary elements encapsulate human existence per-excellence. These literary aspects though perceived as ordinary are in the area of oratory and coated tongue specifically in speech or orality. In writing, scholars are specifically encouraged to probe deeper into meaning of such literary elements and these also encourage research and scholarship.

METHODOLOGY

Professionals from across departments within and outside Yaba College Of Technology (Yabatech) generated materials used to flesh up the skeletal materials available at the beginning of the research. Literary elements as relevant to literary composition are a title so interesting to scholars across tertiary institutions in and outside Nigeria irrespective of department.

Meta – analysis, a product of Gene Glass, is a systematic review of a focused topic in the literature that provides a quantitative estimate for the effect of a treatment intervention or exposure.

The techniques used in meta- analysis provide a structured and standardized approach for analyzing prior findings in a specific topic in literature. It gives credence to the analysis of literary indices and it brings out their values to literary composition.

So, materials and the gathering of materials became handy from across the levels of class interaction including assignment extended to students in the class-room and answer to such questions. All these became useful and helpful to this research.

RECOMMENDATION

From this research there is ample evidence that suggest a crucial need to inculcate literary elements in the teaching of literary compositions and other forms of writing for publication in tertiary institutions of learning. Literary indices have fundamental roles to play in dealing with literary compositions including correspondence, summary and comprehension. These literary indices such as figures of speech, idiomatic expression and proverbs deepen the knowledge of scholars and students and also enlivens.

There is also entertainment value inherent in most of these literary elements particularly pun, alliteration, irony including idioms and proverbs.

This paper hereby recommends to National university commission (NUC) National Board for Technical Education (NBTE) and other educational body particularly concern about higher education to ensure that literary elements are strictly applied to teaching of literary compositions inside and outside classroom environment in Nigerian tertiary institutions.

Lecturers from the department of languages in the polytechnics and colleges of education may be compelled to draw the attention of students to these literary elements. Lecturers particularly from the English and literary units should be encouraged to delve into this area of academic experience.

SUMMARY AND CONCLUSION

Literary elements are crucial to the development of literary composition. Every literary composition including letter, essay, summary, comprehension and interpretation as well as other forms of writing for publication are embedded in literary indices and elements that added value and color. Drama, poetry and prose are the three Genres that are crafted in literary elements. Apart from figures of speech, idiomatic expression, and proverbs including flashback, prologue, purgation, epithet as well as soliloquy are crucial to literary composition. Soliloquy is particularly a product of drama which has to do with the *up-welling of the mind* in vibration of inner thought.
Purgation is also highly outstanding in the sense of its purification of the society.

Prologue is pronounced even in the village gathering and meetings particularly in African community and locality. It tends to throw light on events unfolding particularly in drama and prose.

Apart from writing the literary elements are also more in orature from time to time which are subject of interactive sessions.

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THE EFFECT OF HUMAN RESOURCES TRAINING AND DEVELOPMENT ON ORGANISATIONAL PERFORMANCE

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Abstract

The need for high productivity to address the socio-economic challenges has been the target of nations globally. Meeting this target needs competent human resources that would utilize available resources maximally. This research titled "Effects of Human Resource Training and Development on organizational performance in Nigeria" is written to critically ascertain the extent to which training and development has improved performance of business organizations in Nigeria and the economy at large. The researcher elicited data from primarily secondary sources. The paper concludes that the organizations that invest in their human resources perform better than those who don't. Thus, the paper recommends that training and development programme should be allowed to flourish through adequate funding of the programme and every employee should be given equal opportunity to benefit.

Key words: Training, Development, Human Resources, performance, Productivity

1. Introduction

Training and development have become the most important factor in the business world today, because training increases the efficiency and the effectiveness of both employees and the organization (Raja, Furqan and Khan, 2011). Training and development are not undertaken for the sake of training, but rather are designed to achieve some needs. Therefore, training and development are need based in the sense that they are undertaken to fill some knowledge gap within an organization.

Training is a systematic restructuring of behaviour, attitude and skills through learning- education, instruction and planned experience. Training is designed to change or improve the behaviour of employees in the work place so as to stimulate efficiency. The cardinal purpose of training is to assist the organization achieves its short and long term objectives by adding value to its human capital.

According to Raja et al (2011) Training and development is a very important tool for an organization to compete in this challenging and changing world. Facing fierce competition and ever rapidly changing market environments, large corporations must find ways to improve productivity, efficiency, customer service, staff retention and other key drivers of corporate profitability (Training and development) should they want to be more profitable and be competitive in the industry (Vitcet, nd; Nguyen, 2009).

Performance is the benchmark of measuring the success and progress of any living organization (Sarminah, 2013). Thus, every organisational success is made possible by the efforts of its workforce. Measuring performance is a vital part of monitoring an organization's progress (Maina and Onsongo, 2013). It comprises measuring the actual performance outcomes or results of an organization against its intended goals. Organisational performance is very significance for any successful organizations.

New teaching-learning and training methods are arising due to the modern-day revolutionization in the economic, labour and technological world of workforce. These changes demand to put the theory and practice behind, while prioritizing the more global, integrated, flexible and vocational training (Abeeha and Bariha, 2012). For example the introduction of e-banking system has rapidly changed work process in the banking industry, thus the need for constant up date of knowledge by the employees to meet the continuous challenges. As a result most banks in Nigeria in recent years keep retrenching and recruiting new employees.

Smith (2010) opines that training motivates employee and make them more productive and innovative. Smith asserts further that the reasons why training makes sense include, well-trained employees are more capable and willing to assume more control over their jobs; they need less supervision, with free management for other tasks; employees are more capable to answer questions from customers which enhances customer loyalty. Furthermore, employees who understand their job, complain less, are more satisfied and more motivated and thus improve management-employee relationships. Heathfield arguing in the same direction opines that the opportunity to continue to grow and develop through training and development is one of the most important factors in employee motivation.

Since training and development include all attempts to increase productivity by increasing an employee's ability to perform better, its importance need not to be under-rated as cost of training employees is obviously an investment to the organization.

The perception of employees on training has a greater impact on the success of any organization. If the employees are satisfied with the training policies of the organization, this will have a positive impact on the organization's productivity. The perception or attitude of employees is transformed into positive or negative behaviour. How do the employees see employee training policies of the organization? How seriously does the Management take the Training Policy of its organization? Some see training and development as a waste of time and resources that would have been employed in the production of goods and services that will yield profit to the organization. Sometimes, the fear that an employee could leave the organization after training affects the employees training and sometimes makes it unplanned and unsystematic.

The procedure and process usually adopted by some Human Resource Departments in the identification of those employees that require training are worrisome. For instance, employees sometimes go for training for personal reasons which include enriching themselves; preparing themselves for other positions in other organizations; power play/politics; because he/she knows the person in-charge of training and not necessarily because there is an identified skill gap which needs to be filled through training. Often times, the Human Resource Department does not conduct training needs assessment. Employees training selection criteria ought to be systematic and free from bias. It must follow a lay down procedure to ensure that the right candidates are sent for training for positive effect on organizational performance.

In order to fill this gap, the researcher is compelled to conduct a study on the effect of employee training and development on organizational performance with focus on processes and procedures of identifying appropriate employees for training, training design and delivery style and employee perception towards.

2. Review of Related Literature

2.1 Conceptual framework

The Concept of Employee Training

Training is considered as the process of improving the existing skills, knowledge, exposure, and abilities in an individual (Azara, Syed and Muhammad, 2013). According to Saleem and Mehwish (2011) training is an organized increase from the know-how skills and sensations needed for staff members to execute efficiently in the offered process, as well as, to operate in underling situation. Laing (2009) defines training as an indicator to enhance superior skills, knowledge, capabilities and outlook of the employees that results in effective performance of the workers.

Ofobruku and Nwakoby (2015) perceived training as the process of developing employees' skills and learning new concepts, rules or attitudes in order to increase effectiveness on a particular job. Dialoke (2015) viewed training as teaching or developing in oneself or others, skills and knowledge that relate to specific useful competencies.

Wajdi, Khalil and Maria (2014) perceived training as a planned process to modify attitude, knowledge, skill or behavior through learning experience to achieve effective performance in an activity or range of activities.

Training has become the Holy Grail to some organizations, an evidence of how much the management truly cares about its workforce (Hamid, 2011). Hamid (2011) went further to say that the effectiveness with which organizations manage, develop, motivate, involve and engage the willing contribution of those who work in them is a key determinant of how well these organizations perform.

Ejete-Iroh, Chukwuemeka and Jasper (2010) opined that human resources are the most important assets of every organization as policies and programmes of the organizations are solely integrated and articulated by them towards achieving the desired organizational goals.

Types of Employee Training

There are several typologies of training employees within and outside the organizations.

Managers as well as administrators choose the best methods they perceive to fit their training needs when they are required. However, the following type of employee training exists in the literature.

Armstrong (2009) submitted accentuates that training of employees can take the following forms; manual skills, including modern apprenticeships; information and technology skills, team leader or supervisory training; management training; interpersonal skills e.g. leadership, team building, group dynamics, neuro-linguistic programming; personal skills e.g. assertiveness, coaching, communicating, time management; training in organisational procedures or practices, e.g. induction, health and safety, performance management, equal opportunity or managing diversity policy and practice. Other scholars argued that there are training meant for non-managerial employees as well as managerial employees.

Bohlander, Snell and Sherman (2001) contended that training meant for non-managerial employees include; on-the-job training, apprenticeship training, cooperative training, internships, and government training, classroom instruction, programmed instruction, audiovisual training, computer based training (CBT) and simulation training. In this study, two approaches or methods of employee training will be examined. These are on-the-job training and off-the-job training.

On-the-job training

On-the-job training simply means training an employee to complete a task or function when they are already hired and working (www.study.com). Ivancevich, 2004) argued that on-the-job training is when an employee is placed into the real work situation and shown the job and the tricks of the trade by an experienced employee or the supervisor. Noe, et al. (2004) asserts that on-the-job training refers to training methods in which a person with job experience and skill guides trainees in practicing job skills at the workplace. They argued that on-the-job training takes two dimensions which are apprenticeships and internships.

Apprenticeship is a work-study training method that teaches job skills through a combination of on-the-job training and classroom training (Glover, 2008). Internship on the other hand is on-the job learning sponsored by an educational institution as a component of an academic programme (Noe, et al., 2014).

Methods of on-the-job training

The methods of on-the-job training include the following:

1. Job Rotation: This type of training involves the movement of the trainee from one job to another.

2. Coaching: The trainee is placed under a particular supervisor who functions as a coach in training the individual.

3. Job Instruction: This method is also known as training through step by step.

4. Committee Assignments: Under the committee assignment, group of trainees are given and asked to solve an actual organisational problem

5. Apprenticeship: Apprenticeship is a formalized method of training curriculum program that combines classroom education with on-the-job work under close supervision.

Advantages of on-the-job training

The advantages of on the job training as elucidates by www.whatishumanresource.com include the followings:

1. It is directly in the context of job

2. It is often informal

3. It is most effective because it is learning by experience

4. It is least expensive

5. Trainees are highly motivated

6. It is free from artificial classroom situations

Disadvantages of on-the-job training:

The disadvantages of on-the-job-training as highlighted by www.whatishumanresource.com are as follows:

1. Trainer may not be experienced enough to train or he may not be so inclined.

2. It is not systematically organized

3. Poorly conducted programs may create safety hazards.

Off-the-job training

In this type of method, employees or trainees receive trainings from trainers outside the organization. Secondly, it involves a type of training where the location for the training is far away from the workplace. Rothwell and Kazanas (2004) also argued that off the- job training is very necessary when a large number of staff have a similar training requirement and when there are adequate skills and resources for the design and provision of training. Off-the-job training is very significance to organisational success especially in terms of distraction and other job related stress. It also gives employees the opportunity to meet with other colleagues from similar industries especially in conferences and workshops.

Method of off-the-job training

The methods associated with off-the-job-training as elucidated by www.whatishumanresource.com include the following:

1. **Classroom Lectures:** under the off the job methods of training, classroom method or lecture method is well-known to train white collar or managerial level employees in the organization (www.whatishumanresource.com).

2. **Audio-Visual:** Providing training by way of using Films, Televisions, Video, and Presentations etc (www.whatishumanresource.com).

3. **Simulation:** In the simulation training method, trainee will be trained on the especially designed equipment or machine seems to be really used in the field or job.

Concept of Employee Development

Employee development is a joint initiative of the employee as well as the employer to upgrade the existing skills and knowledge of an individual. It is of utmost importance for employees to keep themselves abreast with the latest developments in the industry to survive the fierce competition. Believe me, if you are not aware of what is happening around you, even before you realize you would be out of the game. As they say there is really no age limit for education. Upgrading knowledge is essential to live with the changes of time. Employee development goes a long way in training, sharpening the skills of an employee and upgrading his/her existing knowledge and abilities. In a layman's language, employee development helps in developing and nurturing employees for them to become reliable resources and eventually benefit the organization. Employees also develop a sense of attachment towards the organization as a result of employee development activities.

Need for Training and Development in the Organization

It is important that all employees be inducted into training and development programmes in order to improve their job related knowledge, skills and performance. The need for training and development in hospitality industry as noted by Yalokwu (2006) and Ezeani (2006) are given thus:

i) **Increased productivity:** Adequate human resource training and development increases skill, which improves the quality as well as quantity of output, this result to increase in the level of performance.

ii) **ii. Improvement in employee morale:** Training and development improves needed skills, which builds up confidence and satisfaction. This in turn develops enthusiasm and pride, which are indicative of high morale.

iii) **iii. Availability of skilled workforce for future personnel needs of organization:** Good training and development programmes develop employees and prepare them for future managerial and executive responsibilities positions. Accordingly, when the need arises for personnel changes, the internal sources can be utilized more effectively.

iv) **iv. Improvement in health and safety:** Proper training and development programme can help prevent industrial accidents and create a safer work environment, since experience and knowledgeable workers are less prone to accidents.

v) **v. Reduced supervision:** Trained employees supervised themselves, they are responsible and expect more freedom and autonomy and less supervision. This, therefore, promotes the spirit of participation and teamwork in hospitality industry.

vi) **vi. Personal growth:** Training and development programmes give the participants a wider awareness, a sense of self-satisfaction and fulfillment, an enlightened perspective and value system that support personal growth.

vii) **vii. Organizational stability:** Training and development programmes can foster the initiative and creativity of employees, which increase the sense of inquisitiveness and improved skills as it prevents manpower obsolescence. There is no greater organizational asset than that of trained and motivated employees.

Measuring the Impact of Training on Organizational Performance

valuating the impact of investments in people (such as training) helps to justify the costs incurred, validate the intervention as a business tool, and aid the design and selection of future investment methods (Page, Jagger, Tamkin and Henwood, 2006). Page et al (2006) further assert that in practical terms, isolating the impact on the bottom line is complex and therefore many organizations do not try to measure it very rigorously. Evaluation is a systematic process of determining the significance or worth of subject, using criteria governed by a set of standards. It can assist an organization to ascertain the degree of achievement or value in regards to the aim and objectives of an undertaken project.

The primary aim of evaluation, apart from gaining insight into prior or existing initiatives, is to enable reflection and assistance in the identification of future change (Sarah Del Tufo, 2002)

i. Organizational Performance Measurement

Many measures of performance may be more relevant to some sectors than others. When measuring organizational performance, the choice of measures should be informed by the sector and business-specific context (Page et al, 2006). Measurement of organizational performance is not without its challenges. Measures based on accountancy are to some extent, open to manipulation and therefore may be difficult to compare over time, or between organizations. Many measures do not necessarily capture the quality of a product or service and where part-time work is frequent and to be comparable, measures need to take into account hours worked (Page et al, 2006).

Page and others developed a set of 'core' measures of organizational performance that have general application, to enable benchmarking and comparison across sectors. The 'core' set of measures include:

- Productivity: Productivity could be measured using Net added value per hour worked or Net added value per worker. However, this measure will be affected by investments other than those in skills and training, for example in capital
- b. Profitability: Return on assets is a useful measure of profitability, and measures how well a company is using its assets to generate earnings. However, values can vary substantially between companies and between sectors and therefore for wider benchmarking purposes profit per employee may be more effective.
- c. Quality: Manufacturing organizations could estimate quality using the Number of defects in a given number of products. More generally, customer satisfaction could be used. Exactly how customer satisfaction is measured is likely to vary from organization to organization.
- d. Innovation: Sales (N) from new or adapted products or services is a measure that could be used to benchmark innovation across sectors and which takes some account of the success of the innovation
- e. Staff performance: Employees' performance is appraised against preset standards.

ii. Employee Performance Indicators

Tracking employee training and measuring training effectiveness is a key objective of any HR department. To ensure that there is adequate return on investment in training of new and current employees, the organization has to establish key performance indicators (KPI). KPI if created and tracked properly serve as a benchmark for measuring the progress of employees towards a set of broader based goals or objectives (Lilly, 2011). However, most organizations are faced with the challenges of developing a good KPI.

Lilly (2011) suggests that quality key performance indicators for tracking employee training effectiveness should include: Measurable and quantifiable indicators; Competency based indicators; Linked to proficiency indicators; and Mapped to organizational and employee goals indicators. Hakala (2008) explains that performance measurement uses the following indicators of performance

- Quantity: This indicator places emphasis on the number of units produced processed or sold against the set standard i.e. the number of units to be produced, processed or sold
- Quality: The quality of work performed can be measured by several means. The percentage of work output that must be redone or is rejected is one such indicator. In a sales environment, the percentage of inquiries converted to sales is an indicator of salesmanship quality.
- Timeliness: This indicator measures how fast work is performed or how fast services are provided. For example, in a service industry, the average customer's downtime is a good indicator of timeliness, while in a manufacturing outfit; it might be the number of units produced per hour.
- Cost-Effectiveness: The cost of work performed should be used as a measure of performance only if the employee has some degree of control over costs.
- Absenteeism/Tardiness: An employee is obviously not performing when he or she is not at work. Other employees' performance may be adversely impacted by absences, too.

- Creativity: It can be difficult to quantify creativity as a performance indicator, but in many white-collar jobs, it is vitally important. Supervisors and employees should keep track of creative work examples and attempt to quantify them.

- Adherence to Policy: This may seem to be the opposite of creativity, but it is merely a boundary on creativity. Deviations from policy indicate an employee whose performance goals are not well aligned with those of the company.

- Gossip and Other Personal Habits: This indicator may not seem performance-related to the employee, but some personal habits, like gossip, can detract from job performance and interfere with the performance of others. The specific behaviors should be defined, and goals should be set for reducing their frequency.

- Personal Appearance/Grooming: Most people know how to dress for work, but in many organizations, there is at least one employee who needs to be told.

2.2 Empirical Studies

Audu J. and Gungul T. (2014) conducted a research on Effects of Human Resource Training and Development on Productivity in Nigerian Hospitality Industry. The objective of the study was to ascertain the extent to which training and development has improved productivity in the hospitality industry. The researchers elicited data from both secondary sources and primary sources like questionnaire, interview and observation. The population of the study was 482 from which a sample size of 98 was selected. The methods of data analysis used were simple percentage and other statistical method. The paper concluded that the hospitality industry in Nigeria could be improved through training and development of human resources. Thus, the paper recommended that hospitality industry should prioritize training and development of their employees by injecting more funds into such human resource programmes so as to ensure improved productivity.

Edeh O. F. and Nwaji C. C. (2017) conducted a study on Employee Training and Organisational Performance of Selected Deposit Money Banks in Abia State, Nigeria. The objective of the study was to examine the association between employee training and organizational performance of deposit money banks in Abia State, Nigeria. A cross-sectional research survey was employed. Target population comprised all deposit money banks in Abia State, Nigeria. Forty top level managers were surveyed. Simple random sampling technique was employed. A sample size of thirty six (36) was ascertained using Krejcie and Morgan (1970). Both secondary primary sources of data were used. Spearman's Rank Order Correlation Coefficient (rho) statistical tool with the aid of statistical package for social sciences (SPSS, 20.0) was used. The study found that employee training has a positive significant relationship with organisational performance. It concluded that employee training that is measured in terms of on-the-job training and off-the-job training promotes organisational performance of deposit money banks. The study recommended that; bank executives should encourage on-the-job training to enhance the skills of their employees so that organisational performance can be achieved; and secondly, managers and other financial institutions administrators should equally adopt both on-the-job training and off-the-job training for organisational performance to be enhanced.

Cross O. D. (2018) conducted a research on Effects of Training on Organizational Performance. The research attempts to find out the impact which training has employee performance bearing in mind that the aggregate of individual performance will culminate to organizational performance. The study considered the microfinance bank sub-sector from which three banks were selected. Data was collected from 304 respondents who were drawn using Taro Yamane sample size determination technique through structured questionnaire. The data collected was subjected to both descriptive and inferential techniques were used to test formulated hypotheses. The study showed that employee skill, knowledge and ability gained from training has significant effect on productivity. Further findings reveal that training has effect on employee commitment to the organization. The conclusion is that training enhances employee performance as well as employee commitment to the organization. It is therefore, recommended that microfinance banks and all organization should take more active interest in the training of its employees.

Enyioko V. U. & Ikoro E. I. (2017) conducted a study on Effect of Employees Training on Organizational Performance: A Study of Seven-Up Botlling Company, Enugu State Nigeria. The objective of the study was to ascertain the extent to which training delivery style affects employee productivity; to determine the relationship between employee perceptions of training and organizational productivity; and to determine the extent to which employee training affects organizational performance. In pursuit of the objectives, a survey research was carried out in Enugu State, Nigeria. The population used for the study was 110 staff of 7UP Bottling Company. Sample size was determined using Taro Yamane (1964) formula. The study made use of data from primary and secondary sources which were collected using questionnaire administered to the 110 staff of the selected Organization. Personnel records and annual reports of the selected Organizations were used for secondary data. The data analyses was carried out using the Statistical Package for the Social Sciences (SPSS version 22), while the person product moment correlation coefficient and the one-sample test were used to test the hypotheses formulated in the study. Findings from the study reveal that the extent to which unsystematic approach of employee training affected organizational productivity was high. The study concluded that if the right employees are sent on training through the systematic training procedure of identifying and selecting employees for training, there would be a significant improvement on the organizational performance. It was recommended that a mechanism should be created for proper assessment and evaluation of employee performance after training as this will ensure that only employees who require training are sent on training.

2.3 Theoretical Framework

This research is based on the HRD-performance linkage model which is a diverging model from the HRM-performance linkage models of Becker and Huselid (1998) and Wright et al. (2003) whose core philosophy suggests that HR practices have a direct impact on employee skills and motivation, which are subsequently translated into improved operating performance that has a direct impact on financial performance.

The HRD-performance linkage model is based on the resource-based view (RBV) which states that increasing employees' abilities and motivation, through HRD will ultimately improve organizational performance (Lopez et al., 2005). The central element of the RBV of human resources is the positive relationship between HRD and organizational performance (Mayo, 2000; Mabey & Ramirez, 2005). The RBV perspective advocates that the potential for competitive advantage of an organization is based on its ability to exploit the inimitable characteristics of its pool of human resources and capabilities.

The pool of employee resources and capabilities on which the RBV perspective is based, considerably depends on employee resourcing and development (Appelbaum & Reichart, 1998). The processes of resourcing and development aimed at providing increased skills to employees have a direct impact on their attitudes, such as motivation, commitment and satisfaction (Bartlett, 2001; Fey et al., 2000; Wright et al., 2003).

Employees' attitudes and behaviours generally depend on the HRD policies and procedures the organization is using. Employees' attitudes influence their behaviour which subsequently influences organizational performance (Wright et al., 2003). It is argued that employee turnover is heavily influenced by job satisfaction, motivation and organizational commitment (Hardre, 2003). It is also argued that satisfaction usually precedes organizational motivation and commitment while job satisfaction, organizational motivation and commitment are strongly interrelated (Bartlett, 2001).The basic causal pathway of this HRD-performance linkage model is as stated thus:

Resourcing → Development → Skills → Attitudes → Behaviour → Performance

Considering this causal pathway, the general framework of the mediating models is indirect linkage or hierarchical linkage through the outcomes of skills, attitudes, and behaviour between development and organizational performance (Black, 2001). In these models we may also see a direct linkage between the individual policies of resourcing and development and the individual outcomes of skills, attitudes, and behavior and organizational performance (Schuler& Jackson, 1999). However, these linkages may not be present at the same time. It may be possible that in the absence of a direct linkage, some policies may significantly contribute to organizational performance through the intervening process.

Furthermore, this intervening process may be 'moderated' by organizational contextual variables. By appropriately managing these moderating organizational features: management style, organizational culture, size, life cycle stage, union intensity and capital intensity, HRD has the potential to be a source of competitive advantage (Ferris et al., 2007).

Conclusion

This study examined the impact of training and development on organizational performance. From the empirical researches consulted, the study concludes that employee training that is measured in terms of on-the-job training and off-the-job training promotes organisational performance.

Recommendations

Though, it has been established that training and development programme play a significant role in any organization, nevertheless, the paper recommends that:

1. Training and development programme should be allowed to flourish through adequate funding of the programme and every employee should be given equal opportunity to benefit.
2. The human resource departments of the organization should draw out an articulated training and development policy so as to be able to avoid the risk of losing its employee to other sectors after being sent on training.
3. The employees in the organization should be adequately motivated through adequate, fair and commensurate reward system in line with their acquired skills.
4. Periodic review of the programme should be carried out to ascertain the extent to which the programme have been successful with view to reviewing it where and when necessary.

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THE EFFECT OF IRREGULAR POWER SUPPLY ON THE ECONOMIC DEVELOPMENT STRATEGY OF NIGERIA

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Abstract

Adequate access to reliable, quality and affordable power is crucial to national economic growth. The Nigerian power industry performance track records and statistics are dismal and appalling. The power supply is characterized by low accessibility, epileptic and poor transmission. The socioeconomic activities in Nigeria have been grossly impacted negatively by insufficient power supply. Yet the huge energy potential available in the country are insignificantly tapped. Therefore the work sought to investigate the effect of irregular power supply on the economic development Nigeria Strategy, the study also x-rays the past and present power situation in Nigeria, the different developmental strategy of Nigeria. The study reported that population, industry,, agriculture, and commercial services are the main determinants of energy demand in Nigeria. The study recommended among others that government should up grade all power distribution and transmission equipment. It was concluded that for development to thrive in Nigeria the attitude and orientation of the implementers of the various strategies must change.

Keywords: *Power, Nigeria, electricity, Energy, strategy, Development, generation. Supply and irregular*

Introduction

The electric power supply in Nigeria is generally believed to be the bone of economic and industrial development in the Country, government has to implement is development strategy for his economic growth and industrialization to take place. In 2016, it was reported that only about 58% of Nigeria's population have access to the national electricity grid and in this percentage, only about 30% of its current requirements are met. The power sector in sub-Saharan Africa (SSA), is in a pathetic state, despite several interventions. The most populous country in the region, Nigeria, is severely affected, even when federal government has privatized the sector, Nigerians were thinking that after the privatization there be regular power supply. The challenges that trail the power sector in Nigeria, seem as they were two decades ago and have deepened in some areas. Before divestiture of Power Holding Company of Nigeria (PHCN) by the federal government in 2013, PHCN was solely mandated to construct and engineer power generating units; maintain and service power grids; operate dams and manage water for power generation, flood control and navigations; resettle; maintain control, protections and communications equipment; maintain scheduling; and analyse security and post contingency. The Power Holding Company of Nigeria (PHCN) started in 1950 as the Electricity Corporation of Nigeria (ECN) and later became the National Electric Power Authority. The running of the PHCN has been lacking in professionalism since inception in 1950 and today, the national grid system is characterized by poor workmanship; poor quality materials; poor standards by foreign and local contractors; cable theft; power theft by consumers; vandalization of pipelines and transformers; court disputes and protests; and much more.

Power is needed to drive industrial machines for the manufacturing of different products, as a result, it contributes, significantly, to national economic growth. The power required to stimulate socioeconomic activity in Nigeria, is grossly inadequate, consequently, there is high rate of unemployment, poverty, high cost of production and services, etc. According to Ebhota and Inambao, (2017) power consumption per capita, is a yardstick for measuring the quality of life and development of a country or region. However, there is an addition to this benchmark in the contemporary energy world, prompted by attributes of modern energy supply. In the contemporary world, the consumption per capita of clean, adequate, affordable and sustainable power is a yardstick for measuring the quality of life and development of a country or region. The aim of this study is to identify the relationship between the development of the power sector in Nigeria and Government developmental strategy.

Until the power sector reforms of 2005, power supply and transmission was the sole responsibility of the Nigerian federal government. As of 2012, Nigeria generated approximately 4,000 - 5,000 megawatts of power for a population of 150 million people as compared with Africa's second largest economy, South Africa, which generated 40,000 megawatts of power for a population of 62 million. An estimated 14 - 20 gig watts of power is provided by private generators to make up for the shortfall. Nigeria has a theoretical capacity of more than 10,000 megawatt generation capacity using existing infrastructure, but has never reached close to that potential.

96% of industry energy consumption is produced off-grid using private generators.

Issues affect all areas of the sector, from generation to transmission to distribution.

Currently the only plan the government has in place to help solve the energy crisis is to expand the fossil fuel burning sector. Alternative forms of energy are not used probably because of availability of oil in Nigeria, as it has the world’s seventh largest oil reserves.

The Nigerian energy supply crisis refers to the ongoing failure of the Nigerian power sector to provide adequate electricity supply to domestic households and industrial producers despite a rapidly growing economy, some of the world's largest deposits of coal, oil and gas and the country's status as Africa's largest oil producer. Currently only 40% of Nigeria's population is connected to the energy grid whilst power supply difficulties are experienced around 60% of the time. At best, average daily power supply is estimated at four hours, although several days can go by without any power at all. Neither power cuts nor restorations are announced, leading to calls for a load shedding schedule during the COVID-19 lockdowns to aid fair distribution and predictability.

Power supply difficulties cripple the agricultural, industrial and mining sectors and impede the Nigeria's ongoing economic development. The energy supply crisis is complex, stems from a variety of issues and has been ongoing for decades. Most Nigerian businesses and households that can afford to do so run one or more diesel-fueled generators to supplement the intermittent supply.

Since 2005, Nigerian power reforms have focused on privatizing the generator and distribution assets and encouraging private investment in the power sector. The government continues to control transmission assets whilst making "modest progress" in creating a regulatory environment attractive to foreign investors. Minor increases in average daily power supply have been reported.

Conceptual Review

Concept of strategy management

In the field of management, strategic management involves the formulation and implementation of the major goals and initiatives taken by an organization’s top managers on behalf of owners, based on consideration of resources and an assessment of the internal and external environments in which the organization operates. Strategic management provides overall direction to an enterprise and involves specifying the organization’s objectives, developing policies and plans to achieve those objectives, and then allocating resources to implement the plans. Academics and practicing managers have developed numerous models and frameworks to assist in strategic decision-making in the context of complex environments and competitive dynamics. strategic management is not static in nature; the models often include a feedback loop to monitor execution and to inform the next round of planning.

Nigeria Development Strategy

Government at different level formulate and implement different development strategies, and many of the this development project has failed because of irregular power supply, The following are the various development strategies that has been adopted at one time or the other. These are: community boards of 1954, the farm settlement scheme of 1959, The First National Development Plan Period (1962-68); The Second National Development Plan Period(1974-1980); The Third National Development Plan Period (1975-80); The Fourth National Development Plan Period (1980-85); and the Post Fourth Plan Period (1985 to 1990), the agricultural development project, operation feed the nation, national directorate for employment, green revolution, mass mobilization for self-reliance and economic recovery, river basin development authority, national accelerated food production Programme, the national livestock development Programme, the directorate of food, roads and rural infrastructures, the integrated rural development programs, the National Economic Empowerment and Development Strategy, the vision 2010, the vision 2020, the seven point agenda of president Yar'adua, the transformation agenda of Goodluck Jonathan, the Economic Recovery And Growth Plan (ERGP) of president mohammed Buhari (PMB) and the World food programme (WFP). (Ohagwu,2010;Ezeah,2005;Ndukwe,2005;Igbokwe and Enwere,2001,Seniyi,1998)

Nigeria had over the year adopted and implement several form of development plan, but suffix to say that they had failed to transform the nation and set it on the path of development, because of so many reason which include irregular power supply, corruption bad leaders etc .The President of Botswana Mr. Festus Mogae, during his presentation had a wise thought for our policy makers, according to him, "Nigeria could grow its economy through focused, honest leadership, with well-defined and coordinated national priorities"(Peterside,2003)

CONCEPT OF ELECTRICITY

Electricity is the flow of electrical power or charge. It is a secondary energy source which means that we get it from the conversion of other sources of energy, like coal, natural gas, oil, nuclear power and other natural sources, which are called primary sources. The energy sources of electricity can be renewable or non-renewable, but electricity itself is neither renewable nor non-renewable. (McGraw-Hill Encyclopedia of Science & Technology, 2002) Electricity is a basic part of nature and it is one of our most widely used forms of energy. Many cities and towns were built alongside waterfalls (a primary source of mechanical energy) that turned water wheels to perform work. Before electricity generation began over 100 years ago, houses were lit with kerosene lamps, food was cooled in iceboxes, and rooms were warmed by wood-burning or coal-burning stoves. Beginning with Benjamin Franklin's experiment with a kite one stormy night in Philadelphia, the principles of electricity gradually became understood. (McGraw-Hill Encyclopedia of Science & Technology, 2002) Thomas Edison helped change everyone's life, he perfected his invention, the electric light bulb. Prior to 1879, direct current (DC) electricity had been used in arc lights for outdoor lighting. In the late-1800s, Nikola Tesla pioneered the generation, transmission, and use of alternating current (AC) electricity, which can be transmitted over much greater distances than direct current. Tesla's inventions used electricity to bring indoor lighting to our homes and to power industrial machines. Despite its great importance in our daily lives, most of us rarely stop to think what university libraries in provision of e-newspapers services would be like without electricity. Yet like air and water, we tend to take electricity for granted. Every day, we use electricity to do many jobs for us, from lighting and cooling our libraries, to powering our computers, library automation cum usage of internet facilities (Agboola, 2011).

Factors responsible for irregular power supply in Nigeria

The factors that affect the efficiency and stability of power supply in any developing country/region can be classified as follows: government policy; economic factor; natural factor; society/community factor; effective energy management; skilled personnel; efficient technology and security factor (Oricha and Olarinoye, 2012). These factors can be broken down to the following factors believed to be responsible for the electric power supply in Nigeria:

Government policy

Government inconsistent energy policies have been a major contributor to the Nigerian energy crisis. For instance, the government's policies for over fifty years now have been favoring monopoly in the power generation, transmission, distribution and sales. From the establishment of ECN in 1950 to the setting up of NEPA in 1972, the policy has been that of having an entity with full control of power generation and supply. If after these years, government is now bringing up policies to unbundle the power sector of the economy, then it is obvious that the earlier policies have not helped the system.

Inefficiency in power generation, transmission, distribution and consumption From the point of power generation in Nigeria, there is over fifty percent power loss. For instance, a study of Delta four power plants revealed a total average power generation of 30.5% out of the installed capacity (Oyem, 2013). This means that a total of 69.5% of power that would have come out of these four power plants and added to the national grid, is lost just at the point of generation. At the stage of transmission and distribution, a reasonable amount of power is also lost due to transmission lines and equipment that are grossly ill maintained or below capacity. At the point of consumption, majority of power consumers in Nigeria leave their electric devices „ON even when they are not needed, because of the default billing method adopted by the power distribution companies. This results to great power loss to the system and also to the over loading of the transmission and distribution equipment.

Incompetent staff of the energy companies

This is a general Nigerian problem where companies especially government firms, employ workers not based on merit and competence but on favoritism and tribalism. Because of this, no government company in Nigeria that requires workers with professional and technical competence has ever succeeded. NEPA and PHCN had staff, majority of which were employed through the back door and therefore, the only thing they seemed to know was how to climb electric poles and cut cables. On November 5, 2013, Nigerians rejoiced as government handed over generation, transmission and distribution of electricity to private companies. At least Nigerians believed that with the private ownership of these companies, the companies would immediately hire competent staff that will work towards the growth and betterment of the system. But six months after, Nigerians from all walks of life continue to grumble that power supply has gone from bad to worse (Ukoko et al, 2014). These new companies still retain the old incompetent staff of NEPA and PHCN for reasons best known to them.

Effects of decline in power supply

To underline the systemic impact of Nigeria's poor and declining electricity supply to her economy, the Gencos through their trade association - the Association of Power Generation Companies (APGC), recently asked the country to expect less benefits from the African Continental Free Trade Agreement (AfCFTA), because industries in the country would without stable electricity fail to compete favourably with other African countries because of the challenges in the power sector.

Detailing how Nigeria may not fully benefit from the AfCFTA, the Gencos stated that the chances of Nigeria taking maximum benefits from the pact were limited on account of its power sector which is still unstable.

It noted for example that due to the significant role stable electricity plays in economic development, the poor power supply in Nigeria means that goods and services offered by her may not be comparatively and competitively priced when compared to other countries in the continent with better power supply.

"Thus, the cumulative result of a significant boost in trade and therefore the economy, may not be realized," the APGC said in a statement signed by its Executive Secretary, Dr. Joy Ogaji.

It further noted that: "For instance, steel mills consume huge amount of power to convert pig iron blocks to liquefied iron, mix with ingredients such as carbon, alloys and chemicals to change into different type of steel, alloy, bars, rods, H-beams, and sheet metals.

"In mining industry, changing the mineral deposit and ores from the mines to concentrate metal blocks also require huge amount of power. Hospitals need uninterrupted electricity supply 24 hours a day, for many health care functions and operation of patients. Also, our universities require constant electricity to undertake high level research and development works."

It thus explained: "Steady and regular power supply is needed for different type of industries, where goods, appliances, tools, instruments, machines, modern communication equipment and gadgets, vehicles, aircrafts, ships are manufactured.

"In direct relation to the just signed AfCFTA agreement, the benefits it poses to Nigeria may not be fully reaped until the problems of the power sector are fully addressed."

Role of Electricity in Business

There is a symbiotic relationship between electricity and business. Energy supplies have a significant impact on economic activities (Velasquez and Pichler, 2010). This is because it is used for varied purposes ranging from production, storage, powering of office equipment and product display. Consequently, the use of electricity serves as input for production. This makes electricity an essential commodity for all industry types- manufacturing, service and distribution. Various sectors of the economy such as manufacturing and transport use enormous amounts of electricity (Haanes et al., 2011) for operation processes including storage, production. It is a critical resource needed to make products. In this respect, electricity as a “transformed unity” serves as a commodity. Consequently, suppliers of electricity have a strong influence on the buying organisation’s ability to gain a competitive advantage and provide solutions to their clients. This is because operators of SMEs have a high dependency on electricity as a standardised input, without it they cannot produce to satisfy their customers.

Industrialization

The word industrialization originated in Europe during the industrial revolution in the 18th and 19th centuries. It was a period that witnessed human effort being replaced by machinery in the manufacturing process for the purpose of mass production. This, coupled with urbanization, have a substantial impact on energy consumption. Urbanization and industrialization are usually co-evolved in the economic development of growing countries. This involves the migration of people from rural to urban areas and from agricultural to industrial engagement. This movement prompts energy consumption increase. The continuing urbanization and industrialization in Nigeria as a developing country further triggers power instability. The industrial sector frequently consumed in excess of 50% of the energy supplied and this generates tension between economic development goals and the limited energy supply. In Nigeria, like other developing countries, electricity supply has not been able to meet the growing demand in the various sectors of the economy. This resulted in the operation of industrial and commercial establishments below their production capability. Many companies today are winding up because of irregular power supply, Ajaokuta Steel company limited for instance is no longer in operation despite the money government has put into it, electricity is one of the major problem of the company, our refinery are not also working irregular power supply is also part of the problem because refinery need electricity to function properly.

Residential

The types of household appliances influence the total power consumed. Frequently, in Nigeria, power is needed for these common household appliances, water heaters, lights, fridges, freezers, air conditioners, televisions, radios or music sets and computers. In 2014, the residential sector consumed over 50% of the country’s total supply and is subsequently the largest electricity consumer in Nigeria. In Nigeria around 55% of the population have electricity with an average household consisting of 5 people. This is very low compared to China (99% and 3 respectively) and most wealthy countries with an average household size of 2.5 people.

Agricultural sector

Although this study could not find credible data on the actual energy consumed in the agricultural sector, it is logical to conclude that a reasonable amount of energy would be required for production. Agriculture requires fuel or electricity to operate machinery and equipment, for lighting, and to cool or heat buildings. Also, power is required for irrigation, fertilizer production, transportation and the preservation and processing of agricultural produce, etc. As it stands today, a lot of agricultural products spoil because of poor preservation due to inadequate and frequent power outages in Nigeria. This normally causes produce shortages resulting in commodity price hikes. Providing adequate power for socioeconomic wellbeing

Adequate power supply stimulates activities that advance the socioeconomic status of a given country. The proponents of quality, adequate, affordable and sustainable power supply system are sufficient electricity generation, efficient transmission and distribution, and domestic manufacturing of power equipment. Therefore, in the dwindling circumstances in the power sector in Nigeria, creative and innovative ideas that reflect global sustainability trends are needed. Industrialization, urbanization and the socioeconomic wellbeing of Nigeria depend largely on effective supply of clean, adequate, affordable and sustainable power. Effective power supply relies on the careful and logical handling of these critical activities power generation; efficient power transmission and distribution to consumers; an infrastructure for the manufacturing of domestic power equipment; management of power supply to meet population, industrialization, and urbanization growth; and national power infrastructural development planning and enabling policy for power sector investments.

Empirical Review

Ukoima Kelvin Nkalo and Ekwe Ogbonnaya Agwu (2019), carried out a study on the Impact of Electricity Supply on Economic Growth: A Nigerian Case Study. This work reviews the impact of electricity supply on economic growth. In this background, power supply in Nigeria was studied from 1983 to 2017. Results obtained show that 100% of stake holders and 68% of the general public in Umudike, Abia State, Nigeria agree that power supply in Nigeria has improved in recent times. For every 1% increase in electricity supply, an economy is expected to grow by 3.94%. Inversely, a 1% increase in real gross domestic product leads to a 0.34% increase in electricity supply and consumption. Although, with an improved current generating capacity of 7000 megawatts and distribution capacity of 4600 megawatts, factors such as an increase in load growth, poor maintenance of existing transmission and distribution facilities and lack of adequate physical structure still cause epileptic power situation in most parts of Nigeria. This study recommends that policies aimed at boosting the generating and distribution of electricity supply in Nigeria should be maintained. This in turn would have a positive impact on the economy.

Toyin Dina (2014), carried out a research on the effects of electricity power outage on the provision of Electronic newspaper services in university libraries in Nigeria with Samuel Adegboyega University, Ogwa, Edo State as a case study. The study employed the use of questionnaire as the instrument for data collection. 40 staff members of Samuel Adegboyega University staff were sampled. The findings indicate that the country is yet to provide desired level of electricity supply to meet the needs of libraries in the provision of electronic newspaper services in university libraries. It was also revealed that no meaningful e-newspaper services can be recorded without constant supply of electricity. It was therefore recommended that adequate electrical power supply should be provided for provision of effective and efficient e- newspaper services in university libraries.

Doe Frederick and Asamoah Emmanuel Selase (2014) examined The Effect of Electric Power Fluctuations on the Profitability and Competitiveness of SMEs: A Study of SMEs within the Accra Business District of Ghana. Their objective was to analyse the effect of electric power fluctuations on the profitability and competitiveness of SMEs, using SMEs operating within the Accra business district of Ghana as a case study. The study employed cross sectional survey and it adopted a mixed method approach. A sample of 70 Ghanaian SMEs was selected using a systematic sampling approach. Inclusion criterion for the selection of the SMEs was their location within the business district of Accra as well as their use of electricity in their main business operation. Data were collected with an interviewer-administered structured questionnaire which focused on the effect of power fluctuation on the operations of SMEs, especially on the profitability and its resulting effect on the firms' competitiveness. The SPSS statistical package was used to group and analyse the data. The study is a single-factor analysis of the exogenous problems facing the Small and Medium Enterprise sector. The study found that without reliable energy supply, SMEs are unable to produce in increased quantities and quality leading to poor sales hence low levels of profitability. It is established that low profitability negatively affects Return on Assets (ROA) and Return on Investment (ROI) of SMEs. Consequently, if the level of profitability is high, it is expected that ROA and ROI will be high and vice versa. With high profits, SMEs are able to increase their competitiveness.

Recommendations to solving Nigerian electric power supply

Having studied and analyzed the causes of erratic power supply in the Country, the following recommendations to solving the Nigerian erratic power supply are hereby made:

- Adoption of energy conservative policies; Immediate discontinuation of default/estimated billing system; Upgrade of power distribution and transmission equipment

- Engagement of competent and qualified staff by the electric power companies.

CONCLUSION

It is widely believed that the problem of electric power supply in Nigeria is as a result of low power generation capacity of the country. This is because Nigeria with a population of over 150 million has power generation capacity of around 3,600 megawatts out of the installed capacity of about 6,000 megawatts (PTFP, 2014). Industrial machines need power to run to provide the needed manufacturing for socioeconomic development. The growth of socioeconomic activities in Nigeria is at a snail's pace as power required to stimulate in the economy, is grossly inadequate and frequently cut. Consequently, there is a high rate of unemployment, poverty, high cost of production and services, etc. Therefore, access to clean, adequate, reliable, affordable and quality energy, especially, electricity, is a fundamental to the socioeconomic development of a country. Therefore, the balancing of energy sustainability components - energy security, energy equity, and environmental sustainability is the foundation of Nigeria's economic success and competitiveness Therefore, for development to thrive in Nigeria, the attitude and orientation of the implementers of the various strategies must change. Commitment and honesty on the part of the policy makers and implementers remains the only antidote to developmental challenges and the ineffectiveness of the strategies for development

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APPLICATION OF FORMAL METHODS IN WASTE MANAGEMENT

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Abstract

Environmental contamination owing to solid waste mismanagement is a global issue. The proper definition of waste is crucial to constructing a sustainable agenda of waste management. Waste management is a field which lacks a holistic methodology in terms of a commonly accepted universal definition of waste thus making the boundaries of the domain of waste management ambiguous as it is not possible to say strictly which issues from the substance of the domain is relevant and which one is irrelevant. The increase in population, urbanization and industrialisation in support of globalization has brought about an increase in the challenge of waste management. Currently, large quantities of community solid waste in many cities of the developing countries are being dumped for open burning in informal or formal but unregulated dumpsites that threaten the ecological environment and general public health. The expectation of suitable waste management approach is to prevent waste which may pose significant treats to human beings and the environment as a result of an epidemic disease that may further lead to a global crisis. A critical study in the domain of traditional view of waste management has necessitated the need for models and techniques for system review such as a formal methods. The aim of this paper is to explore through critical review how PSSP ontology approach can be applied to formalize and systematize waste management sector in Nigeria through improving the quality of service, disposal of domestic waste, the present level of cleansing in creating a clean and green Ogun State. The approach comprises of four universal properties: Purpose, Structure, State and Performance. A significant redesign of waste processes with formal methods to prevent adverse outcomes in public health and environmental protection is desirable.

Keywords: *Formal Methods, Waste, Waste Management, Epidemic Disease*

1. Introduction

Waste is any solid, liquid or gaseous substances or materials which being a scrap or being super flows, refuse or reject, is disposed off or required to be disposed as unwanted (Nnorom & Osibanjo, 2008). The amount of waste has been steadily increasing due to the increasing human population and urbanization (Demirbas, 2010). Waste materials are generated from manufacturing processes and industries and include the following: durable goods, non durable goods, containers and packaging, food scraps, yard trimmings and miscellaneous inorganic wastes from residential, commercial and industrial sources. Liquid waste management consists of waste water treatment, sewage treatment and chemical and biochemical processing. Therefore, the increase in population, urbanization and industrialisation in support of globalization has brought about an increase in the challenge of waste management and even now a complicated issue, which makes waste management, became an important and necessary function.

Formal methods are powerful tools in introducing rigor that would enforce correctness in design specification and help build confidence in design. Formal Methods help in understanding a comprehensive set of methods, techniques and tools that have a formal background in mathematics (Adekola & Adebayo, 2017). Therefore, formal methods use mathematical techniques for analysis and verification at any part of a program life-cycle. Formal methods are mathematical techniques, much supported by tools, for creating software and hardware systems. This means each specification language has both mathematical syntax and semantics, and a proof system and at the same time supporting refinement, model checking, proof and test (Bjorner, 2012). A tool in this context is associated with specification and coding languages, model checking, theorem and text tools, among others.

Method, in software engineering simply means understanding a set of principles for selecting a number of techniques and tools in order to analyze and synthesize an artefact (Bjorner, 2006). Formal Methods aid in understanding a broad set of methods, techniques and tools that have a formal background in mathematics. Techniques are abstract, making a concrete change, proof, refinement and the likes. A tool, in this circumstance, is being with specification and coding languages, model checking, theorem proving and test tools, among others (Adekola & Adebayo, 2017) .

Formal methods comprise of writing formal descriptions, analyzing those descriptions and in some cases producing new descriptions which can be applied in different stages of development process (Batra, Malik, & Dave, 2013).

Formal methods for waste management admit formalizing the waste management techniques which are Landfill, Incineration, Disposal methods and Biogas (Demirbas, 2011). Formal methods are used in the creation of specifications that describe the requirements of the user, ensure that the implementation satisfy the requirements specification and basically concerned for the development and maintenance of a reliable systems on time and within budget (Batra et al., 2013).

Waste as the term implies is any solid, liquid or gaseous substances or materials which being a scrap or being super flows, refuse or reject, is disposed off or required to be disposed as unwanted (Nnorom & Osibanjo, 2008). 'Waste', or its equivalent in other natural languages, is a word used to refer to objects regarded as waste by people in various situations in various cultures. Thus, wastes are linked to human assessment, and their existence to human civilization. The concept of waste has a meaning only in the context of artefacts, which are objects of human origin (Richard, Comet, & Bernot, 2006).

Waste management is the collection, transport, processing or disposal of waste materials, usually ones produced by human activity, in an effort to reduce their effect on human health. Waste management can involve solid, liquid or gaseous wastes, with different methods and fields of expertise for each ("Waste Management," 2017).

Waste management is also the collection, transport, recovery and disposal of waste, including the supervision of such operations and after-care of disposal sites'' as cited in Article 1 of the European Council Directive on waste. This definition of waste management has the same 'organizational' approach as the definition of waste. It is concerned with the existing amount of waste, trying to minimize the human-waste or environment-waste interface, to minimize potential impact (Richard et al., 2006). Waste management is a field which lacks a holistic methodology in commonly accepted universal definition of waste thus making the boundaries of the domain of waste management ambiguous as it is not possible to say strictly which issues from the substance of the domain is relevant and which one is irrelevant.

Formal methods are mathematically based techniques and tools which can be used in terms of any part of program life-cycle. It aids the development of a system by giving the feature of abstraction and unambiguous description mechanism. It then can be classified into two ways, firstly, according to formal specifications styles and secondly, according to software development life-cycle perspective (Batra et al., 2013).

The formal specification styles are specified to be model based languages, algebraic specification and process oriented. Formal languages are used in two phases which are requirement analysis phase and testing phase (Batra et al., 2013). Landfill and incineration are some of the techniques in waste management which any of the classified formal methods can be applied.

The aims of waste management concept are reduction of total amount of waste, secondary raw materials or energy carrier, best possible reduction of waste quantities, flexible concept concerning fluctuations in waste quantities and the composition of domestic waste (Demirbas, 2011).

2. Statement of Problem

The generation of solid waste and final disposal presents a unique problem in most developing countries. Piles of wastes are often found by roads, rivers, and many other open spaces in the city, and this is causing significant health and environmental problems. Mismanagement of waste could lead to various related diseases such as malaria, typhoid and cholera. The boundaries of the domain of waste management is extremely ambiguous such that it is not possible to say strictly which issues from the substance of the domain is relevant and which one is irrelevant. The instability experienced in software due to the negligence in crucial approach or stubbornness that can strengthen the product could be addressed with formal methods just like it has been well explored in hardware. Formal method could provide mathematical models for specifying and verifying software designs which could serve as proof of correctness or requirement validation in order to reduce or eliminate errors which could also provide leverage for safety critical systems.

3. Objectives

The main aim of this work is to explore through critical review how PSSP ontology approach can be applied to formalize and systematize waste management.

The specific objectives are to:

i. Conduct extensive review on the uses and benefits of formal methods

ii. Address the effectiveness of formal method in waste management

4. Methodology

These studies symbolize systematic literature reviews and surveys. Important requirements were identified in related papers. The relevant documents obtained were qualitatively analyzed for convergence, and relevant details were extracted using inductive approach. This work also explored the concepts of formal methods and the potency of its application in waste management.

5. Literature Review

The process oriented style of formal specifications can be applied to identifying and specifying waste management, which is built upon the PSSP ontology. The ontology name is an acronym of the four universal attributes that objects can have: Purpose, Structure, State and Performance. The basic commitment of PSSP ontology is that this set of attributes is the necessary and sufficient set of attributes of all objects. Figure 1 shows the four universal properties as attributes that objects can have.

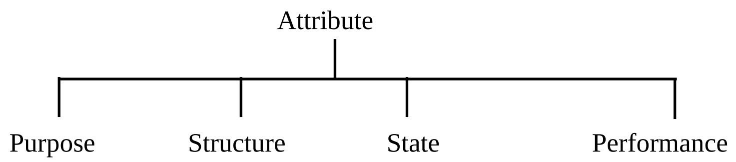

Figure 1: The four universal properties object attributes Source: (Richard et al., 2006)

Purpose is an object's claim of justification to exist currently, in the future, or in the past. Structure is a hierarchy of relations. An object can manifest its structure as a set of sub-objects and a set of causal, spatial and temporal relationships between state variables of these sub-objects. An object's structure embeds all the information about object's functionality. State is how an object's functionality becomes manifest in particular situations of coexistence. Performance is the means by which an object manifests how it manages to fulfil its justification to exist and to survive. Performance can be viewed as a measure of how good an object is for its purpose. An object shows the specific way of having an unambiguous attributes, which are issues of the four universal attributes, Purpose, Structure, State and Performance. Every object exists as a whole but not accumulation of individual's attributes, which is an indication that the four attributes are strongly related to each other. The potential of an object is a function that shows its state in the object's coexistence with another object as embedded in the structure. The manner in which an object reacts in a specific situation is a matter of its performance when altered against how the object should react in all situations in order to ascertain its existence as against its purpose. Figure 2 shows the incineration process as a waste management option.

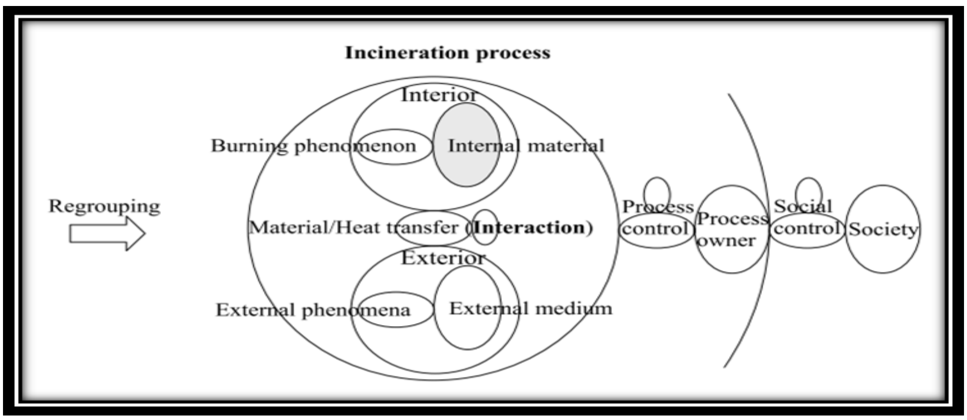

Figure 2: Incineration process as a waste management option. Source: (Richard et al., 2006)

In PSSP, ontology management of waste is an activity (Phojola, 2006). It is an activity, because anything in reality having a boundary can be taken as an activity. Waste management has a limit, because it mainly focuses on events and media as related to human civilization. The realm of waste management has different extensions. In one case the effect of waste related activities are local, in another case, it is far reaching. The setting of the boundaries in each case is carried out by the society based on the knowledge, ignorance and attitudes a decision maker has.

Worst decisions is the responsibility of a decision maker mainly based on ignorance of what should be known and the only way out is to have holistic idea supported by a representation of waste management as an activity including all important social, ethical and technical areas in an integral format. This representation is achievable if and only if it is built upon a sufficient ontology. However, no domain ontology would carry out a specific action on waste management for two reasons. First, there is no predefined domain of waste management in the sense that the issues, which can be relevant for waste management, cannot be exhaustively listed. Second, the issues, which are known to be relevant for waste management, reside in various conventional domains and are loaded with conventional domain specific meanings, which unfortunately is often an unsurpassable obstacle for knowledge integration (Richard et al., 2006).

Demirbas (2011), reviewed waste management concept, waste management system, biomass and bio-waste resources, waste classification, and waste management methods and concluded that waste management system consist of collection, transportation, pre-treatment, processing, and final abatement of residues. The waste management system comprises of the whole set of activities in relation to handling, treating, disposing or recycling the waste materials. The general classification of waste is difficult. Some of the most common sources of wastes are as follows: domestic wastes, commercial wastes, ashes, animal wastes, biomedical wastes, construction wastes, industrial solid wastes, biodegradable wastes, non-biodegradable wastes, and hazardous wastes. He further concluded that waste and recycling management plans should be developed for any construction project prior to the start of work in order to sustain environmental, economic, and social development principles; however the use of formal methods was not reviewed in the study. The author explored comparative research to isolate the important factors that characterised the informal management systems with respect to the ways scavengers act within the broader setting of waste management and opined that informal waste management systems are unjustifiably considered problematic but often reveal great development potential whereas formal methods could be used to formalize the problematic activities (Nas & Jaffe, 2004).

Nzeadibe (2009) discussed how the status of waste management can be considered as an index for assessing governance, knowing fully well that the informal sector plays a vital role in managing waste in cities of the developing world. According to Nzeadibe (2009), direct field observations, key-informant interviews with vital stakeholders in waste management were used to support its findings on review of relevant legislation, policies and reports in solid waste management. The study listed recent efforts that can be used to visibly improve services through reform of solid waste management in the urban area. The supports of informal recyclers in handling waste problem, creating jobs and alleviating poverty were also noted. The author was able to establish that informal recycling sector has an unacknowledged development prospect and address for special support and recognition in empowering people who are involved in it within the context of the reform activities which could be implemented with the use of formal methods to support the Millennium Development Goals (MDGs) on poverty reduction, improvement of quality of life and environmental sustainability.

Waste management was seen as a process and the main restriction to the consolidation of informal waste collectors and scavengers is the acceptability in the society as a good source of income (Oguntoyinbo, 2012). All these limitations can be overcome if waste management process is model in mathematical language called formal methods.

5.1 Benefits of Adoption of Formal Methods in Waste Management

Formal method can be a very complicated and wonderful action to undertake when it comes to waste management. However, formal methods practitioners and proponents have advocated the adoption of formal methods for a number of reasons which varies widely and impact projects in different ways and at different levels.

- **Increased reliability:** The most obvious reason to use formal methods when developing waste management is to increase reliability, which was the original promise of formal methods – to prove that systems were free of defects.

- **Increased tractability:** Increased system (activities/projects) and code tractability is another good reason to use formal methods in waste management. Since formal notations are mathematical and unambiguous, unlike natural language, they give room for higher precision when describing system behaviour which allows the system specification to be more easily validated.

- **Decreased cost:** Different claims have indicated that the use of formal methods can actually lead to an overall reduction in system cost, that is, the cost of adding formal methods to a system is more than made up for by savings in the traditional view.

- **Proof of quality:** Formal notations, being mathematical in nature, are susceptible to proof. Proof provides more confidence in correctness than testing alone and therefore is helpful in providing evidence of quality in waste management.

- **Advancement of waste management:** One novel argument for formal methods is that they are required for the development of a genuine discipline of project. Formal methods can be considered the mathematics of computer programming. And since "real" project is based on mathematics, so must be waste management (Geer, 2011).

6. Formal method concepts

The following as displayed in figure 3 are some notable formal method specification methods as well as the illustrations of their applicability.

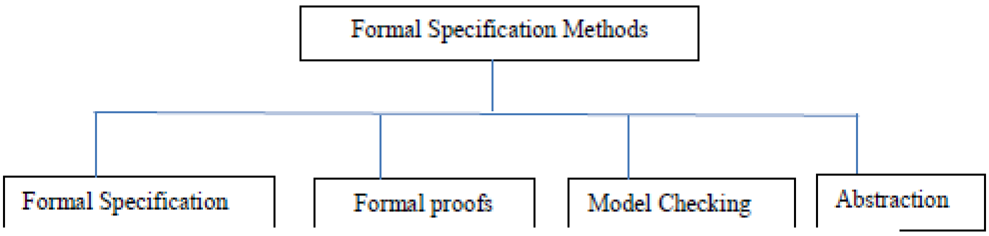

Figure1: Applications of Formal Specification Methods (Haxthausen, 2010)

- **Formal specification** involves translation of a non-mathematical description of a system into a formal specification language. Majorly, the goals are to overcome imprecision, ambiguity, and prolonged testing.
- **Formal Proofs** provides convincing arguments to validate some properties of system description. It connotes formulating series of steps and simple rules to formalize informal description which helps in removing ambiguity and subjectivity.
- **Model Checking** is about determining if the generated finite state machine model satisfies requirements expressed as formulas in a given logic. Here, all reachable paths in a computational tree derived from the state machine model are explored.
- **Abstractions** are used to simplify a system and to focus on general major features, which prevent undue concentration to design details especially when such details could distract or are not yet required (Haxthausen, 2010).

6.1. Formal methods notable tools

Complex computation problems are simplified and are channelled to follow some series of formalized procedure that lead to solution phases (Bjourner, 2012). A tool like finite state machine for instance helps make complex computational process easy to design, read and interpret. It is a mathematical model used to specify a system, a design, an algorithm or a solution. This will eventually consist of series of step by step simple procedure that will result into a solution to essentially large or complex problem. Regular expression, termed rules about rules, defines acceptable strings of letters. Basically, four rules connote the description of a regular expression namely: Alphabet rule, concatenation rule, alternative rule and repetition rule. Regular expression passes for a larger universe of possible formal systems. Conceptually, regular expression is supposedly not a sequence of steps but a description of a desired result. Formal method also presents grammar, which is very useful in programming language design because of the capability to create more efficient parse (Hopcroft, Motwani and Ulman, 2006).

6.2 General benefits of formal specification methods

The following are the benefits attributed to formal methods and their applications:

- Higher level of mathematical rigour promotes system builders' better knowledge of the system
- Bugs that could subtly hide in traditional methods of specification are quickly exposed
- Timely identification of defects at the early stage of system cycle
- Gives room for formal proofs which can establish fundamental system properties
- Provision of repeatable analytical procedure to authenticate theory.
- Abstract formal view promotes understanding of what the system is to do without the need to bother about how it will be done.
- Model checking activities and formal language for computer, software and software design are preventive measures toward bug or error management in system design.
- Wrong requirement naturally translates to a wrong system. Therefore, it is highly constructive to use automated tools to check various aspects of requirement and design.
- Model checking helps check if the architectural design and specification meets desired properties
- With formal methods, burden at testing phase is minimized
- Building formal language at requirement levels help remove assumptions and ambiguity

7. Limits to the usefulness of formal methods

- **Method complexity:** Formal methods are often seen as being too complex. It uses deep mathematical notation, mathematical reasoning, and other techniques that are not staples of traditional software development. These are seen as stress to developers, who may have spent years writing perfectly good software without them.
- **Lack of awareness:** Many software developers simply are not aware of formal methods because they are not necessarily a core requirement in most computer science curricular when taught at the graduate and undergraduate levels.
- **Tool support:** There is an obvious lack of tools to support formal methods as compared to more conventional software development tools (Geer, 2011).

8. Results and Conclusion

Formal methods use mathematical models for analysis and verification at any phase of system development life cycle and go a long way in helping to detect errors at the early stages of system development. Formal methods can tremendously improve quality assurance when carefully applied in system design. In order to apply the mathematical rigor involved in using formal methods rather than choosing alternative verification measures, tool like PSSP ontology was applied to identifying and specifying waste management. PSSP ontology is a tool for formalizing and systematizing waste management. It identifies the candidates of waste as belonging to one of the few fundamental PSSP classes and characterized them in terms of the universal properties of Purpose, Structure, State and Performance. In PSSP ontology, waste management is a process that has boundary and would represent a smart method for building system with minimized error, reduced cost and very high quality.

9. Limitations of study

The drawback of this study is that complete formality is impossible to achieve in terms of the effectiveness of application of formal methods using PSSP ontology tool when compared between the hardware and software industries.

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COVID-19 PANDEMIC: A COMPARATIVE STUDY OF THE IMPACT OF VIRTUAL AND PHYSICAL (CLASSROOM) LEARNING ON STUDENTS' KNOWLEDGE ACQUISITION AND SKILLS ENHANCEMENT (A STUDY OF SOME SELECTED TERTIARY INSTITUTIONS IN LAGOS STATE)

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Abstract

This study intends to compare the impact of virtual and physical (classroom) learning on students' knowledge acquisition and skills enhancement. In this study, the descriptive survey method was adopted. The population constituted the numbers of students in University of Lagos, Lagos State University, Yaba College of Technology and Lagos State Polytechnic. The sample size of eight hundred (800) students was randomly targeted with two hundred students (200) in each of the four institutions. A well-structured questionnaire was used to obtain data. Due to Covid-19 pandemic lockdown, it was administered through an online survey form. Data collected were analyzed using mean and standard deviation. The study alternative hypothesis was tested using the paired t-test to find the significant difference between the mean responses of the impact of virtual learning and physical (classroom) learning on tertiary institution students' knowledge acquisition and skills enhancement. The study found that virtual learning can be accessible anywhere in the world and students can gain multiple skills and talents from various sources via the Internet; though, it is highly expensive in term of the data subscription while the students' assimilation is usually low as they tend to understand better in the physical (classroom) learning. It was, therefore, concluded that the virtual learning can be used to complement the physical (classroom) learning. It was recommended that students should master the use of virtual tools and technologies in enhancing their learning skills.

Keywords: *Classroom, Learning, Physical, Students, Virtual,*

Introduction

Nowadays education is accessible anywhere in the world with the availability of Internet and computer technologies. The emergence of Covid-19 pandemic lockdown prompted Nigerian tertiary institution regulatory bodies to approve the online teaching and learning in Nigeria after students have spent a couple of weeks at home without being engaged by their various institutions. The engagement of students online is called virtual learning which replaces the physical (classroom) learning. Virtual learning is a subset of e-learning. Virtual learning is defined as a means of students gaining knowledge and acquiring skills via the Internet and computer technologies. This means knowledge could be gained via one's laptop, phone, tablet, and television with Internet facilities without the physical present of the teachers i.e. to offer the face-to-face classroom engagement. According to Anekwe (2017), virtual learning is technologically-driven platform that supports both an individual's direct and regulated learning. The students' use of computer technologies and applications to access learning materials via the Internet and be able to download and watch related video clips, listen to audio lecture messages and live streaming lectures is regarded as virtual learning. The video clips can be accessed via the YouTube app, the audio lecture messages can be in MP3 or MP4 format while the live streaming lectures may be accessed via the ZOOM or YouTube application. Virtual learning is one of the methods of accessing education at the corridor of one's home.

On the other hand, the physical (classroom) learning involves the physical present of the lecturers and their students for effective interaction and communication while they share ideas and gain more knowledge in the classrooms. It is a face-to-face classroom interaction and discussion. Ghosh (2015) defines physical (classroom) learning as a learning environment that combines both the social and physical qualities and promotes classroom experience. Classroom learning environment is the assembling of students and their teachers in a suitable and conducive learning room. For this kind of learning method, the students do not need personal laptop/computer let alone of Internet facilities except if they are learning the practical section of Information and Communication Technology (ICT) that requires the use of computer and its accessories. However, if it is the theoretical courses, the tools and Internet facilities are not necessary. According to Phillips (2014), the physical (classroom) environment enhances:

i. students' morale and learning
ii. student' interaction with their teachers and fellow students
iii. instructional approaches
iv. seating arrangement and layout
v. students sense of empowerment

It is believed that students and teachers relate with one another effectively in the physical (classroom) learning environment than the virtual learning environment. Also, the students are primarily used to and understand the physical (classroom) learning method than the virtual learning method.

Critical Issues

The global emergence of Coronavirus (Covid-19) pandemic in December 2019 tremendously affected business operations, educational and social activities. In order to safe human lives and sustain the economy, Nigerian government, at all levels, took a tactical decision by announcing a total lockdown while those organizations that provide essential duties - medical, security and food production - are exempted. After a few weeks of staying at home, the educational providers adopted the virtual learning method as a means of engaging the students via the Internet using various social media such as WhatsApp, Telegram, ZOOM, Google Classroom and several others. Almost all schools owned by the private individuals, state and federal government embraced this method of teaching and learning before the lockdown was finally lifted and schools reopened. The widespread of technology prompts Nigerian institutions to adopt the use of technologies and virtual tools in lecture delivery (Ahmad, 2012; Ahlan, Atanda, and Shehu, 2014). Before the emergence of Covid-19 pandemic, the use of Internet and computer technologies for learning has not been implemented fully in Nigerian tertiary institution and some students find it difficult to cope with such a method of learning. Nigerian undergraduates have different views on virtual learning. They are used to the physical (classroom) learning environment (Bill, 2020) and their lecturers are well-trained in this regard. Some of them do not have personal laptop and for those who have, there is no Internet facility. Those who possess both the personal laptop/computer and Internet facilities seem not to understand unlike the physical (classroom) learning. As a result, the introduction of virtual learning during the Covid-19 pandemic lockdown was not taken seriously. The virtual learning is seen as the learning method of post graduates and experienced students who must have worked in multinational organizations and gathered many experiences. To access virtual learning materials, the students must enjoy constant Internet connection with any well-functional computer e.g. laptop, desktop computer, android phone or tablet (Olasina, 2012). Hence, the study aims at comparing the impact of virtual learning and physical (classroom) learning on students' knowledge acquisition and skills enhancement using selected undergraduates of some tertiary institutions in Lagos State as a study.

Research Questions

i. What is the effect of the virtual learning on students' knowledge acquisition and skills enhancement in tertiary institution?
ii. What is the effect of the physical (classroom) learning on students' knowledge acquisition and skills enhancement in tertiary institution?

Hypotheses

H_{01}: There is significant difference in the impact of virtual learning and physical (classroom) learning on students' knowledge acquisition and skills enhancement in tertiary institution

Virtual Learning Review

Virtual learning is a computer application online platform that allows instructors and learners to exchange information and ideas and also share educational materials in a controlled teaching-learning context (Yusny, 2017). The word virtual shows that the learning environment is online, using a connected network of computers of its users. Although Covey (2020) describes virtual learning to be more interactive as the students would join live lectures with their instructors/tutors. The virtual learning platform also gives the students an opportunity to chat with their course mates privately. Olibie, Ezoem, and Ekene (2014) cite Lokie (2011) describe virtual learning as the learning gains outside the walls of a classroom which involves the use of Internet facilities, satellite links, platforms and related system to access, analyze, create, exchange, and use data, information, and knowledge in ways which until recently, were almost unimaginable. Virtual learning has brought education to the doorsteps of the learners. They do not need to appear physically in the classrooms before gaining access to their lecture materials and instructors. Bill (2020) asserts that the virtual learning is an effective learning method for students who are not so self-sufficient and are used to physical (classroom) learning.

Physical (Classroom) Learning Review

Physical (classroom) learning is a method of learning within the physical structure of blocks of classrooms with the physical present of the teachers and their students gather in the same lecture room. Fahlström (2016) describes physical (classroom) learning as educational system that takes place and arranged in a built physical/school environment. The physical learning environment consists of lightings, seat arrangements; layout, whiteboard positioning, teachers stand, and multimedia. According to Shalway (2020), a physical learning environment is a warm, well-run classroom that begins with physical layout, desks arrangement and space management, placement of attractive bulletin boards, materials cabinets and supplies.

Fahlström (2016) cites Earthman (2004) and Higgins et. al. (2005) who found in their studies that physical/school environments have direct effect on students' learning outcomes. The learning facilities and resources provided are expected to be in good condition and of good quality.

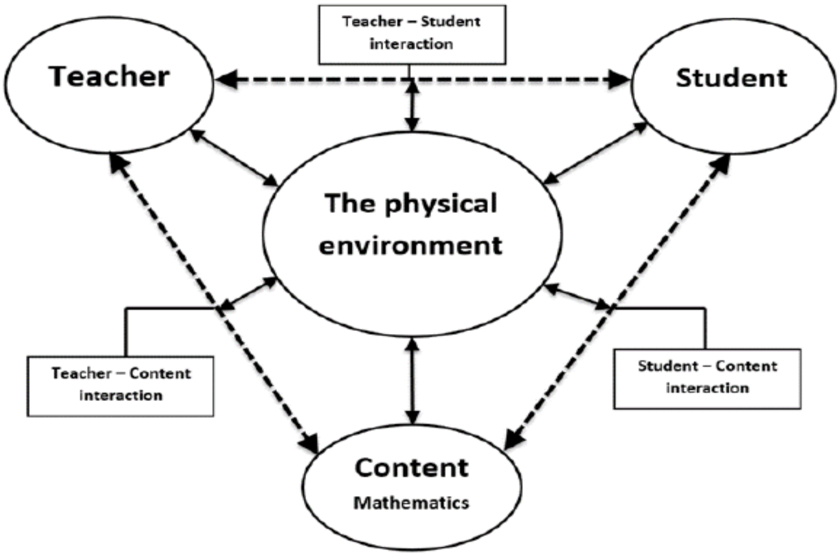

Fig. 1: Model of the physical environment in a didactical situation
Source: Fahlström (2016)

Fahlström (2016) propounds the six interactions that exist in every physical environment and they are captured in the model above. These six are:

i. the teachers (lecturers),
ii. the students,
iii. the content (i.e. the study-materials),
iv. the interaction/relationship between the students and the teachers,
v. the interaction/relationship between the teachers and the content, and
vi. the interaction/relationship between the students and the content.

A thorough reviewing of Fig. 1, it shows the level of relationship and interaction that exists between the teachers and students interact with one another and the content (the study-materials). A break in any of the interactions will affect the outcome of the study. As long as the teachers and the students interaction/relationship is cordial, they will tend to understand each other better. Also, in other interaction, when the teachers understand the content (study-materials), they will delivery effectively and the students will be satisfied with their lectures. On the other hand, the students' mutual relationship with their study materials will go a long way to help them perform excellently on the examination day.

Virtual Learning Features

Virtual learning environment makes use of different tools for better students' learning and skills enhancement. These tools are pre-programed and programed to deliver optimally when the students and their teachers make use of them.

According to YouTestMe (2020), there are seven (7) features of virtual learning and they are:

i. **Testing engine.** The engine to use for learning is pre-tested and tested before being certified for usage. The teachers and students can simply put to use as the platform is already programed for such a learning delivery. The test is programed in accordance to students' age and knowledge. Everything is done for the teachers and they get the final product ready for their students.

ii. **Flexible user organization.** In a modern world, the virtual learning tools are organized. Students and their teachers can schedule a class in their best ways that will be convenient for both parties.

iii. **Multimedia lessons.** During lecture delivery via virtual learning environment, students enjoy their learning through the use of multimedia. It is one of the most important features of virtual learning. Multimedia materials help the students who lack enthusiasm to boost their learning skills in the classroom.

iv. **Adaptable learning curve.** This helps the students to also be involved in the learning activities. By being involved, they interact and gain more knowledge from their teachers.

v. **Variable questions.** With the use of a testing tool for variable questions, students would be able to test their abilities and competencies on different kinds of questions via the virtual learning environment.

vi. **Customizable grading system.** The machine enables the teachers to customize their students' grades and appropriately store them for future references.

vii. **Content management system.** The tool saves all the students' and teachers' documents and materials in one particular storage device and they will be retrieved easily from the same spot.

Physical (Classroom) Learning Features

The physical (classroom) learning is expected to well-structured and organized in order to effectively and positively influence the learning habit of the students. Shalaway (2020) explains some of the features of the physical (classroom) learning as follows:

i. **Arranging Space.** The physical layout reflects both the teaching and learning styles. It helps the teachers and the student to actualize their goals. In a collaboration class, if the students' population is small, then the seats will be arranged or organized around tables/desks. However, if it is a larger students' population, the arrangement for group discussions will be a U-shaped or circle desk configuration.

ii. **Desk Placement.** The space of a classroom determines how the desks and seats will be arranged. In a large space classroom, the seats and desks will be placed facing the teachers at the center front row. The teacher's desk and seat will be stationed in the front facing the students irrespective of their population size.

iii. **Environmental Preferences.** The classroom lighting, temperature and noise level are some of the environmental preferences that affect students in learning. It is believed that students perform excellently in their academics when the learning environment is adjustable to meet their demands.

iv. **Designing Classroom Space.** A learning environment that is equipped and designed with various learning materials and tools will go a long in sharpening and molding the students' learning skills. When the learning environment space is also equipped with a puppet theatre, private conference center, quiet reading/writing space, test make-up area, and place to stage skits and more, students tend to perform better.

Virtual and Physical (Classroom) Learning Environments Comparism and Distinction

Covey (2020) outlines and discusses the two learning environments as follows.

i. **Interacting effectively face-to-face and in group discussion.** In this regard, the physical (classroom) learning has an upper hand irrespective of the level of technologies that are available. Covey opines that face-to-face and group discussions enhance students' communication skills. In the classroom learning, students have the golden opportunity to clear out their doubts immediately as the lecture is on. However, in the virtual learning method, the students would only type their comments and their lectures will reply by typing comments too. This method does not improve communication Skills.

ii. **Study-materials accessibility.** Virtual learning method has several features through which various study-materials can be accessed. This is one of the advantages of virtual learning; the students can visit different websites to source related materials and notes to buttress on those points and topics they have covered in the virtual class. Meanwhile, the physical (classroom) learning method does not provide such an opportunity. The students must need to pay rapt attention to their lecturers for better understanding.

iii. **Class notes.** In virtual learning, lecturers deliver their lectures in form of both text and video transcripts. The students are obliged to listen or download the materials and go through them. The video transcript will be recorded and uploaded for the students' usage and adoption. The text transcript is well-prepared and uploaded online for easy download. Whereas in the physical (classroom) learning, the lecturers deliver using the text transcript and can leverage on different scenarios without be stereotyped or focused on one point. In this regard, the physical (classroom) will help the student to develop their problem-solving skills.

iv. **Flexibility and time control.** The virtual learning can be accessible anytime and anywhere. The students are in the control of the time and can decide when to visit the educational sites; they learn at their own pace and time. It is flexible learning method because the students can choose to learn different topics at a glance while visiting various websites. Virtual learning method allows the students to revisit what they have been taught again and again. The video transcript is recorded and uploaded and can be downloaded anytime. On the other side, the physical (classroom) learning does not give such an opportunity. The students are only limited to what they have been taught in the classroom.

v. **Deadlines and discipline.** Virtual learning is preset and programed. Students are expected to submit their online assignments at a certain period; if the time lapses, they will not be able to submit them again. Virtual learning disciplines the students to imbibe the culture of meeting the deadline for online assignments submission. On like the physical (classroom) learning, the students may persuade their lecturers to change their mind and give them more time. Also, if the assignments are submitted late, the lecturers can pardon the students. Fixing time/deadline for assignments submission and having schedules for classroom routings help students mind to grow.

vi. **Gaining the real-world activities experience.** Virtual learning gives such opportunity. The students are exposed to the real-world activities and could collaborate with other international students in various countries. In today's competitive environment, students and lecturers have to work in accordance to global happening and application-based learning. Though application-based learning is better provided by the physical (classroom) learning method especially in the technical and practical aspects. Students will be supervised by their lecturers and observations and corrections will be made. Virtual learning may not be able to provide this strict supervision and monitoring. However, the practical and technical knowledge could be gained from other international students and tutors through the virtual learning method. This helps young students to get the required exposure and choose their career paths better. In virtual learning method, gaining experience will be leveraged on the vast experience and delivery of the lecturers which decision process is usually difficult.

vii. **The bottom line.** Virtual learning is suitable for adult education and professionals with many experiences while the physical (classroom) learning method is appropriate for the undergraduates and young students. The face-to-face teaching and learning method brings the students more closely to their lecturers and it helps to sustain mutual relationships. Hence, apply both learning methods will optimally enhance students' learning from different techniques.

According to Will (2020) opines that virtual (online) learning is flexible and when it is observed live, it increases human engagement and helps those students who have mastered the physical (classroom) learning. Virtual learning is vital in any course as it enables the students to receive feedback on their performance immediately submission of quiz are made online unlike the physical (classroom) learning whereby the students will have to wait for a couple of days. Olasina (2012) asserts that ICT tools usage have enhanced learning and impacted effectively on learning skills of students and teachers in developed countries and it continues doing so. Nigeria is not left out. Puteh et. al. (2015) opines that an aspect of the physical environment contributes teacher and student discomfort and that reduce the effectiveness of learning in the classroom. They suggest that physical learning environment should be improved with modern classroom facilities and equipment in order to meet and achieve world-class education.

The analysis of Will (2020) differences between virtual learning and physical (classroom) learning environments are as follows:

i. The first crucial difference is how the classrooms are managed. In a physical classroom, the teacher is free to rearrange the seating positions (Raji, 2019) and move the students around by grouping them into groups that will help to make the classroom activities run smoothly.

ii. The virtual classes use conferencing software which can make breakout groups and different arrangements of students possible in the classroom (Raphael, 2020). The virtual classrooms enable building of the text function to act as a back channel for the students' engagement; this helps to have both the students and teachers in lecture-style online lessons. This cannot be experienced in a physical (classroom) learning environment.

iii. In online classes, lack of visual feedback is a main challenge for teachers especially when to study and assess the students' level of understanding through their body languages. This is practicable in a physical (classroom) learning environment (Raji, 2019). Teachers can gain the control of bored faces by introducing various interesting and inspiring activities in order to engage the students more.

iv. In virtual learning platforms, teachers can make full use of the technological tools available to get feedback from the students (Racheva, 2017). Also, the students can respond via voting tools and the teachers can use it as attendance especially during a live online class.

v. Virtual learning can also be of great advantage to the students because they are not seen; hence, there is a room for anonymity (Racheva, 2017). This helps those students who are usually shy or nervous to contribute and raise their own issues whereas they may rarely communicate in the physical class. It is in the same vein for those physically challenged students whose participation in physical class is limited. They can freely and actively participate.

Will concludes that, though, there are various differences between virtual and physical class learning, using both methods to impart knowledge would help to achieve the same goals. Also, any of the learning methods the teachers and the students choose should be leverage on the better understanding of the topics to be covered. Presently, the virtual learning environment is gaining more patronage especially in those advanced countries. According to Soyemi, Ogunyinka and Soyemi (2012), students are comfortable and fulfilled in a virtual learning and such an environment improves their learning skills and enhance their academic performance at large.

Methodology

The study adopted descriptive survey research design. In this study, eight hundred (800) undergraduates were targeted online in four (4) tertiary institutions in Lagos State namely UNILAG, LASU, YABATECH, and LASPOTECH. The questionnaire was prepared with the use of Microsoft Survey Form and its link was generated and sent via WhatsApp and Telegram to the prospective undergraduates in each of these institutions. For easy distribution of this link and meeting the required target numbers, some lecturers and students assisted in sharing the link. Their responses were successfully retrieved through the same Microsoft Survey Form. In all, 558 undergraduates concluded the assessment and successfully submitted.

Questionnaire Online Assessment Analysis

Description	Frequency	%
Number of targeted undergraduates	800	100
Successfully received	558	69.8
Received as Void	Nil	0.00
Not Received	242	31.2

Source: Field Survey (2020) **Table** 1.1

Table 1.1 shows that out of the targeted 800 undergraduates in the four tertiary institutions captured in this study, only 558 undergraduates representing 69.8% assessed the questionnaire and successfully submitted it online. There was no void questionnaire while 242 representing 31.2% were not received.

Hypothesis Testing

There is significant difference in the mean responses of the impact of virtual learning and physical (classroom) learning on tertiary institution students' knowledge acquisition and skills enhancement

Summary of t-test analysis of the mean responses of the impact of virtual learning and physical (classroom) learning on tertiary institution students' knowledge acquisition and skills enhancement

Groups	Mean	N	Std. Deviation	Std. Error Mean
Virtual learning	2.81	558	1.365	.145
Physical (classroom) learning	3.48	558	1.782	.167

Source: Field Survey (2020) **Table** 1.2

The descriptive statistics in Table 1.2 shows that in the first group there were 558 respondents with the mean score of 2.81 while the second group in the same number of respondents had a mean score of 3.48. The standard deviations of both groups are 1.36 and 1.78 respectively.

Paired Samples Correlations

Groups	N	Correlation	Sig.
Virtual learning & Physical (classroom) learning	558	-312	.057

Source: Field Survey (2020) **Table** 1.3

Table 1.3 shows that there were 558 pairs of observations. The correlation between the two variables is r = -.312. The p value is .057. Hence, the alternative hypothesis is accepted. There is sufficient evidence to conclude that the population correlation (ρ) -312 is different from .057.

Discussions of Findings

The study revealed that virtual learning environment is widely adopted in Nigeria due to the emergence of Covid-19 pandemic lockdown. It is considered an option because government intends to engage the students at all levels in their comfort zones. Despite having enhanced features and easy connectivity, Nigerian tertiary institution students still find the virtual learning environment difficult for knowledge acquisition and skills enhancement. This is in line with the study of Olibie, Ezoem, and Ekene (2014) who found that Nigerian tertiary institution students are to be motivated and encouraged to embrace the use of online learning tools and technologies as most students have not been able to adapt to the use of technologies for better academic performance. The physical (classroom) learning, on the other side, enables the students to relate well with their teachers and ask questions whenever they are in doubt. Olasina (2012) found in his study that Nigerian tertiary institution students do not want the virtual learning or any form of e-learning as a replacement to the physical (classroom) learning that they have been used to. It is also obvious that both learning environments (virtual and physical) will go a long way in impacting the students' better understanding of their course of study both in theory and practical sections. In the conclusion of the study of Soyemi, Ogunyinka, Soyemi (2012), they agree that the combination of both virtual learning and physical (classroom) learning will be the best learning method to enhance students' skills and improve their knowledge acquisition.

Conclusion

Virtual learning is not well-embraced in Nigerian educational system unlike the physical (classroom) learning platform that the students at all levels of education in Nigeria are used to. Virtual learning complements the physical (classroom) learning and both could be used to enhance and improve students' better understanding of their course of studies and its usage can be incorporated by institutional management phase by phase. The training of the teachers and impacting of virtual learning usage to students at the early stage of gaining admission to school will help them get acquainted to its features and components and would not find the platform extremely multifaceted for learning.

Recommendations

This study recommends that:

- Government should continue funding Nigerian education at all levels through her designated regulatory bodies and agencies
- Government should provide enabling infrastructures that would promote the use of virtual learning and physical (classroom) learning environments in Nigeria
- Tertiary institution management should involve all students in the virtual learning platform for better familiarization to its usage as they are acquainted to its physical (classroom) learning environment counterpart
- Tertiary institution management should provide Internet facilities and constant availability of its network both in the classroom and outside the class
- Tertiary institution management should train both the teachers and students on how best to use the virtual tools and technologies
- Tertiary institution management should embrace the use of virtual in some of her programmes to reinforce the usual physical programmes
- Tertiary institution management should establish a virtual learning center/unit to help students building their skills on the usage of virtual learning tools
- Students should embrace the virtual learning platform
- Students should procure personal laptop and other computer accessories for virtual learning
- Students should devote time on both virtual and physical (class) learning platforms
- Students should develop a positive attitude towards virtual learning as they do during the physical (classroom) learning
- Students should constantly practicing the use of computers, Internet facilities and other accessories

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REJIGGING LIBRARY OPERATIONS AND SERVICES IN THE NEW NORMAL FOR SUSTAINABLE ECONOMY

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Abstract

Scientists and health professionals are working day and night, tirelessly to limit COVID-19 from further infections. COVID-19 is a new strain of coronavirus that has not previously been seen in humans with symptoms such as fever, cough, loss of smell, tiredness, muscle pain and mostly difficulty breathing. According to the World Health organization (WHO), as of 24 April 2020, there were close to 3 million confirmed cases globally and since then risen substantially. As scientists and health professionals search for solutions to COVID - 19, librarians have the important role of disseminating COVID - 19 related information and resources to the public through various virtual media channels available to them, especially as most people may not come to the library or because the library may be closed during the COVID - 19 pandemic.

Key words: Library operations, library services, new normal, sustainable economy

Inroduction

Information needs and dissemination

For centuries, the defining role of the library has been as a repository of books. However, 21stcentury library faces a more significant challenge as there is a paradigm shift from the printed pages to digital screens for information and communication becomes pronounced, mostly during and COVID 19 pandemic period. Some of the core issues under review include– technology integration, innovative services, institutional identity and right-sizing collections (plan for shaping a library's physical collection into one that meets its users' needs - (Ward, 2015). The 21st century library patron has significantly evolved as Matthews (2011) grouped them into three categories which are: the digital fugitive – these patrons are not digital migrants and have not really accepted digital technology and still prefer the 'good old library' as their source; the digital migrant – these group did not grow up with digital technology but have absorbed and integrated it into their lives as a necessity, and the digital native – these are the group of users who grew up learning digital technology and have come to depend on it as an integral part of their lives. Aside the relatively small group of digital fugitives who are not really into technology, majority of libraries patrons fall into the younger generation of users. Therefore, libraries must acknowledge technology trends and re-invent their services in order to remain relevant in the scheme of things in the post COVID 19 period in other to sustain the economy of the country through information provision in the library. Otherwise users will bypass processes and institutions that they perceive to be slow, unresponsive, unappealing and irrelevant in favour of a more direct approach to services offered by others that just might be "good enough" for what they need to do (Miller and Jensen (2007). This implies that libraries have to be proactive, re-strategize and restructure its mode of service delivery to as to so as to meet the information needs of their 21st century patrons and significantly counter the current library ennui that pervades our society about the library (Bell, 2007). Librarians and information professionals disseminate information as often as they have access to authoritative information and resources. Information dissemination, according to Wu et al. (2016), is the transportation of information to the intended recipients while satisfying certain requirements such as delays, reliability and so forth. Stating that these requirements vary, depending upon the information being disseminated, Dhawan (2018) notes that information dissemination is a proactive information service designed to educate and inform various groups of users on social, economic and educational issues, problems, and opportunities of interest to them. It requires systematic planning, collection, organization, and storage of information for its delivery to the target. Okike and Adetoro (2019).

21st century librarians and effective information service delivery

The human resource is a vital aspect of any organization. The success or failure of any organization depends to a large extent on the human capacity. The librarian of the 21st century is changing with the changing environment which is a consequent of ICT. Moghaddam (2009) notes that one of the vital elements of success and dynamism is specialized human resources viz librarians. LaRue (2012) firmly believes that the library's most powerful asset is its professional staff. According to him, librarians have the power to change lives and build community- but to do this, they have to leave their desks, leave their buildings and show the community what a powerful tool they are. Tanawade (2011) observed that it is time to publicize ourselves, our professionalism, and the skills we have to offer. From the foregoing, the librarian of the 21st century is no longer one that sits behind the reference desk answering mere reference questions but rather an active marketer who sells the library's products and services to his community at every opportunity. He packages current information sources and delivers on point. This strategy serves as his bait to attract clients and by doing so; he according to Tanawade (2011) ―fixes the idea in their minds that the library is source of incalculable value." The 21st century librarian is an information warehouse, one with a desperate zeal to impact positively on his environment. He is at home with modern technological infrastructure. According to Ikhemuemhe (2005), if librarians are to continue to make substantial contributions as information disseminators, they will have to understand and exploit ICT infrastructure and emerging technologies in delivering services to their clientele. In repositioning the academic library for effective information service delivery, the roles of the 21stcentury librarian will include the following:

Advocacy: In the current dispensation, users no longer seek information in the library. The reverse has become the case where the library goes out to render information services to users. To achieve this, the librarian has to look out for opportunities to connect and interact with his varied users. He therefore employs his interpersonal skills strategies to connect with administrators, faculty and students. During meetings, he can brief faculty on current publications and their terms of accessibility. By this, acts as a strong advocate for the library which is a vital organ of the university.

Use of social media: The library is in the business of connecting people with information. Web 2.0 technologies have brought new roles for library professionals. Web 2.0 tools such as face book, twitter, blogs, online groups which are also known as social media have made it possible for people to actually connect to one another through the internet. Khan and Bhatti (2012) put it thus; social media provides more opportunity to reach your community, target specific audiences, and give them a chance to interact with your library. By using social media, libraries can engage their clients on issues of interest and enable them make inputs especially as it affects library services. This can improve the library's image.

Use of mobile phones for information request: Mobile devices like cell phones have improved communication and enhanced the way information is being created, delivered and accessed. The 21st century librarian can provide effective library services through mobile telephones like the GSM (Global Systems for Mobile Communication). In support of teaching and research, the use of SMS (Short Message Services) can be employed to answer reference queries, and alert users on new arrivals and upcoming events in the university calendar e.g public holidays, university matriculation, lecture free week etc. This could be flashed through a facility called - broadcast where one text message is sent to all the library contacts listed in the address book on the mobile phoneatonce. (Iwhiwhu, Ruteyan & Eghwubare, 2010).

Information packaging: Packaging of information in various formats has become the norm in the digital era. This has created new opportunities for the library to provide value added services in the academic environment. Users of the 21st century are at home with electronic sources of information which permit multiple use of a material by different users at the same time. To exploit this advantage, the librarian can develop and preserve research output of his institution through digitizing projects, theses and dissertations. In collaboration with the university ICT center, an institutional repository can be created to host these projects on the universities ‘websites. While their visibility is guaranteed on the website, their access and retrieval remains the sole responsibility of the library.

Reference service: Reference service is the assistance given to a user in search of information in a library. In the Nigerian situation, many users shy away from the catalogue because they do not know how to use it. Some are oblivious of the importance of a catalogue in the retrieval process. Their inability to locate the needed information could cause frustration and apathy to library use. Reference service is the core of librarianship and should not be relegated. Ibegbulam (2000) observes that reference services no longer center on one-on-one service delivered face-to-face in the library. The quality of a good reference service depends on the competency and skill of the reference librarian. The 21st century librarian employs his in-depth knowledge and search strategy to meet user information needs. He does not just point to a row of shelves rather he involves himself in the search process. He is not satisfied until he has satisfied his client. By so doing, he improves his knowledge as well as the image of the library.

Partnership: Librarians in the 21st century can partner with academic units to teach their students information literacy skills so that they can become effective users of information. Ashoor (2000) posits that developing information literacy skills should be the main goal of the library's instructional programs. Information literacy is the set of skills needed to find, retrieve, analyze and use information. IL equips students with the critical skills necessary to become independent lifelong learners. It includes the technological skills needed to use the modern library as a gateway to information. Libraries inform as well as empower users to become resourceful. When users acquire the right knowledge, they are empowered to become useful citizens. In partnership with relevant units, the academic library can create an activity center for users to acquire extra skills. Such skills include sewing, baking, hair dressing, decorations, poultry or fish farming. This has the advantage of adding value to the library.

Rejigging library operations and services through cloud computing for sustainable economy

Having established the only means of survival of libraries in this dispensation is by embracing technological trends that can improve her service delivery to her clienteles. One fundamental way of enhancing library services in the 21st century is via cloud computing, which Qusay (2011) defined as a type of Internet-based computing that provides shared computer processing resources, data to computers and other devices on demand instead. Sahu (2015) opined that cloud computing can transform the way systems are built and services delivered, providing libraries with an opportunity to extend their impact. Thus, the importance of cloud computing to 21st century service delivery cannot be over emphasized. Libraries should therefore in essence

1. Make a move from the physical to virtual – for decades, libraries have existed exclusively as physical spaces, but with the paradigm shift from offline to online contents which implies that libraries have to take steps to better meet its community information needs, provide computer access, subscription to academic databases, trained assistants to help the users navigate and search for qualitative and well researched information; Promote libraries as strong community anchors that enhance civic engagement, cultural opportunities and economic vitality (Miller, 2012). Libraries should offer services that help to advance solutions to community problems by providing safe spaces for gatherings, and connecting points to community services by creating partnerships with businesses, agencies, institutions, for engagement with the host community. Libraries should host events that bring the people together.

2. Libraries should focus less on collection and more on creation – libraries should not just beplaces to store content, but should become places where people of all ages create and produce content themselves. Libraries should become places of innovation and exploration and should create programmes focused on digital literacy and training.

Basic concept of cloud computing

Cloud computing works on a principle of sharing of resources and infrastructure for effective and efficient service delivery. It encompasses the provision of software services and with the essential hardware resources used as a virtualized platform across numerous host computers connected by the Internet or an organization's internal network (Treacy, 2009; Buyya, et al.,2009). The US department of Commerce's National Institute of Standards and Technology defines cloud computing as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. Email servers like Gmail, Hotmail, Yahoo are popular providers of electronic mail services handling the hardware and software needed to support personal email accounts (Huth & Cebula, 2011) used by individuals and organizations for their day-to-day tasks. Which simply requires a web browser, a smart device, or any Internet enabled devices, and an access to a registered email account. Cloud computing provides new opportunities for innovation and offers unprecedented new levels of configurability for diverse groups of users of which the library is not left out. Creates possibilities for services to be dynamically configured to the needs of each user with a single unified, usually global-scaled, architecture (Kushida, Murray, & Zysman, 2011).

It delivers services incorporated in any of the following nomenclature: data storage, computation (processing power), and networking. That is, sharing of data storage, computing power, and network infrastructure by multiple user groups. Cloud services can be provided to users at any time, regardless of location, with the cost based only on the resources used. Users or subscribers only need to procure from the providers the 'amount of computing' required without needing to invest in the entire computing infrastructure (Kushida, Murray, & Zysman, 2011).

Type of cloud computing Clouds computing come in different forms precipitated on need. They are also tied to who provides the services and where they are located. They include: public, private, community, and hybrid clouds.

Public Cloud: - this is a type of cloud in which the computing infrastructure is possessed, runand situated within the sites of the host company's data centres (not in the customers' premises). That is, it is an off-premise arrangement from which services are provided. The subscriber does not have physical control over the infrastructure. This type of cloud uses a shared infrastructure pool from which many companies and institutions that need their services share same infrastructure to run their services. It can be accessed from any location with internet connectivity which is the only requirement. A typical example is the institutional mails (abc@unionuniversity.edu.ng) been used by many universities and colleges around the world, hosted by Google, Microsoft, and other email servers. Examples include: Google App Engine, Smart Cloud, and Amazon EC2.

Private cloud – this is not shared infrastructure, but could still be located in a remote facility.This type also allows organizations the option of choosing an on-premise infrastructure set-upwhich is usually expensive, with more control over the infrastructure. It is more secure with high control levels. They are deployed in closed environments, maintained and operated for a specific organization (Balan, Gupta, Kanal, Singh, & Bhanumurthy, 2014). Some examples include: Ubuntu Enterprise Cloud, Amazon VPC (Virtual Private Cloud), and VMware Cloud Infrastructure suite.

Community cloud – community infrastructure is shared between organizations, usually withthe shared data and data management concerns (organizations with similar interests). Several organizations can jointly construct and share the same cloud infrastructure as well as policies, requirements, values and concerns (Dillon, Wu, & Chang, 2010). The infrastructure could be hosted by a third-party vendor or within one of the organizations in the community. Some examples include: Google Apps for Government, and Microsoft Government CommunityCloud.

Hybrid cloud – this is a combination of clouds (private and public cloud offerings) that allowfor transitive information exchange (the cloud has the ability through their interfaces to give room for data, and applications to be moved from one cloud to another), that is, compatibility and portability across disparate cloud service offerings is possible. They use standard methodologies regardless of the ownership or location. Hybrid cloud providers can use third party providers in part or full depending on demand, thereby increasing flexibility of computing. Examples, Microsoft Windows Azure, and VMware vCloud, etc. are some clouds with hybrid capabilities.

Models of Cloud Computing
Cloud computing models are broadly grouped into three categories which are Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS).

(a) Software as a Service (SaaS): this model avails to the consumer the use of the provider's applications, running on a cloud infrastructure and accessible from various client devices through a thin client interfaces (e.g. web browser). It offers full applications to a customer on demand. The individual subscribing does not require investment in servers or software licenses, and the provider's cost are reduced, since a single application needs to be hosted and maintained. The applications are released on a hosting environment which can be accessed through networks from various clients (e.g. web browsers, PDAs, Smart Devices, etc.) by application users (Dillon, Wu, & Chang, 2010). Consumers do not have control over the cloud infrastructure which employs a multi-tenancy system architecture. Applications are organized into a single logical environment on the SaaS cloud to achieve economies of scale and optimization in terms of speed, security, availability, disaster recovery, and maintenance (Dillon, Wu, & Chang, 2010). Some of known providers include: Salesforce, LinkedIn, Workday, Netsuite, Service Now, Concur Technologies, Athena health, The Ultimate Software Group.

(b) Platform as a Service – this supports full "software lifecycle" which allows consumers to develop cloud service applications (e.g. SaaS) directly on the PaaS cloud. The difference between SaaS and PaaS is in the fact that SaaS only hosts completed cloud applications, whereas, PaaS offers a development platform that hosts both completed and in-progress applications (Dillon, Wu, & Chang, 2010). Major cloud providers include: Google, Microsoft and Amazon with services like the popular email services (Gmail, Hotmail), Windows Azure, Google's Android.

(c) Infrastructure as a Service – in this model, what is been shared or used by the cloud consumers are the IT (Computational) infrastructure (that is, processing, storage, networks, and other fundamental computing resources) (Huth & Cebula, 2011) provided in the IaaS cloud. This model relies extensively on virtualization. This is so because the need to integrate/decompose physical resources in a manner to meet growing or shrinking resource demand from cloud consumers (Dillon, Wu, & ,2010)EC2andS3(a data reaching these dynamic patrons. Libraries and information professionals have to embrace this technologies and leverage them for improved service delivery. storage service), Cloud Front (a content distribution network) and Virtual Private Cloud (VPC) service offered by the pioneer cloud service provider Amazon are examples of IaaS offerings. Other providers include: RackSpace, CloudSigma (Kushida, Murray, & Zysman, 2011).

The role of the Cloud computing for enhanced library service delivery
Switching services to the cloud environments or running services alongside the traditional library routine will afford the libraries the opportunities to revolutionize service delivery in present-day libraries. This move means that library housekeeping operations, digital libraries, etc. are now hosted on cloud-based networks. However, with the current day challenges libraries and information centers face for survival due to the roles played by competing agencies and services, it is pertinent for libraries to step up their game and enlist the services of cloud providers, among other innovative steps for service delivery, so as to improve the present state of libraries and with a view to appeal more to the current crop of techno-savvy patronage. Cloud computing could play pivotal roles in: extending the reach of libraries, create a seamless

environment for interaction between the library and its patrons, increase the potentials for collaboration, and enhance the general service routine within the library. The roles are discussed below:

1. Extending patron reach – providing libraries on the cloud will enable the library to reach more patrons than would have been possible using traditional means. Patrons in their spare time can reach and have access to resources without the hindrance of time and place. With the innovation and dynamism provided by cloud options, which are offered via the Internet, this provides libraries with opportunities to extend their impact. With cloud services, the library will surmount the challenge of distance, closing hours, and a host of other restrictive tendencies to service provision. This will also give the library the global appeal and reach in terms of services and outlook.

2. Real-Time interaction with the library – Users today want quick access to information. Most organizations now offer customer care services on real-time basis and available on a 24-hour basis. This buttress the emphasis on the need to keep their patrons close. Libraries can leverage on cloud offerings to provide online, real-time access to information. Digital/Virtual reference services for example, will help give the patrons information required and where they have other needs, the library is just a click away. Widgets for Instant Chat/Messaging (IM), video chat (skype), social media chat, etc. could be added by libraries on their cloud portals to increase efficiency of services.

3. Potentials for collaboration – using cloud services creates the possibility and opportunity for resource pooling, that is, many patrons and libraries can use the same network, same platforms and tools, and functions simultaneously. With the possibilities created by cloud services platforms, libraries and library professionals can share same resources and services for the interests of their patrons. Pooling and sharing of resources is an offer that cloud services could afford libraries. With community clouds for example, libraries could come together to have a shared platform where their patrons will have more and a richer experience with the resources of the individual libraries made available under a common platform.

4. Enhanced service delivery – use of modern information and communication technologies in libraries has potentials for positively impacting services. With cloud services, libraries can create applications in an online environment and make available to their patrons with the barrier of time and place. The change in information seeking behaviour of today's techno-savvy users has greatly changed, many now prefer services that are provided on internet and web environments. Libraries can build, test, and deploy web-based applications (Kroski, 2009) to offer services to users even outside business hours. Platform-as-a-Service model affords the library the liberty to explore development options without the need to purchase and maintain the required infrastructure. Cloud services could make it much easier for the library to try out new software without necessarily purchasing the hardware required, conditions for operation is simplified (power consumption issues – Air conditioning, constant power supply for massive devices, etc) and with less space consumed by large gadgets

Challenges to Effective Information Service Delivery in the 21ST

Lack of competency: some librarians in Nigeria are not competent to take on the challenging role of the 21st century information service delivery. They are averse to technology and perceive the application of computers to library work as an aberration. This being the case, they are reluctant to embrace new technology. Tanawade (2011) asserts that many librarians lack confidence in the face of increasing information technology. This slows service delivery and retards productivity. Hayati and Jowkar (2008) opine that the most problematic factors slow down the adoption of information technologies stem from unfamiliarity of academic librarians and users with computers and searching databases.

Lack of technology literacy: Some professional librarians lack the requisite technological literacy needed for a 21st century library service. Technological literacy can be viewed as the ability to responsibly use appropriate technology to communicate, solve problems, access, manage, integrate, evaluate, design and create information to improve learning in all subject areas and acquire lifelong knowledge and skills in the 21st century. Edem (2008), states that the major challenge facing the 21st century library is not underfunding but the poor performance of librarians and information professionals in the developing countries as a result of poor ICT skills. Lack of basic skills in the use of information technology has become a clog to better library services. Anyira (2011) adds that librarians without a well-developed ICT skill cannot render effective library services, thus, lack of skills among librarians constitute a major obstacle to service delivery in the 21stcentury.

Poor Internet connectivity: In a digital library, the internet plays a primary role in digital information but equitable access to the internet in Nigerian academic libraries is yet to be realized. The existing internet connections for most people are slow. Olabude (2007) states that there are many constraints that led to the poor internet development in Africa, one of this is the initial capital outlay to install internet facilities. This is because almost all the African countries are experiencing huge debts and foreign exchange required to purchase the facilities are lacking. Chigbu and Dim (2012) further asserts that there is no efficient telecommunication and power supply base to serve as spring board for the development of internet services in Africa. Where they are available, the expensive nature of the services is another huge factor. Inadequate power supply: The Nigerian power situation is in deplorable condition. There is constant power outage which has frustrated effective provision of information services. Most libraries rely on alternative source of electricity such as power generating machines to function. However, these machines are fraught with problems of maintenance, high cost of diesel and petrol. The resultant effect has been the provision of epileptic services. According to Adepetun (2012), the pangs of power supply crisis in the country have found expression in the expenditure profile, as most organizations expend huge amount of money providing alternative power supply. These alternatives include generators, solar system, green technology, turbine gas among others. The library as an organization is not divorced from this anomaly. Effective information service delivery cannot thrive in this type of scenario.

Poor funding: Money is the tendon that attaches the academic library to effective information service provision. Money is needed for the acquisition of information and communication technology equipment, for internet subscriptions, staff training, emolument and maintenance. The strength of a library lies in its information resources both print and online. Funds are needed to cater for a whole range of services in the library of the 21st century yet government subventions in the education sector are not adequate. Nwalo (2000), states that problems inhibiting IT applications by African libraries include apathy and inadequate government funding. Funding is essential to excellent library services Suffice it to say that, scarcity of funds has always been a primary hindrance to several noble pursuits.

Benefits of Cloud Computing to libraries

Cloud computing provides a scalable online environment which facilitates the ability to handle an increased volume of work without impacting on the performance of the system (Choo, 2010). It offers a significant computing capability and economy of scale that might not otherwise be affordable to non-profit and small-scale entities.

a) **Cost reduction** - Ability to increase or decrease the consumption of hardware or software resources immediately and in some cases automatically (the need to purchase servers, and other network infrastructure is removed from the expenditure of the budgeting librarians/library management). Also the billing system which is a pay as per usage model, infrastructure is not purchased which reduces maintenance cost. Initial and recurring expenses are significantly lower than traditional computing.

b) **Increased storage capacity** – due to the vast infrastructure offered by cloud providers in recent times, storage and maintenance of large volumes of data has become a more realistic and attainable goal for organizations in need of large storage. With cloud options, libraries can offer and resources without the limitation of physical storage.

c) **Scalability** – “Pay as you go” allowing a more efficient control of expenditures. This feature of cloud computing also makes it possible for organization/library to improve on their services as the need arises without having to purchase more infrastructure to accommodate growing demands.

d) **Provision of customer support services** – most cloud services providers have customer support services set up to assist their customers in the usage of the provided services. Call centres equipped with facilities to attend to the complaints and challenges of the customers in real time via dedicated telephone lines, email, social media accounts, etc.

Implications and recommendation of Cloud computing usage in Libraries

Adapting information and communication technologies by Libraries and librarians in developing countries has been a slow process. Many factors have been attributed to this which include but not limited to: Funding, technical skill deficiencies, poor political will on the part of government, resistance to change on the part of library managers and technophobia, are some. However, with the obvious changes in information seeking behaviour of library users, the need for the acceptance of these technologies in libraries and librarianship has become a necessity (Yuvaraj, 2015). Also, with the proliferation of electronic resources and databases, coupled with the growth of digital libraries, and the geometric rise in the number of library users who now have access to and use web 2.0 services (Wikipedia, Blogging, Facebook, Flickr), use of cloud computing services has equally risen albeit unconsciously among library patrons (Abidi & Abidi, 2012).

Libraries adopting cloud-based resources and services will thereby increase reach, foster efficiency in service delivery, create more opportunities for collaboration, reduce need for inhouse technical expertise, save costs, and improve services with faster access to the latest IT functionality. The cloud will also expedite workflow, automated software updates, redundancy, and back-ups. 'Libraries and librarians need to be more efficient in processing operations, markedly in maintaining print and electronic content in a single set of workflows said Burke (ProQuest) (Bright future with library clouds, 2014). Also the creation of a centralised knowledge-base is important in the drive to deliver unified collection management. Cloud based computing if properly harnessed can become pronounced enabler of library services; enhancing collaboration across departments, institutions and disciplines, and relieving staff of routine, repetitive and technical tasks so that they can concentrate on delivering improved and innovative services to end-users (Brisson, European strategy director at Ex Libris). Libraries and librarians need also consider reallocating resources from managing technology to developing added-value services that satisfy demands of patrons.

Libraries and librarians should focus more on faculty and student needs, by using the increased data access and efficient administrative tools and work smarter using mobile devices, tablets, and computers to fashion user-centred applications that will reflect the libraries vision and objectives for the provision of access to online content (e-journals, videos, databases, etc.) and more from their personal devices, without the barrier of location. Libraries need also to channel their energies to sourcing creative ways of getting new technologies and empowering their employees in the handling, maintenance, and general relationship with new media. Librarians should individually develop more interest in the use of these new technologies for services and open to new knowledge as they come.

CONCLUSION

Trends in technology are unrelenting, new gadgets and services keep flocking into the market with possibilities for new services unending. Cloud technologies offer possibilities for reach and collaboration that hitherto would have been impossible with traditional library services. Also, libraries and its practitioners need to accept the fact that modern patrons have altered their information seeking behaviour to a great extent, which calls for new means of reaching these dynamic patrons. With the alternatives at the beck of patrons today, and the seeming reduction in the cost of technology, dependence on libraries will shift. The only way of keeping these patrons will depend on the innovativeness and creativity displayed in terms of services and relationship with the patrons. Libraries and information professionals have to embrace this technologies and leverage them for improved service delivery.

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ESTIMATING THE MODEL PARAMETERS OF THE DISTRIBUTED LAG MODEL OF A CROSS-SECTION DATA USING POLYUNWANA ADMISSION AND GRADUATION DATA

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Introduction

It is a natural phenomenon to think of estimating the parameters of a distributed lag data or transfer function models from time series data since it is in time series contexts that such models arise. The present research deals with the estimation of a distributed lag model in a situation where a relevant body of a cross-sectional data not only exists but seems to be more appropriate for this purpose than those the available time series data (Theil and Stern, 2010). The researchers seek to investigate the input and output dynamics relating to polytechnics admission to subsequent graduations. The model of the admitted and graduated students would provide a frame work in which to compute expected graduations and thus forecast available chances for admitting new students.

This research analysis will be based on the assumptions that the polytechnic may be represented by a linear function which transforms the input sequence of admissions into the output sequence of graduations That is;

$$D_i = \sum_{i=1} C_i A_i + U_i$$

Where

D_i *is the number of graduates in the department i*

C_i are the fixed constants

A_i the number of admitted students in the department

U_i Is the disturbance term which prevents graduation from been predicted perfectly from the past admission

This study primarily is concerned with the estimation of the model parameters. Thus, $Y_i = \beta_0 + \beta_1 X_i + \beta_2 X_{i-1} + U_i$ may be obtained only after certain assumptions have been made concerning the functional form of the equation and the properties of the variables and errors in the respective equation. The assumption that all the equations are linear is perhaps the most naïve assumption that can be made about the functional form of the model. Riley (2015) concluded, from his study of the meat purchases of the consumer panel, that there appeared to be no strong preference for a logarithmic form over the linear form of equations which he investigated. Therefore, to avoid the additional costs involved in converting the data and logarithms, the assumption will be made that the equations for the model are linear.

Statement of the problem

The rate at which students are admitted into privates, states as well as federal polytechnic is very alarming. The researcher wish to probe into the prevailing rate of admission and graduation of students

Aim and objectives

The primary aim of this research is to estimate the model parameters of the distributed lag model and appropriate conclusion drawn based on the hypothesis set to test; the specific objectives of this research are stated below

- To determine the linear relationship between admission and graduation of students.
- To make recommendations based on the formulated model.

Literature Review

Often when we try to model statistical relationships, we tend to use contemporaneous values. For example, as we want to model changes in graduation because of a change in disposable admission, we may try to run the regression $\Delta Y_i = \beta_0 + \beta_1 X_i + \beta_2 \Delta X_{i-1} + e_i$, where ΔY_i is the percentage change in graduation and ΔX_i is the percentage change in disposable admission, β_0 and β_1 are the regression parameters, and e_i is the random error. The relationships works very well, but it has been documented that students demonstrate "graduation inertia" that is, the graduation habits of students do not change right away in response to an increase in the disposable admission, because graduation expectations are formed by past changes in admission, this class of models is called backward-looking expectations models. The best way to capture graduation inertia is to include in the regression model not only in the current changes in disposable admission but also previous changes. If an independent variable (ΔX_i) appears more than once, with different time lags, then the model is called a distributed lag model.

There are several problems with this kind ad-hoc specification. First there is no guidance in terms of the lag length. Second, if the sample size is small, then as the lag length increases statistical inference maybe some what shaky, with fewer degrees of freedom. Finally, successive lags, tends to have high correlations (Multi-collinearity), leading to smaller t-ratios and incorrect inferences. One way to reduce the number of lags and extent of Multi-collinearity is to use LM Koyck's (2017) adaptive expectations model. In this type of model, in addition to the explanatory variable, a lagged dependent variable is included and is represented as $Y_t = \beta_0 + \beta_1 X_t + \beta_2 X_{i-1} + U_t$ where U is the error term. If the dependent variable is random, the lagged dependent variable may also be random, and including a random explanatory variable in the model may produce biased and inconsistent estimates. Thus, in order to use this model, it is essential to verify that the lagged dependent variable is not correlated with the random errors. In addition, in the above models, serial correlation in errors cannot be tested using normal auto-correlation statistics. One of the assumptions of infinite distributed lag models such as Koyck's is that the coefficients on the lag variables declines geometrically as the lag length increases. If the coefficients do not behave in this manner, then the above lag structure may be suitable. In these circumstances, you need a more flexible model that would incorporate a variety of lag structures, such as Almon's (2005) distributed lag models. To estimate a flexible model such as Almon, we must at prior specify the lag length to verify the changes in the size of the coefficients. If the β's decrease at first and then increase with higher lags, β's can then be approximated by a second degree polynomial because we have one size change. The more turning points, the higher the degree of polynomials.

The illustrations above shows a multiple regression model, together with a few simple innovations structures, as a way of illustrating some general issues related to estimation of dynamic models. The code here is easily modified to observe the effects of changing parameters values, adjusting the innovations variance, using different lag structures and so on. Explanatory distributed lag terms have the ability to reduce estimator bias, though ordinary least square method tends to over-estimate auto-correlation co-efficient at the expense of distributed lag coefficients. Explanatory distributed lag terms can also be added to the models. The general set-up here allows for a great deal of experimentation, as is often required when evaluating models in practice.

This study is designed to investigate the applicability of selected distributed lagged models to admission and graduation of students in Akanu Ibiam Federal Polytechnic. More especially, the analysis is directed towards the estimation of the parameters of the relationship for the admission and graduation. An attempt is made to identify lags and seasonal shifts in student demand for graduation.

Econometric consideration

The method of least squares (L.S.) is perhaps the most widely used estimation techniques in empirical economic analysis. The popularity of the technique is primarily due to;

- Its computational simplicity.
- The small variances of its estimates.
- The fact that under certain conditions regarding the recursive or identification properties of a system of equations, the structural parameters of the system may be derived either directly or from the transformed coefficients of the equations which maybe estimated by least square.

Data source and analysis

The data used in this research was obtained from the record unit Akanu ibiam Federal Polytechnic Unwana Ebonyi State. collection. This methodology was chosen to pave the researcher with necessary information required. The method of data analysis is ordinary least square method of estimation. The model specification is; $Y_i = \beta_0 + \beta_1 X_i + \beta_2 X_{i-1} + U_{ij} \quad 0 \le \beta_1 < 1$

Y_i *is* the response variable (Graduations)

X_i *is* the explanatory variable (Admission)

X_{i-1} *is the lagged random variable*

β_0 *is the intercept to be estimated*

β_1 *is the slope/coefficient of the variable* X_i *also to be estimated*

β_2 *is the lag weight to be estimated also*

Under this method (OLS) is used to estimate the parameters

$Y_i = \beta_0 + \beta_1 X_i + \beta_2 X_{i-1} + U_i \quad i = 1,2,3,\cdots,n$ *And* $\hat{Y}_i = \beta_0 + \beta_1 X_i + \beta_2 X_{i-1}$

So, $U_i = Y_i - \hat{Y}_i$

Assumptions of the classified linear distributed lag model

1. Linearity
2. Exogeneity of independent variables
3. Exogenously generated data
4. Normal distribution

Linearity

$$Y_i = X\beta + e_i$$

The model specifies a linear relationship between Y_i and X_i in matrix form.

Full rank

X Is a $n \times k$ matrix with rank k .

Hence, X has full column rank; the column of X are linearly independent and there are at least k observations.

Exogeneity of independent variables

The disturbance is assumed to have conditional expected value zero at every observation, which we write as $E(e_i) = 0.$

In principle, the mean of each e_i conditioned on all observations on X convey information about the expected value of disturbance.

Exogenously generated data

The ultimate source of data X is unrelated (Statistically and economically) to the source of error e_i .

Normal distribution

It is convenient to assume that the disturbance as "e_i" are normally distributed, with zero mean and constant variance.

$$e_i = \approx \mu\left(0, \sigma^2\right)$$

In view of our description of the source of error e_i , the condition of the central limit theorem will generally apply, at least approximately, and normality.

Analysis and interpretation

Table 1.0

S/N	Departments	Admitted (Xi)	Graduands (Yi)	Lagged (Xi-1)
1	Accounting	608	299	-
2	BAM	735	224	608
3	Marketing	382	239	735
4	OTM	326	169	282

5	Public Admin	756	215	326
6	Civil engineering	371	188	756
7	Elect & Elect. Eng.	409	147	371
8	Mechanical eng. tech.	253	192	409
9	Arcitectural tech.	113	71	253
10	Building technology	120	115	113
11	Estate mgt.	129	102	120
12	Quantity survey	150	103	129
13	Ceramics & glass tech.	71	44	150
14	Computer science	420	229	71
15	Maths & statistics	125	106	420
16	Science lab. tech.	337	268	125
17	Surveying & Geoinfo.	99	43	337
18	Agric. Technology	134	71	99
19	Hort. & land scoping tech.	70	9	134
20	Food technology	145	104	70
21	Hotel mgt & tourism	132	20	145

Obtaining the model for the data

The parameters of the model were determined using ordinary least square method of regression analysis. Secondly, the significance of the regression model was tested using analysis of variance ANOVA. Finally, the standard error estimate of the model and coefficient of determination (R^2) were obtained to check the adequacy of the model. For precision and accuracy, the result was obtained using SPSS.

Descriptive Statistics

	Mean	Std. Deviation	N
Y	140.8571	84.71971	21
X	280.2381	212.29765	21
Xi-1	269.1905	217.37631	21

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	93492.752	2	46746.376	16.810	.000[b]
	Residual	50055.819	18	2780.879		
	Total	143548.571	20			

a. Dependent Variable: Y

b. Predictors: (Constant), Xi-1, X

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	51.145	21.735		2.353	.030	5.482	96.809
	X	.323	.059	.810	5.469	.000	.199	.447
	Xi-1	-.003	.058	-.008	-.054	.957	-.124	.118

a. Dependent Variable: Y

Discussions of the findings

The result of a regression of one lag of disposable admission is $Y_i = 51 + 0.323X_i - 0.003X_{i-1}$.
The coefficients of the disposable admissions "0.323" shows that a unit change in a disposable admissions would cause 0.323 unit increase in graduation. The intercept 51 implies that no matter what, each department in the polytechnic must graduate 51 students and -0.003 is the lag weight.

Conclusion

This study is focused to estimate the distributed lag model. One of the most popular techniques, which are used for estimating the parameters of the distributed lag model, is proposed by Almon (2005). In Almon technique, the distributed lag model is transformed under the assumptions that the lag coefficients lies on linearity. Since we observed that the error term is homoscedastic, we immediately apply the ordinary least square for the estimation of the model parameters. Since we observed that successive lags tend to have high correlation (multi-collinearity), leading to imprecise estimates, also the sample size is small (n < 30), we decided to lag only one department so we can have a better result. The model $Y_i = 51 + 0.323X_i - 0.003X_{i-1}$ of the admitted and graduated students of the polytechnic would provide a frame work in which to compute expected graduations.

Recommendations
At the end of the statistical analysis; the following recommendations are made based on the available model $Y_i = 51 + 0.323X_i - 0.003X_{i-1}$ of 2017 admitted and the graduated Polyunwana students at all levels.

1. Government should make proper plans for graduated students of the polytechnic, since it is observed from the findings that not less than 30,000 students graduate each year.
2. Since the research is of great benefit to determine the rate at which polytechnic is maximizing growth through admission and graduation of students, it is recommended that polytechnic management should make proper plans for the admitted students.

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POST PANDEMIC: TECHNOLOGICAL VIEW OF RESPONSE IN EDUCATION, HEALTH AND BUSINESS IN NIGERIA

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Abstracts

Technology has proved a useful and necessary tool to help ensure that local and regional governments on the frontline of the emergency continue to provide essential public services during the COVID-19 crisis. As the coronavirus continues to spread around the world, governments have put in place important restrictions on the movement of people, the functioning of services, and rules on physical distancing. Within this context, technology can have a profound effect on citizen's daily lives and ensure them access to health services, access to information, and communication with competent authorities, among other things. Local and regional governments on the frontline of the COVID-19 crisis have resorted to digital technologies to monitor, anticipate and influence the spread of the disease, as well as to provide education for students who cannot access school as well as foster social cohesion while we respect physical distancing. Overall, technology will be vital in protecting communities in the aftermath of the crisis and digital tools must ensure that citizen's rights are being protected as well as serve to bridge the socioeconomic divide and promote the transformation needed to achieve the global agendas. This paper examines the important of technological response to COVID-19; identify technological tools in fighting against COVID-19, This paper also review technological strategy and tools employ in education and business operation in response to in COVID-19 in Nigeria.

Keywords: Technology, COVID-19, Health, Education, Business.

Introduction

A pandemic is generally defined as a new disease that rapidly spreads in a number of countries and continents. Even a mild pandemic can kill several millions of people (Osterholm, 2005). Over the past hundred years or so, we have seen three deadly pandemics, namely, in 1918, 1957 and 1968 (Mills, Robins, & Lipsitch, 2004). Novel Coronavirus (Covid-19) is the most recent pandemic that has resulted in unprecedented social and economic impact on society. Covid-19 is one of a large group of viruses that was transmitted to humans from bats in a local live animal market in Wuhan in late 2019 (Ji, Wang, Zhao, Zai, & Li, 2020). However, we are fortunate that our current cities are more resilient than ever before. This is due to the increased adoption of smart technologies such as the Internet of things (IoT), big data, and artificial intelligence (AI) (Rama Krishna Reddy Kummitha, 2020). Many cities and regions are putting many efforts into ensuring that this academic season and education can continue as smoothly as possible and technological solutions have emerged to make it happen. Government has put in place a multi-channel strategy that involves the public TV and radio broadcasters and which aims to offer virtual contents for children so that they can continue their education. The engagement of teachers is also worth underlining, which is relying on the technological tools available (phone, email, WhatsApp, Zoom etc) to maintain communication with students, keep the exercises and exams going and check on their wellbeing, The enforcement of social distancing, lockdowns and other measures in response to the COVID-19 pandemic has led consumers to ramp up online shopping, social media use, internet telephony and teleconferencing, and streaming of videos and films (Guidance note on education, 2020).

For many years, educators have been exploring ways to combine different learning styles and student-constructed knowledge with the theory of practice-centered learning. Instead of being passive recipients of knowledge, students are now capable of constructing their own knowledge with guidance from the teacher. Using emerging computer-based technology as a resource, students are encouraged to explore their own interests and to become active educational workers, with opportunities to solve some authentic problems (Edwards, & Clear, 2001)

Health is without a doubt the local and regional government competence that has been most affected by the pandemic. LRGs have reacted promptly, sometimes even faster than their national governments, to order lockdowns, prepare hospitals and other facilities, involve health workers and ensure the provision of medical equipment and supplies. For many of them, digital technology has been key to coordinate these decisions. For example, in order to avoid high-risk cases to spread COVID in communities Xi'an created a QR code to trace confirmed symptomatic cases and locate them for their close contacts. In New York, the city government coordinated a joint response with the Brooklyn Navy Yard, an important local technology hub, to provide additional personal protective equipment for doctors, again reinforcing the idea mentioned above that partnerships with private stakeholders are highly necessary to deal with the pandemic (UN Habitat, 2020)

Literature Review

2.1 Measures and Actions Taken to Facilitate Education Technological Tools in Response to Covid-19 in Nigeria

The growing urban population and the need to enhance the potential of city-level governance systems have given birth to the smart city concept (Kummitha & Crutzen, 2017; Lee & Lee, 2014). From a technological point of view, smart cities are equipped with some sort of IoT to collect and analyze data. IoT devices include sensors, processors, wearables, electronics, software, actuators, vehicles, cell phones and computers (Kankahalli, Charalabidis, & Mellouli, 2019; Mora, Deakin, Reid, & Angelidou, 2019).While schools are closed; many countries have turned to distance learning as a means of mitigating for lost time in continuing education services. Some countries are simply putting resources on their website, and making available more products, but not necessarily online classes. Others, like Spain, are asking teachers to prepare online content and offer online classes. Infrastructure and familiarity with the tools seem to be driving successes (and challenges) of delivering learning. China for example, with robust connectivity, is offering distance learning successfully whereas others with limited penetration of internet, cell phone, or television (e.g. Vietnam, Mongolia) are finding it difficult to reach all students equally. In addition, many countries have challenges in ensuring that education services are equally accessible for employees/students with disabilities (Guidance note on education, 2020).

According to United Nation 2020, The COVID-19 pandemic has created the largest disruption of education systems in history, affecting nearly 1.6 billion learners in more than 190 countries and all continents. Closures of schools and other learning spaces have impacted 94 per cent of the world's student population, up to 99 per cent in low and lower-middle income countries; On the other hand, this crisis has stimulated innovation within the education sector. We have seen innovative approaches in support of education and training continuity: from radio and television to take-home packages. Distance learning solutions were developed thanks to quick responses by governments and partners all over the world supporting education continuity, including the Global Education Coalition convened by UNESCO. We have also been reminded of the essential role of teachers and that government and other key partners have an ongoing duty of care to education personnel.

Some African countries (Nigeria, Kenya, Rwanda, South Africa, Senegal, Botswana, and Gambia) can start preparing now as there is reasonable school connectivity. In most countries, however, students have some access to mobile devices and optimizing accessible solutions to those should be the main emphasis. Although there is plenty of digital content available, some even open source, a key challenge for the coming weeks is to prepare pedagogical material to be available in a structured way such that could capture the attention of all students (Guidance note on education, 2020).

Partnering with some private sector providers to provide content already developed is a useful option to explore. A key element in the discussion of using smartphones is establishing partnerships with telecom providers to allow for zero charges for content downloaded from the Ministry of Education (or any agency that hosts learning resources platforms). TV, which can use captions to support various language learners and students with disabilities or sign language interpreters to reach deaf learners, and radio options, can still be used but they tend to be better suited for lower grades (and should be prepared thinking of children and caregivers). Many countries have material available that can be rebroadcasted (Guidance note on education, 2020).

In addition to infrastructure and connectivity, teachers' and administrators' familiarity with the tools and processes are also key factors in providing distance learning. Singapore is currently rolling out training for teachers on provision of classes online in anticipation of school closings. Some countries like Lebanon have opted to send kids home with lessons as homework, promoting independent distance learning with help from peers and parents that would then be reinforced once school resumed (Guidance note on education, 2020). Some schools in Nigeria such as Ogun state institute of technology Igbesa (Ogitech) adopt the use of goggle class room for lecturing of her students to cover for the time lost due to COVID-19.

2.2 Some Technological tools Employed in Nigeria to Facilitate on e-learning during COVID-19

According to Oyeniran, Oyeniran , Oyeniyi, , Ogundele , and Ojo (2020), The e-learning zone is the combination of android and computer applications for the purpose of teaching and learning. The following are the android and computer software applications that are used during the pandemic.

Google Classroom: This is a free web service that is developed by Google for schools that aims to simplify creating, distributing and grading assignments in a paperless way with the purpose of streamlining the process of sharing files between lecturers and students.

Zoom: This is a video communication that provides video telephony and online chat services through a cloud-based peer-to-peer software platform that is used for distance education and social relations

Whats App: This is a freeware, cross-platform, messaging and voice over IP service owned by

Facebook, Inc. It allows users to send text messages and voice messages, make voice and video calls and share images, documents, user location and other media.

Blog: This is an online journal or informational website that displays information in a reversed chronological order with the latest post appearing first. It is a platform where a writer shares his/her view on any subject.

2.3 Measures and Actions Taken to Facilitate E-Commerce of Goods in Response to Covid-19 in Nigeria

In order to implement effectively the social distancing measures aimed at containing the further spread of COVID-19, several governments around the world including Nigeria have encouraged online purchasing as an alternative to physical shopping, and consumers have adapted their shopping patterns and behaviours to minimize risks of getting infected. In some developed countries, distribution service platforms have managed to address problems without government intervention. In developing countries like Nigeria, some governments have been more proactive than others, and in particular in countries where face-to-face transactions had, until now, remained the norm (World trade organization, 2020).

For example, in some African countries like Nigeria, to facilitate online purchases of essential food items, local governments have compiled and circulated, via social media and other means, the telephone contacts of coordinators of different food products in various markets to enable consumers to call and order groceries. Consumers then pay with mobile money (i.e. by means of their mobile phones) and have their purchases delivered by bicycle and motorcycle taxis known as tuku-tukus3 operated, for example, by Uber, SafeBoda, or other similar options. This expansion of delivery services has had positive knock-on effects for increased employment, even if these may be temporary (World trade organization, 2020)

In addition, several telecommunications providers have made available data services for minimal or no costs. Central banks have temporarily permitted companies and banks to lower or scrap transaction costs and fees on digital payments and mobile money transfers in order to encourage the use of mobile money in preference to cash (World trade organization, 2020)

Other authorities, including in the United Arab Emirates and the Russian Federation, have encouraged the use of mobile payments but are yet to formally unveil specific regulations.

These are some of the innovative measures/actions which have been employed to encourage regions in which, hitherto, populations did not fully trust online purchases, with a view to ensuring a continued flow of food supplies and essential household goods. Despite persistent challenges, in light of the pandemic, online purchases and e-commerce have become *de facto* fall-back solutions in developed and developing countries like Nigeria. Going forward, the questions arise of whether the experiences from the COVID-19 pandemic will propel more consumers to change their shopping behaviours and patterns and increasingly resort to online purchases, and whether governments in these regions will prioritize and invest more in e-commerce and online-facilitating infrastructure and policies (World trade organization, 2020)

However, spurred by social distancing and stay-at-home requirements, e-commerce in services that can be delivered electronically has flourished, with demand rising sharply. While it may be a short-term phenomenon that might not last beyond the current crisis, as with online shopping, longer-term shifts in customer habits could potentially make businesses and consumers more accustomed to consuming online services in both work and personal settings (World trade organization, 2020)

One example is media services. Facebook reports that its online messaging, voice and video call services are up by more than 50 per cent, with Italy showing a 70 per cent surge overall, and a 1,000 per cent increase in group calls. Spain's Telefonica has seen an increase in IP (i.e. internet protocol) and mobile data traffic of 40 per cent and 50 per cent, respectively. Thailand reported an 828 per cent rise in data traffic from Zoom Video Communications and a 215 per cent spike on Skype video conferencing (World trade organization, 2020)

Both companies and governments are moving to address capacity constraints and facilitate consumer access. Some publishers have, for example, made COVID-19-related content freely available online. In addition, social distancing measures have dramatically boosted the demand for audiovisual content; and, as consumers cannot attend cultural events physically, content is being brought online. For example, a number of opera and concert houses have chosen to offer free online streaming of their repertoire. (World trade organization, 2020)

3 Measures and Actions Taken to Facilitate the use of technologies tools in Response to Covid-19

According to Mihalis K. 2020, the following are the ten (10) technological tools used in fighting covid-19

3.1 Artificial intelligence

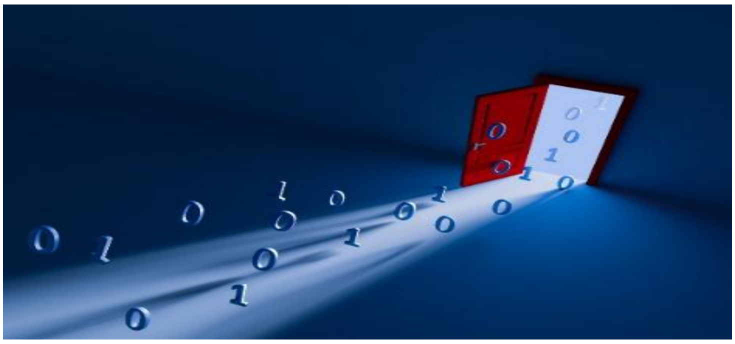
Analytics have changed the way disease outbreaks are tracked and managed, thereby saving lives. The international community is currently focused on the 2019-2020 novel coronavirus (Covid-19) pandemic, first identified in Wuhan, China. As it spreads, raising fears of a worldwide lockdown, international organizations and scientists have been using artificial intelligence (AI) to track the epidemic in real-time, so as to be able to predict where the virus might appear next and develop an effective response. A health monitoring start-up correctly predicted the spread of Covid-19, using natural-language processing and machine learning. Decisions during outbreaks of this nature need to be made on an urgent basis, often in the context of scientific uncertainty, fear, distrust, and social and institutional disruption.

3.2 Block chain

Covid-19's highly infectious nature means that there is a pressing need to find appropriate solutions, from speeding up the detection of virus carriers and halting the spread of the virus to developing a vaccine. Blockchain technology has recently emerged as a key technology in the critical domain of epidemic management. Blockchain applications could provide a robust, transparent and cheap means of facilitating effective decision-making and, as a result, could lead to faster responses during emergencies of this kind. In the context of this pandemic, blockchain has the potential to become an integral part of the global response to coronavirus by tracking the spread of the disease, managing insurance payments and maintaining the sustainability of medical supply chains and donation tracking pathways.

3.3 Open-source technologies

During disease outbreaks, rapid data sharing is critical as it allows for a better understanding of the origins and spread of the infection and can serve as a basis for effective prevention, treatment and care. The capacity of information technologies to allow for low-cost dissemination and collaboration of data has led to the establishment of a multitude of repositories and information technology platforms for data sharing. Most of these data-collection activities are coordinated by international organizations such as the World Health Organization (WHO) and the European Centre for Disease Prevention and Control. At the same time, an increasing number of bottom-up, open-data initiatives and open-source projects have also been developed, facilitating access to research data and scientific publications as well as sharing blueprints for production of critical medical equipment such as ventilators and face shields.

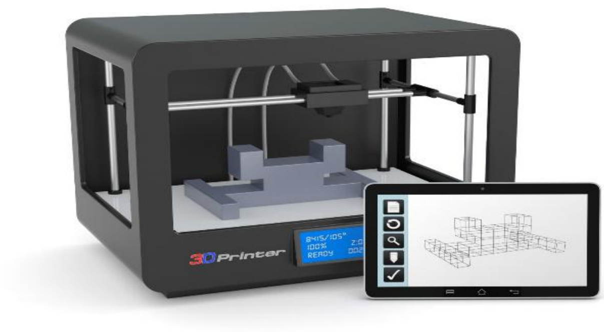


3.4 Telehealth technologies

The Covid-19 pandemic is posing unique challenges to healthcare delivery. States across the world are shutting down non-essential services and in several cases issuing stay-at-home restrictive orders to flatten the curve and help overcrowded hospitals remain functional. Alternative technologies, conducive to self-quarantine, could therefore offer an essential link between patients and clinicians, circumventing the need to travel to overburdened hospitals. Given the high transmission rates of the disease, especially within hospitals, telehealth technologies can be a cost-effective means to slow the spread of the virus and to lessen the pressure on hospital capacity by operating as a possible filter, keeping those with moderate symptoms at home while routing more severe cases to hospitals.

3.5 Three-dimensional printing

Given the high risk of healthcare system capacity being exceeded, including the availability of medical hardware (face masks, ventilators and breathing filters) to treat Covid-19 patients, governments around the world are taking increasingly drastic measures to boost production and optimise the supply of the necessary medical equipment. As the coronavirus continues to put a strain on hospitals around the world, three-dimensional (3D) printing can play an important role as a disruptive digital manufacturing technology in sustaining the effort of hospital workers in the middle of this emergency and in keeping patients alive.



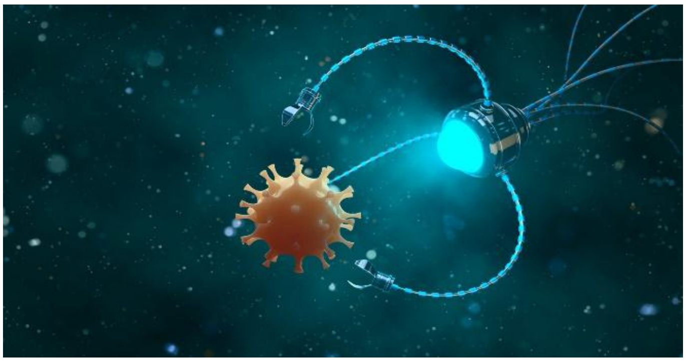
3.6 Gene-editing technologies

The international community is currently focused on containing the largest human coronavirus severe-disease outbreak we ever seen (Covid-19). As it spreads, governments, academic institutions and pharmaceutical companies are racing to develop treatments to combat the pandemic. At the moment, there are no approved medicines to protect people from or treat them for Covid-19, although some antiviral therapies are being tested. Could gene-editing technologies help in the diagnosis and treatment of this pandemic disease and become humanity's next virus killer?

3.7 Nanotechnology

Covid-19 is spreading rapidly over the globe, but there are few specific tools available to control the growing pandemic and to treat those who are sick. Quarantine, isolation, and infection-control measures are all that can be used to prevent the spread of the disease and those who become ill must rely on supportive care. What is lacking is a specific antiviral agent to treat the infected and subsequently, decrease viral shedding and transmission. Nano-based products are currently being developed and deployed for the containment, diagnosis and treatment of Covid 19. An experimental Nano-vaccine has become the first vaccine to be tested in a human trial.

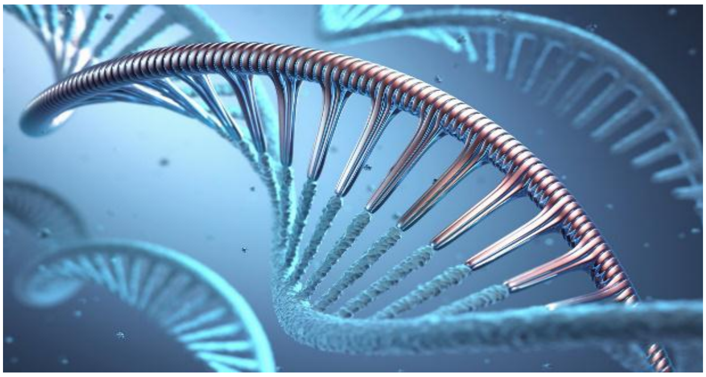
Nanotechnology is a multidisciplinary field that makes use of nano-sized particles and devices for various applications, including diagnostics, targeted drug delivery and the production of new therapeutic materials. Nanoparticles such as gold and silver have been used in biomedical and diagnostic applications, for the detection of viral particles for instance. Nanotechnology has been shown to help in treating viral infection by means of various mechanisms. Nanoparticles can act as antiviral drug delivery systems; they can interact and bind to a virus and thereby prevent it from attaching and entering the host cell; and they can be designed to exhibit antiviral effects. All together, the use of nanotechnology in the development of new medicines has been recognized as a key enabling technology, capable of providing new and innovative medical solutions to address unmet medical needs.



3.8 Synthetic biology

In synthetic (lab-based) biology, scientists take a multidisciplinary approach, using biology, engineering, genetics, chemistry and computer science to substantially alter the genotype of viruses. This can contribute to advances in fields ranging from drug and vaccine development to pest control of invasive species. In response to the current pandemic, synthetic biologists are applying cutting-edge tools to speed up the development of a successful vaccine. Their efforts illustrate synthetic biology's potential to design, build, and test solutions for an unanticipated challenge such as Covid-19.

Conventionally, researchers study a virus by isolating it from cells of a sick patient and growing it in a petri dish. However, when a disease outbreak occurs far away, it can take months for laboratories to access physical samples. In such situations, researchers can use a synthetic version of the virus, known as an infectious clone, so as to be able to start studying it without losing time. The synthetic virus is just a substitute for the actual virus.

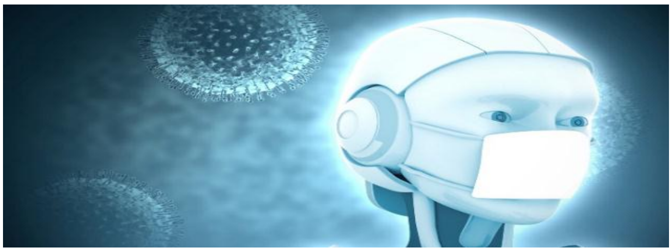


3.9 Drones

From disinfection and street patrols to food and medicine delivery in quarantined districts, drones are being deployed on the front line to contain the spread of the novel coronavirus. The Chinese government adapted and co-opted industrial drones to enforce the world's largest quarantine exercise. The modification of drone's software by state agencies and drone manufacturers to enforce restrictive measures and to boost disease detection and crowd management makes a compelling case about the risks of pervasive surveillance and overstretched law enforcement. In the context of the Covid-19 pandemic, drones are being used to monitor quarantine measures, to facilitate aerial broadcasting, to spray disinfectant, conduct aerial thermal sensing, monitor traffic and deliver medical supplies in infected areas. As the situation is becoming more serious, drone software is being rewritten to acquire a multitude of functions, with drones being used to replace helicopter patrols and traditional regular disinfection, for law enforcement purposes and for transportation to shore up epidemic prevention and control in several countries.

3.10 Robots

Like drones, robots are another new technology being deployed to contain the spread of Covid-19. From the initial outbreak of coronavirus (Covid-19) in China to its spread across the globe, robots have been used to provide services and care for those quarantined or practising social distancing. Robotics developers are responding quickly to public health concerns and needs and the pandemic has fast-tracked the 'testing' of robots and drones in public, with all stakeholders seeking the most expedient and safest way to grapple with the outbreak and limit its further spread.



4.0 Conclusion

As the coronavirus (Covid-19) pandemic spreads, technological applications and initiatives are multiplying in an attempt to stem contagion, treat patients in an effective way and ease the pressure on overworked healthcare workers, while also racing to develop new vaccines. This research paper analysis the response level of Nigeria to Covid–19 in using technology to continue and improved education, health care services and businesses, the paper also look at 10 innovative technologies used in the fight against Covid-19. Technology in itself cannot replace or make up for other public policy measures but it does have an increasingly critical role to play in emergency responses. Covid-19, as the first major epidemic of the 21st century, represents an excellent opportunity for policy-makers and regulators to reflect on the legal plausibility, ethical soundness and effectiveness deploying emerging technologies under time pressure. Striking the right balance will be crucial for maintaining the public's trust in evidence-based public health interventions.

5.0 Recommendation

Developing country like Nigeria, still have a lot to explore in the area of technology; this paper reveals how technology has helped in the fight against Covid-19 in the education, health and business sector in Nigeria and other countries, Nigeria need to fully explore the technology tools to improve its education, health, business sector and other sectors as technology has been proved as one of the useful tools in the fight against Covid-19, among the technologies identified as the tools for the fight against COVID-19, it is only Drone that is mostly and currently used in Nigeria, other technologies identified need to be explore for proper fight against COVID-19 and to guide against future occurrence of any pandemic, also very few schools were able to explore technology as a means to foster education between the teacher and students and schools that were able to so were able to cover up for about 70% of time lost due to COVID-19 example is Ogun state institute of technology (Ogitech) that use goggle classroom for e-learning, the government need to make virtual technology available and accessible to both teachers and students to guide against future occurrence of any pandemic, Nigeria need to explore the use of technology in health sector for the fight against COVID-19 as identified in other countries, presently the only available connection to health officials is through phone call, there are more technology that patient can explore than phone call. Finally, Nigeria is not doing badly in online business but more application needs to be employed for online business and government need to make data cheap to citizens as most technology rely on network connectivity to operate.

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THE IMPACT OF COVID 19 ON HUMAN RESOURCE MANAGEMENT OF AN ORGANIZATION (A STUDY OF SELECTED EATERIES IN ABEOKUTA, OGUN STATE)

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Abstract

Dramatic changes caused by the new coronavirus COVID-19 have unprecedented implications on companies around the globe and influenced human resource management profoundly. HRM took leadership to navigate in the vague present and unforeseeable future by managing people to cope with stress and to continue working remotely so that business goes on with its operations. However, HRM had to deal with the dismissals and reduction of the staff caused by the pandemic lockdown. The presented paper is based on the qualitative expert interview research method. The study is an empirical investigation conducted through a self-administered survey questionnaire which was used to elicit information amongst some selected eateries in Abeokuta, Ogun State. Data obtained from survey were analyzed and presented through the use of ordinary least regression inferential statistical technique. Findings from the study revealed that; the spread of virus is a function of labour turnover (R =0.612, R_2 =0 .528, P < .05). Also, the pandemic lock down is a function of retrenchment in an organization (R = 0.610, R_2 = 0.528, P< .05). The study therefore recommend that rules and regulations that guide against the spread of virus must be maintained in every given organization and as well medical services must be adequate with more sophisticated and conducive isolation centres should be available in the country.

Keywords: covid 19, human resource management, retrenchment, labour turnover, pandemic lockdown

INTRODUCTION

Organizations are faced with increasing uncertainty as they navigate today's "grand challenges", or highly significant problems not typically confined to national, economic, or societal borders (Gehman, 2015). The grand challenges of today are diverse, involving a range of complex issues such as climate change, severe economic downturns, and political instability (George, Howard-Grenville, Joshi, & Tihanyi, 2016).

The COVID-19 pandemic has created a particularly challenging environment for human resource management (HRM) – with managers having to quickly venture into the "unknown unknowns" as they strive to help their workforce adapt to and cope with radical changes occurring in the work and social environment. For example, employees who formerly spent all or most of their time working inside their organization's physical boundaries now have to quickly adjust to remote work environments. Due to shelter in place orders and the closure of non-essential businesses, even those who might be well adjusted to remote working conditions are now faced with their own unique challenges due to an inability to seek alternative workspaces (e.g., cafés, libraries, coworking-spaces) outside of the home itself. This has likely further limited the segmentation between work and private spheres leading to greater difficulties in "unplugging" from work demands (Chawla, 2020). The economic effect of the global pandemic (Covid-19) includes acceleration of the digitalisation processes. Companies now need to immediately use digital platforms to enable access to jobs for their employees. Human Resource Management has an essential role to play in helping organisation to navigate in the situation of dramatic changes caused by the pandemic lockdown.

The research is induced by the situation in which business process continuity has been affected by the regulations aiming to prevent the spread of Covid-19, causing dismissals or reduction the staff.

Accordingly, as organizations continue to adapt their HR practices in the face of COVID-19, understanding how these unprecedented changes are influencing employees' experience of P-E fit, and how to resolve potential misfit, will be critical. For instance, as organizations have to transition to virtual forms of recruitment, selection, and training in lieu of face-to-face interactions (Maurer, 2020) it will become increasingly important to understand how these practices will impact the future fabric of an organization's values and culture, as these new practices could certainly attract and retain individuals differently than traditional face-to-face approaches.

The aim of this research is to estimate the level and magnitude of the challenge companies have been facing in terms of HRM, and to assume the consequences, what changes are expecting to be initiated.

The research results present remarkable insights for HR managers and organizations. HR managers need to know how to improve the wellbeing of employees during virtual work in crisis times taking into consideration personal stress. Besides, internal corporate communication, company brand image should be in compliance with the organization's approach to the workforce during turbulent times.

Overall, the contribution of the manuscript to scholarship is its suggestion that main challenges triggered by the pandemic lockdown are the recession when revenues have been decreased enforcing companies to reduce or dismiss the staff. The research results recommend HR managers to acknowledge their dominant role in the heart of the changing processes of digitalisation towards remote working models, and of developing new HR policies. Resilience, flexibility, and adaptability are crucial overcoming strategies.

Statement of the Research Problem

Perhaps one of the most salient HRM challenges stemming from the COVID-19 pandemic involves adjusting new and current employees to drastically altered work conditions, such as shifting to remote work environments or implementing new workplace policies and procedures to limit human contact. Such dramatic alterations in how and where employees do their work is likely to have important implications for employees' experiences of person-environment fit (P-E fit), or the level of congruence between the attributes they possess and those of the environment (Kristof, 1996).

P-E fit theory posits that individuals are *attracted to* and *selected by* organizations whose work environments reflect the same values, cultures, and work features as their own important beliefs, values, and desires (Kristof-Brown & Guay, 2011). Based upon these processes, employees who enter organizations where their P-E fit is maximized typically flourish and experience heightened levels of satisfaction, engagement, and overall well-being (Kristof-Brown,2005). However, when the work environment that supports the fulfillment of these needs and desires is drastically altered – as is currently happening in response to the COVID-19 pandemic – the saliency of the growing chasm between an individual's needs and current work environment is likely to lead to experiences of *misfit* (Follmer, 2018).

For example, one of the most commonly sought desires within P-E fit work relationships focuses on an individual's fundamental goal for developing relationships and striving for communion with others (Barrick, Mount, & Li, 2013). Throughout the recruitment and selection process, people are attracted to organizations based on this fundamental need (Yu, 2014), and indeed extant research supports the notion that work relationships fulfill this fundamental desire for association with others (Edwards & Cable, 2009). But as organizations adapt their workforces in response to the current pandemic in ways that fundamentally limit physical interaction, the potential misfit stemming from this newfound P-E incongruence presents a potential disaster for employee well-being and productivity for organizations.

Accordingly, as organizations continue to adapt their HR practices in the face of COVID-19, understanding how these unprecedented changes are influencing employees' experience of P-E fit, and how to resolve potential misfit, will be critical. For instance, as organizations have to transition to virtual forms of recruitment, selection, and training in lieu of face-to-face interactions (Maurer, 2020), it will become increasingly important to understand how these practices will impact the future fabric of an organization's values and culture, as these new practices could certainly attract and retain individuals differently than traditional face-to-face approaches. Toward this end, research is needed to understand the impact that COVID-19 has on employees' ability to navigate the job search process, how the transition to virtual recruitment affects their ability to develop and assess perceptions of fit regarding potential employment situations, and the efficacy of virtual assessment centers and training programs.

In addition, understanding whether certain socialization practices can help rebalance potential perceptions of misfit among existing employees, and how to best implement them, will be necessary. Keeping with the prior example concerning the need for social relationships, a current panacea for balancing social connections embraced by many organizations involves virtual socialization opportunities such as virtual lunches, coffee breaks, and happy hours

(Maurer, 2020). While these practices potentially alleviate perceptions of misfit as a result of the abrupt change in the social fabric of the work environment, they may also leave participants feeling unsatisfied as they pine for the social interactions they had in their pre-pandemic work-lives (Fetters, 2014). Accordingly, more research is needed to better understand how these transformed community-building practices translate to rebalancing the experienced P-E misfit. Building upon the work of (Chawla,2020) regarding the daily recovery activities of employees, for instance, future research could investigate the daily impact and recovery experienced when engaging in virtual social activities with colleagues as a replacement for face-to-face social gatherings. This study is conducted to find out the impact of covid-19 on human resource management of an organization. Some main goals are to investigate how the spread of virus affect labour turnover and also to know how the pandemic lockdown has affected retrenchment of an organization.

Research Questions

The following questions were addressed in the course of the work.

- . How does spread of virus affect labour turnover?
- To what extent does pandemic lockdown affect retrenchment in an organization?

Objective of the study:

The general objective is to examine the impact of COVID 19 on HRM of an organization.

The specific objectives are:

- To investigate the effect of virus spread on labour turnover in an organization.
- To determine the impact of pandemic lockdown on retrenchment in an organization.

Research Hypotheses

The following hypotheses were tested in order achieve the objectives of the study.

Ho_1: The spread of virus has no significant effect on labour turnover.

H_{02} . There is no significant impact of pandemic lockdown on organization retrenchment

LITERATURE REVIEW

This area discussed comprehensively the review of relevant literatures of the previous works done on impact of covid-19 on human resources of an organization. These were discussed on three (3) major headings; Conceptual framework, Theoretical framework and Empirical review.

Conceptual Review

Employees are the backbone of an entity and their existence is more than essential for them. Retention of the employees is a broad topic, and lots of companies look serious in this provision to maintain a healthy output with their employees (Bisht, Chaubey & Thapliyal, 2016). The retention of the employees is associated directly with the policies made and implemented by the HR Department of a company. It is mandatory for an organization to provide their every employees implemented by the HR Department of a company. It is mandatory for an organization to provide their every employee the mean to satisfy their needs professionally and ethically. According to Al-sharafi, Hassan & Alam (2018), the retention of the employees increases with their motivation. Motivation is then divided into two different factors which are intrinsic factors and extrinsic factors. Both of these factors of motivation are essential in generating lots of effectiveness and enhance their provision accordingly. According to Dhanya & Prashath (2019), motivation is a driving force that enables an employee to become reactive, efficient and productive. High motivation of the employees could maximize the potential and satisfaction level of the employees that ultimately increases the values and productivity of the companies in particular. There are certain factors that increase the motivation level of the employees proactively. These factors have been divided into two main types which are intrinsic motivation and extrinsic motivation. Both, intrinsic and extrinsic motivational factors are valuable in providing maximum satisfaction to the employees. Theoretically, as defined by Kuvaas, Buch, Weibel, Dysvik & Nerstad (2017), intrinsic motivational factors are non-monetary factors that could increase the level of satisfaction among the employees, while the extrinsic motivational factors are monetary factors that increase the level of satisfaction in the employees. Some of the main examples of extrinsic motivation are bonuses, perks and competitive salaries. The motivational factors tend to change among the companies as per there requirements. Both of these methods are efficient as well as productive that ultimately value the organizations and enhance the productivity level of the employees. Therefore, each of these factors should have been considered as proactive for the value creation in particular. Bear, Slaughter, Mantz & Farley-Ripple (2017) identified the role of the HRM towards their employees during Medical-Based Pandemics and the Financial Slumps. Some of the main factors that define by the author are as follows

- Workplace Guideline and Support
- Access to Information and Updates on Pandemic with Financial Benefits
- Health Related Quality of Life
- Communication and Promoting Message

These four factors have been taken into consideration in this research as well. As per the views shared by Eliza Wong & Kin (2020), Workplace Guideline and Support during a hard time are always a sigh of relief that helps the employees to regain their confidence and motivation. It increases the level of motivation of the employees and satisfies their needs accordingly. Access to Information and Updates on Pandemic with Financial Benefits is the most suitable and effective benefits that provide by the entities to their end-users. Especially, during the hard times such as Pandemic, an organization should not get away in providing provisional healthcare benefits to its employees, as it is one of the most important retention techniques available to them. As per the opinion shared by Khoshnevin & Gholipoui (2017), there are companies that give certain bonuses to their employees during hard times in order to tackle the situation. The same factor is applicable in the context of this research as well in which analysis of the Pandemic Bonuses have been discussed accordingly. It is also observed from the previous analysis that companies cut the salaries of the employees during their hard times that made them fully unsatisfied with the policies of the entity and ultimately increases employees' turnover. There was a research conducted in the same domain, and it was initiated by Khalil & Hashim (2019). The researcher identified the importance and implication of different motivational factors that use for retaining the employees for a long span of time.

Theoretical Review

This section highlighted and discussed the various theories already propounded in the area of human resources of an organisation.

Contingency theory

Theorists like Selznik, Burns and Stalker, Woodward, Lawrence and Lorsch, Thomson were the principal developers of this theory. According to Delery and Doty" the contingency theory, indicates that the relationship between the relevant independent variable and the dependent variable will vary according to such influences as company size, company age, technology, and

capital intensity, the degree of unionization, industry sector, ownership and location.

This theory expresses the definitions of aims, policies and strategies, lists of activities and analyses of the role at Human Resource Department are valid only if they are related to the

circumstances of the organization. According to Armstrong, textbooks narrate principles and practices in a more prescriptive manner of how the organizations manage their human resources, portray the universalistic view but how the organizations adopt according to recurrent trends and changes in socio, economic political situations and in the emerging technology relate to contingency theory. Contingency theory is essentially about the need to achieve best " fit" between what the organization is and wants, technology, size, structure, the people, its employees and its external environment and what the organization performs and how it is structured and the processes, procedures and practices it implements. Contingency theory suggests a situational viewpoint which enables for any organization to face any challenging

circumstances and opportunities. In contingency theory, it is believed that there is no universally accepted practice or principles in managing human resources. It is an opposing viewpoint to universalistic theory. Hence, managers are supposed to act according to environmental factors both internal and external to the organization. Therefore the proponents of this theory are classified as contingentists or situationalists and their ideology as *'best fit theory or contingency theory of HRM.* The Underlying philosophy of the above theory is the intricate relationship that exists between the change and the permanence and it is an admixture of both.

Resource based theory

The resource based theory of HRM draws attention to the strategic value of the workforce and to the issues of workplace learning. Thus, it appears to embrace a soft view of HRM. Penrose who conceptualized the firm as a collection of productive resources. Quoting Boxall Penrose distinguishes between physical and human resources and draw attention to the issues of learning including knowledge and experience of the management team. According to Armstrong resource based theory which recognizes that the strategic capability of a firm depends on its resource capability, specifically the human resources. The human or people are highly utilized as a resource. Hamel and Prahalad expose that competitive advantage could be achieved by the firms, through developing human resources by way of learning organization and learning and practicing, before their competitors in a most healthiest manner. Heery and Noon"' note that competitive advantage means the situation that an organization is implementing a strategy that has not been adopted by itscurrent or potential competitors. Competitive advantage is temporary while the sustained competitive advantage is permanent. According to (Purcell, 2009) if any organization could develop extraordinary, non-imitable strategies, values and policies and practices that organization is able to achieve sustained competitive advantage which emanates the view of resources based approach. Therefore sustained competitive advantage is that if any strategy in such way is always targeted at the virtue of internal resources particularly the human resource and applied such strategy or strategies through an effort of benchmarking. The underlined principle of this theory is that

Motivation Theory

Motivation is a way to create a high amount of passion in order to achieve organizational goals, and this condition is addressed by fulfilling certain individual needs. As Haque, Haque and Islam (2014) stated that managers within businesses or organizations are largely responsible for ensuring that the activities or roles are conducted in the right way by workers. To accomplish that, these HRM must guarantee that they have a professional team of workers to hire the best staff capable of doing the job. To optimize the productivity of the employees, the employee needs to be motivated enough. At this level, one must understand human nature better understand how motivation can impact on the performance of the employee. To achieve this goal, it is important to combine the correct motivational resources with successful management and leadership in as much as motivation impacts on employee performance (Haque, Haque & Islam, 2014).

Not to ignore the idea that motivation is quite important in determining the skill of the employee, so do other variables like the resources provided to an employee to do their job. Successful work output may therefore emerge from a variety of motives. It provides an ambiguity in the discussion as performance and motivation varies from individual to individual and from industry to industry. This therefore gives rise to more critical analytical thought in the subject area. In this context, several academic literatures from scholars and practitioners have ensured that this fascinating academic area can be resolved on how motivation can improve performance (Haque, Haque & Islam, 2014).

Observations indicate that workers who are well motivated are more productive and creative in achieving business or organizational goals. On the other hand, less motivated workers are less productive and appear to deviate from the accomplishment of organizational goals. Motivation as incentive programs is essential for capacity building and capacity translation into higher performance (William, 2010,

Empirical Review

In the study done by (Kuvaas,2017). The research was conducted in the region of the United Kingdom (UK), in which the importance of intrinsic and extrinsic motivation has been visualized. The research was conducted through the quantitative method in which primary data collection method has been used. The data collection was through the close-ended questionnaire in which descriptive statistics and linear regression has been applied. Based on the applicable statistical metrics, it is found that the connection between intrinsic/extrinsic motivations are high and positive with satisfaction of the employees that ultimately assist them in retaining them for a certain time period. The research also idealized that both of these motivational factors are productive in the hard economic times, such as the current time.

There was a research conducted in the same domain, and it was initiated by Khalil & Hashim (2019). The researcher identified the importance and implication of different motivational factors that use for retaining the employees for a long span of time.

The researcher used both, monetary and non-monetary benefits into the account and frequency distribution has taken into consideration. The researcher managed to find a significant connection between motivational outputs and its satisfaction of the employees accordingly.

As per the view shared by Eliza Wong & Kin (2020), Workplace Guideline and Support during a hard time are always a sigh of relief that helps the employees to regain their confidence and motivation. It increases the level of motivation of the employees and satisfies their needs accordingly. Access to Information and Updates on Pandemic with Financial Benefits is the most suitable and effective benefits that provide by the entities to their end-users. Especially, during the hard times such as Pandemic, an organization should not get away in providing provisional healthcare benefits to its employees, as it is one of the most important retention techniques available to them.

There is another research that was conducted by (Wassem,2019), as per the researcher, apart from the extrinsic rewards, there are intrinsic rewards as well which are essential for the HR managers to increase the level of satisfaction in the employees that ultimately increases their retention. The researcher idealized that communicating with the employees from the management and informs them about the Pandemic and intensity could be ideal for the employees to get satisfied and retain with the company accordingly. This outcome will be effective for the companies, in the current time period as well, and in all over the world because the effect of Covid-19 is currently spreading in every single economy of the world. Based on the same analysis, it is recommended to the HR managers to play their role with

Research Gap

There are numerous recent researchers who suggest on covid 19 on human resource management with a history of not following the adherence to the rules and regulations that guide against the spread of virus in every given organisation . Few or no research of this nature have been conducted in any country. Therefore, this study intends to study how the spread of virus affects labour turnover and to know the extent the pandemic lockdown has affected retrenchment in an organisation.

METHODOLOGY

This study intends to showcase the impact of COVID-19 on organization human resource management (HRM). It presents the methodology to be adopted in gathering the needed data for realizing the set objectives for the study. This encompasses the research design, population of the study, sample size and sampling technique, source of data collection, method of data analysis and model specification.

Research Design

The study is an empirical investigation of the impact of COVID-19 on organization HRM in Nigeria. Self-administered survey questionnaire was adopted in conducting the exercise.

Population of the study

The population of this study was derived via the adoption of random sampling method of population determination by dividing the city into different different stratum. The total population is 150.

Sampling Procedure and Sample Size

Sample and sampling techniques for the study is drawn from the total population which is 150 of the selected eateries in Abeokuta, Ogun State Nigeria. The total population of the selected eateries was used as the sample size for the study. Hence, the use of sample size determination was not necessary due to the homo-genuineness of the population.

Method of data collection

Questionnaire was the instrument used to collect data for the study and was distributed to the respondents directly by the researcher. This is said to be primary means of gathering the required information from the field of study.

Method of data analysis

Data collected via primary source was analyzed using multiple regression method of (OLS) Ordinary Lease Square using through version 20 of SPSS.

Model specification

Y= a + B1X1 + B2X2 + e

Where;

Y= Organization HRM

a = Constant variable

B1--B2 = the slope of X1--X2.

X1= Spread of Virus.

X2= Pandemic Lookdown.

e= error terms.

DATA PRESENTATION AND ANALYSIS

The data collected from the field was computed using SPSS (v.20). Multiple linear regression analysis was used to the two hypotheses deduced for this study.

Table 1: Sex of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	65	43.3	43.3	43.3
	female	85	56.7	56.7	100.0
	Total	150	100.0	100.0	

Source: Field Survey, 2020

Table 1 above shows the sex distribution of the respondents. It is revealed that Sixty-five(65) respondents were male, which constitute 43.3%, while Eighty-five(85) were female which constitute 56.7%. This implies that, female are more than male in the selected eateries of the study area.

Table 2: Age of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30yrs	45	30.0	30.0	30.0
	31-40yrs	36	24.0	24.0	54.0
	41-50yrs	56	37.3	37.3	91.3
	51yrs and above	13	8.7	8.7	100.0
	Total	150	100.0	100.0	

Source: Field Survey, 2020

Table 2 above shows the age distribution of the respondents. It is revealed that Forty-five (45) respondents were of age between 20-30 years representing 30.0%, Thirty-six (36) were age between 31-40 years representing 24.0%, Fifty-six (56) respondents were age 41-50 representing 37.3% while Thirteen (13) respondents representing 8.7% were between 51 and above. This implies that, people between age of 20- 30 years are more than other age bracket in the study area.

Table 3: Year of experience of the respondents

		Frequency	Percent	Val id Percent	Cumulative Percent
Valid	less than 5years	68	45.3	45.3	45.3
	6-10 years	44	29.3	29.3	74.6
	11-20 years	23	15.3	15.3	89.9
	21 years above	15	10.1	10.1	100.0
	Total	150	100.0	100.0	

Field Survey, 2020

Table 3 above shows the working experiences of the respondents. It is revealed that Sixty-eight (68) respondents representing 45.3% working experience were below 5 years, Forty-four (44) working experience were within 6 to 10 years representing 29.3%, Twenty-three (23) respondents working experience were within 11 to 20 years representing 15.3% while One hundred and Fifteen(15) respondents working experience were 21 years and above representing 10.1%. This implies that, staff with apparently 21 years and above of working experience are into eateries business than other categories of working experience.

Test of Hypotheses

The data collected to test its hypotheses for the study was analyzed using a multiple regression of ordinary least square (OLS) method in order to validate how disaster management and emergency management affect sustainable development in Nigeria**.**

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.612[a]	.528	.620	.603

a. Predictor : (Constant), Spread of virus, Pandemic lockdown.
Source: SPSS Printout (2020)

The table 1 above presents the model summary of a regression analysis conducted to test the hypotheses. The result obtained reveals an R value of 0.612 (61.2%). This signifies that there is significant relationship Covid-19 pandemic (proxied by spread of virus, pandemic lockdown) and organization HRM. The R^2 value of 0.528 obtained implies that the combined effect of the sub-variables of Covid-19 pandemic explains 52.8% of variations in organization HRM.

Also, a very close Adjusted R Square value of 62.0% signifies a goodness of fit of the regression model and that the model proved to be useful for making inference about the influence of Covid-19 pandemic on organization HRM.

Table 2: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	64.595	3	14.645	46.614	.000[b]
	Residual	90.484	282	.262		
	Total	153.110	275			

a. Dependent Variable: Organization HRM (Labor turnover, retrenchment)
b. Predictors: (Constant),Spread of Virus, Pandemic Lockdown.
Source: SPSS Printout (2020)

The analysis of Variance (ANOVA) table presented above revealed a P-value of 0.000 which is less than the critical value of 0.05 at 95% confidence level. Therefore, the null hypotheses which stated that "there are no significant impact of spread of virus on labour turnover and that of pandemic lockdown on organization staff retrenchment are rejected while the alternative hypotheses are accepted. Hence, is can be concluded that Covid-19 has significant impact on organization HRM.

Table 3: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.645	.124		3.211	.001
	Spread of virus	.420	.052	.293	4.764	.000
	Pandemic lockdown	.302	.037	.285	4.110	.000

a. Dependent Variable: organization HRM
Source: SPSS Printout (2020)

The table presented above provides more information about the influence of the sub-variables of the independent variable (Covid-19 pandemic) on the dependent variable (Organization HRM). Based on the standardized Beta (β) obtained in the table, it can be inferred that Organization HRM would increase by 64.5% when all other sub-variable of Covid-19 pandemic are held constant. Organization HRM of an organization would increase by 42.0% and 30.2%, when there is decrease in Labor turnover, retrenchment respectively. Furthermore, the P-value obtained for each of the variables is less than the critical value of 0.05 (5%) at 95% confidence level. Hence, Covid-19 pandemic(spread of virus, pandemic lockdown) has significant effect on Organization HRM.

Discussion of Findings

The study examined the implications of corona virus pandemic on human resources management of an organisation. Findings from the study revealed that there is significant effect of the extent of the pandemic lockdown which affect the company's labour turnover and retrenchment. The result was in line with the assertions shared by Eliza Wong & Kin (2020), Workplace Guideline and Support during a hard time are always a sigh of relief that helps the employees to regain their confidence and motivation. It increases the level of motivation of the employees and satisfies their needs accordingly. Access to Information and Updates on Pandemic with Financial Benefits is the most suitable and effective benefits that provide by the entities to their end-users. Especially, during the hard times such as Pandemic, an organization should not get away in providing provisional healthcare benefits to its employees, as it is one of the most important retention techniques available to them.

Finally, the study further revealed that the spread of virus affect labour turnover. This is consistent with the findings of (Wassem,2019) the researcher idealized that communicating with the employees from the management and informs them about the Pandemic and intensity could be ideal for the employees to get satisfied and retain with the company accordingly. This outcome will be effective for the companies, in the current time period as well, and in all over the world because the effect of Covid-19 is currently spreading in every single economy of the world.

Conclusion and Recommendations

This study has revealed the impact of Covid-19 pandemic on Organization HRM. Base on the findings of the test of hypotheses from the analysis, the study concluded that Covid-19 pandemic has significant impact on Organization HRM. It was inferred that Covid-19 pandemic will affect company's labour turnover and retrenchment.
The study hereby recommends the following base on conclusion:

- Adherence to the rules and regulations that guide against the spread of virus must be maintained in every given organization.
- Medical services must be adequate with more sophisticated and conducive isolation centered should be made available in the country.
- Lectures on how to curb the spread of virus must be encouraged in an organization.

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MARKETING INNOVATIVE CULTURE AND COMPETITIVE ADVANTAGE OF SELECTED INSURANCE FIRMS IN OGUN STATE, NIGERIA: A THEORETICAL EXPOSITORY

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ABSTRACT

In recent times, business activities around the globe have declined as a result of covid-19 pandemic and this has further disrupted both intra and inter-boarder trades among nations. Specifically, the insurance business sector in Nigeria has been found to be badly affected. The importance of marketing innovative culture to responding to external competitive pressure in the post pandemic era is considered the basis for insurance firms to achieve competitive advantage. This paper provides a theoretical basis on how marketing and technological capabilities as dimensions of marketing innovative culture could drive the overall activities of insurance businesses in Nigeria during post pandemic era towards achieving competitive advantage. The Dynamic capability theory and Resource based view were adopted and explored to draw on strategic perspective of how marketing and technological capabilities could be adopted as innovative base to achieve competitive advantage. The paper adopted a meta-analytical methodology where previous related studies were reviewed. The study thus concluded that both marketing and technological capabilities formed innovative bases required for insurance firms operating in a situation of pre and post covid-19 pandemic to achieve a competitive advantage given in Nigeria.

Keywords: *Marketing innovative culture, Marketing Capability, Technological Capability, Competitive advantage.*

Background to the study

The importance of insurance business to global economy cannot be overemphasized. Business organizations (whether local or international) operates in a highly demanding, risky and competitive business environment which require constant evaluation of vital environmental signals that are capable of influencing the overall performance of the business. Given the risk associated with local and international business involvement by multinational corporations, Insurance business in Nigeria and globally are saddled with the responsibility of mitigating corporate business risk by ensuring seamless business operations in the dynamic and competitive business environment through identifying individuals, corporate organizations, government bodies etc. on unexpected risk (whether life or corporate) encountered in the course of life. However, Insurance business globally and in Nigeria particularly in Ogun state are currently faced with number of issues ranging from low insurance product patronage, absence of technological initiative, constant changes in customer demand and product requirement, poor marketing initiative vis-à-vis other financial institutionswith COVID-19 changing business financial institutions system of operations among others.

Today's competitive and fast-changing environment has been inexorably altered by the COVID-19 pandemic as consumers are turning to non-traditional players such as BigTechs and product manufacturers for innovative, personalized offerings with enhanced customer experience and are increasingly relying on digital channels in the face of the COVID-19 pandemic (Duhen, 2020). The conventional approach of selling protective products is not near enough for insurer given the impact of recent global melt down. Therefore insurance business growth and competitive edge will come from new service models, innovative products and greater focus on prevention (proactive business measures)in the post pandemic era (Deloitte, 2020) as disruptive new technologies and the availability of massive data sets will continue to shape the global insurance industry in the post pandemic era (EY, 2020).The appetite for BigTech insurance companies is accelerating fast with only 17% of World Insurance Report 2016 survey respondents considered purchasing insurance products from a BigTech insurance players, this number has doubled by 2020 to 36% (Duhen, 2020) as today's customers do not depend exclusively on a channel in their purchasing decision. This shows that the future trend/survival of micro insurance firms globally with Nigeria inclusive depend on how quick they respond to the external environmental pressure in the face of COVID-19 pandemic and beyond.

In addition, while consumers are turning to comparison websites and company websites to gather information on policies, less than 30% of insurers globally think their websites are useful for sharing policy information and only

37% says comparison websites help educate customers (Duhen, 2020) with traditional insurers face losing out 75% of customers switching insurers if seamless policy servicing was not available across all channels. Similarly,the growth and development of insurance business operations in Nigeria could depend on how well the organization (i.e Insurance firms) integrate and coordinate effectively its marketing capabilities to respond appropriately to various changes in insurance business operations through proper implementation of innovative measures meant to create, build, sustain and maintain a value driven relationship between both parties (i.e insurer and insured).Customers are important relationship partners who possess unique information that can be advantageous to the competitors (e.g., related to services, marketing communication, new technology, and customer preferences) (Bindroo, Mariadoss, &Rajani, 2012). In identifying and serving customer needs for products and services; timing of exploiting sustainable resource, executing differentiating capabilities or launching an innovative technology are critical factors (Adhikari & Gill, 2011).

Pre COVID-19 global pandemic, Nigeria's insurance industry has not shared in the growth experienced by other Nigerian financial services, notably banks, pension funds and mutual funds. In fact, it has hardly grown in real terms over 10 years (Coronation Merchant bank, 2019), with a continuous decline in financial performance and poor market share penetration (Alli, 2018). Also, Insurance business in Nigeria is highly centralized given the population of insurance firms currently operating in Lagos state. Therefore, this has affected the growth rate of insurance business in Nigeria with Ogun state having the poorest insurance penetration rate despite its proximity to all neighboring states (with Lagos inclusive). Similarly, The Nigeria Insurance Association (2018)claimed that in 2014, insurance industry contributed only 0.3% of overall GDP of Nigeria, 0.72 in 2015, 1.31 in 2016; and 1.02 in 2017. This facts clearly shows the insurance businesses in Nigeria was obviously struggling for market share and the overall sector performance vis-à-visother financial institutions in the country was relatively poor considering the degree technological utilization and customer involvement in the its service delivery processes.

No doubt, the recent decline in business activities globally as a result of COVID-19 pandemic have disrupted both intra and inter boarder trade among nation(s), many business organizations especially insurance business in Nigeria are beginning to appreciate the importance of marketing innovative culture as a strategic tool in responding to external competitive pressure in the post pandemic era .As a result, consumers of all ages are adopting a millennial mindset as they want flexibility and ease when surveying insurance providers with more than 50% demanding usage-based insurance because it offers hyper-personalization as well as value for money, but only half of insurers offer this kind of option especially in Nigeria (Duhen, 2020). However, for insurance business in Nigeria especially in Ogun state to strive efficiently well given the present technological driven and competitive business environment as a result of COVID-19 pandemic, implementation of an appropriate marketing innovative culture which include utilization of new technology and right application of available marketing resources could be a crucial tools in achieving a sustainable competitive advantage in the post pandemic era. This paper provide a theoretical and conceptual discussions on how marketing and technological capabilities as a crucial marketing innovative culture dimensions could drive the overall activities of insurance businesses in Nigeria especially within Ogun state in the post pandemic era with special emphasizes on how a sustainable competitive advantage can be realized.

Conceptual Review

Marketing Innovative Culture

The term "innovation" as such was used for the first time by Schumpeter at the beginning of the 20th century. His ideas and research have been developed by a number of other authors. Schumpeter defined innovations as product, process and organizational changes that do not necessarily originate from new scientific discoveries (Žižlavský, 2011), but may arise from a combination of already existing technologies and their application in a new context (Zizlavsky, 2011). In the modern economy organizations that understand the new rules of marketing develop relationships directly with consumers (Scott, 2013). The main objective of marketing innovation is to improve the identification process and profitable satisfaction of customer needs. By implementation of new marketing methods and activities organization aims to establish a closer relationship with customers and brings them into a situation when customers become promoters of the organization - a condition in which consumers are loyal to the organization and recommend it to their reference groups (Kotler & Keller, 2006). Despite the aforementioned, other objectives of marketing innovation are: penetration into new markets i.e. improving the visibility level and presence of the product in the market as well as achieving large scale and sales frequency (Ilic, Ostojic, Damnjanovic, 2014).

The basic marketing tools, i.e. basic marketing mix elements (so-called the 4P- product, price, place, and promotion) are appropriate combination of components through which organizations achieve their own marketing objectives and reach sustainable competitive advantage (Kotler, 2000). Marketing innovation is based on the promotion of the four instruments that are inter-related and focused on meeting the consumer needs by achieving a sustainable competitive advantage (Ferrell & Hartline, 2011). So, marketing innovation involves the use of completely new marketing strategies, marketing concepts or new marketing methods that have never been applied in the organization. They are based on the combination of the following elements (Stosic, 2007);significant product design improvements (changes in form and packaging);Implementation of new pricing strategies, implementation of an entirely new retail concept (introduction of completely new distribution channels);implementation of an entirely new promotion concept (advertising on social networks).

Regardless of the type or classification of innovation which is spoken, academia and industry have pointed out that innovation is one of the key elements for companies to achieve the development of sustainable competitive advantages in the market, thus enabling been considered competitive companies (Bernal, Fracica, Salomón, & González, 2012). Before this point is valid it indicate that innovation is necessary but not sufficient for the survival and sustenance of an organization, considering that a company must not only be able to generate new ideas but it must know how to apply and achieve them generation an additional value to the organization (Horta, Silveira, & Camacho, 2015) It is then through the use and implementation of innovation that a company can transform the way they carry out their activities, perceives in between needs and resources available in advance to competition (Pomar, Rangel, & Franco, 2014). Innovative companies tend to be competitive to the extent that they develop a better ability to adapt to the environment, have a flexible character and improve its ability to exploit opportunities (Naranjo-Valencia et al., 2012).

Marketing and Technology Capabilities

Capability for an organization is admitted as the source of competitive advantage and is described as a core competence (Prahalad & Hamel, 1994), exclusive knowledge (Day, 1994), superior resources (Hunt & Morgan, 1995) and strategic asset (Barney, 1991). Further, the researchers view the importance of competence role in the marketing sector by formulating strategy and implementation and propose that companies must gain information about the competitors and utilize it in a coordinated department to apply the strategy, comprehension, creation, selection, conduction and modification of the strategy that will be run. Day (1994) said that competence is seen as collective skill and learning of business organization applied in the process of corporate activities. A study of Pitt & Clarke (1999) views competence as a coordinated organizational capability, collective skill and capacity of an organization. In an increasingly competitive external environment, organization strives to learn on a new market trend and ideas to become the vanguard (Hoe, 2008). Further, Hoe (2008) explained that as the consequence, the new form of organizational learning capability rises where the organization is able to implement market knowledge generated from the customers and competitors that modify the corporate behavior in responding competition. The implementation of the knowledge is the company's policy to shape customer profitable market and develop new product in order to expand customer network (Yogyakarta, 2018).

Competitive Advantage

A competitive advantage comes from the good performance that the company may develop depending on the use of resources and the potential for developing new skills (Porter, 1985), with which they manage to guarantee its permanence in the middle even though competition also carry out activities to maintain their status in the market (Horta, Silveira, & Camacho, 2015). The success of a company in the process of developing competitive advantage lies not only in generating value through valuable resources that are difficult to imitate and replace, but is linked to additional work carried out by the company to make the competitive advantages become sustainable over time (Alegre, 2013).

A competitive advantage is sustainable if the company manages to keep developments provided they comply with the condition inimitable and irreplaceable, supported by what some authors is innovation itself, to understand it as a sustainable competitive advantage for companies working in function to integrate something new or no longer used by the competition (Gálvez & García, 2012). Starting from the premise that innovation is not just a matter of technological developments, it decided to analyze the implication of the use of innovations within an organization considering that these are used in activities aimed at developing products and services and in restructuring strategies and tactics that guide the organization (Sergio & Guerrero, 2017).Sustainable competitive advantage is a relationship that involves the following: conducting business activity in more efficient, effective, and innovative way with a higher differentiation degree in order to deliver more value to the consumer compared to the reference competition (Ilić, 2012).

Theoretical Foundation

This study was underpinned by two theories, namely; Dynamic capability theory (DCT) and Resource based view (RBV). Dynamic capability theory (DCT) was developed by Teece, Pisano & Shuen (1997) and was defined as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (p. 516) and it examines how firms address or bring about changes in their turbulent business environment through reconfiguration of their firm-specific competencies into new competencies (Teece, 2007). In organizational theory, dynamic capability (DC) is the capability of an organization to purposefully adapt an organization's resource base. Eisenhardt and Martin (2000) defined dynamic capability as "the firm's processes that use resources-specifically the processes to integrate, reconfigure, gain and release resources-to match and even create market change" and "the organizational and strategic routines by which firms achieve new resources and configurations as markets emerge, collide, split, evolve, and die" (p. 1107). Some of the assumptions of the dynamic capabilities theory include the fact that successful firms are able to demonstrate timely responsiveness to market dynamics. Furthermore, the theory holds that the way organizations develop firm specific competencies to respond to the changes in the business environment is ultimately related to the firm's business process, market positions and opportunities. In addition, the theory views competition in Schumpeterian terms, where firms are constantly seeking to create new combinations and competitors in the market place are continuously attempting to improve their competences or to imitate the competences of their most qualified competitors (Teece, Pisano, &Shuen, 1997).

Chew, Yan, & Cheah (2008) defined capability as the main key for an organization to attain competitive advantage. Further stated, a positive relationship between core capabilities and strategic advantage exists. The study also concluded the importance of core capabilities and strategic advantage as the main driving factors to achieve superior performance. Performance, according to Yıldız &Karakaş (2012), is crucial for a company with the correct approaches and criteria in achieving sustainable competitive advantage. Similarly, Yıldız & Karakaş (2012) also measured the dimension of business performance with eleven indicators that comprise profit and profit growth, sales and sales growth, market share and market share growth, successful launch of new products, entire business performance, return on sales, return on investment, customer satisfaction, good quality of goods/services procurement, reputation and image and competitive advantage. Nuryakin &Retnawati (2016) measured marketing performance indicate with sales growth, profitability and market coverage. Mappigau &Hastan (2012) explained that the core competence of a company may create competitive advantage. Their finding also shows that core competence development will focus on the development of design, color and exclusiveness of motives for new materials and material interior and souvenirs. Lertputtarak (2011) studied the characteristic of human resources managers and organizations and also examines their levels and knowledge competencies in the market within organizational performance. The results showed that managers with different characteristics on personal and organizational data have significant differences on human resources. The human resources and competencies in a market knowledge influences organizational performance.

The DCT, according to Kumar & Gulati (2010) and Kuncoro & Suriani (2018) supported the DC theory and stated that DCT explain how enterprises' responsiveness and innovativeness become timely, rapid and flexible in dynamic markets. Despite its popularity and insightful theoretical foundation, the DC approach was criticized that the DCT does not answer all questions of sustainable competitive advantage. Zahra, Sapienza, & Davidsson (2006) argued that that there are some inconsistencies and ambiguities in the literature of DC. Dynamic capabilities help firm's sense opportunities and then seize them by successfully reallocating resources, often by adjusting existing competencies or developing new ones. Therefore, Insurance businesses in Nigeria should respond appropriate to the changing business trends by timely implementation of new technology and reliable marketing initiatives that gives the organization a sustainable competitive edge in the post pandemic era.

On the other hand, the Resource-Based View (RBV) was originated by Barney (1986) and Wernerfelt (1984) based on the fundamental ideas of Penrose (1959) in the theory of the growth of the firm and Rubin (1973) in the theory of the expansion of firms. The RBV states that organizational resources which are valuable, rare, and difficult to duplicate and substitute are a source of competitive advantage, which is capable of improving business performance (Barney, 1991).The longevity of a firm's competitive advantage depends upon the rate at which the underlying resources and capabilities depreciate or become obsolete. This can be affected by increasing pace of technological change, environmental turbulence, and socialization of new employees to sustain the organizational culture (Barney, 1986). A firm's resource is valuable to the extent that it helps the firm create strategies that capitalize on opportunities and ward off threats from the environment and from competitors.

The RBV has been criticized because it is static and does not explain how a specific resource can create sustainable competitive advantage while firms do not have enough knowledge about the productivity of each individual asset (Cumberland, 2006). Adequate utilization of scare business resources in an appropriate manner is a major determinant of business success or failure. Innovation capability of an organization according to Martín-de Castro, Delgado-Verde, Navas-López & Cruz-González (2013) depends closely on its intellectual and/or organizational knowledge assets and on its ability to employ these assets. The internal environment of an organization needs to have a suitably preset innovative culture, since this type of culture is characterized by the transience of organizational structures, resources, utilization of specialists and temporary teams, mobile offices, the necessity of speedy and flexible changes responding to new opportunities, which increases the innovative potential of such organizations (Molina-Morales, 2011).

Methodology

This paper retained an analytical character linked to the process of literature review regarding marketing innovative culture and competitive advantage. Through the exploration of information in databases, insurance business report (within and outside Nigeria), business journals within 2014-2020, search criteria associated with innovation and competitive advantage as pillars of systematic research contents defined. Therefore, a persistent reviewed of past quantitative and qualitative studies were adopted in this study while comparison of various findings in this research context was undertaken in relation to the current marketing practices within the Nigeria insurance sector, Ogun state as a focus .

Discussion of Findings

The overall influence of marketing innovative culture as a crucial strategic marketing tool in achieving a competitive advantage in the highly demanding and competitive business environment has been a subject of extant research within and outside Nigeria over the years. Although, some of the findings of these literatures show some level of inconsistency given the context/domain of the study. However, both marketing capabilities and technological capabilities are essential marketing innovative culture which have been linked competitive advantage by contemporary literatures (Ahmad, et al. 2019; Imbambi & Oloko, 2017; Shen, et al. 2020). Similarly, various empirical studies within Nigeria (Joseph & Monica, 2014; Adelekan**,** 2016; Dibie, et al. 2019) among others have established a statistical link between marketing innovative culture and competitive advantage. These researches have shown that a positive and beneficial relationship exists between the two variables with particular emphasis on the Nigeria market. Therefore, the Insurance sector in Nigeria especially in Ogun state will benefit immensely if they (i.e. Insurers) can change their business philosophy toward inject an innovative cultural practices in delivering its services to the customers at large.

Other qualitative studies which are not included in the summarized quantitative studies above also demonstrated that a positive relationship exist between MIC and CA. For instance, Noruzy, Dalfard, Azhdari, Nazari-Shirkouhi & Rezazadeh (2012) researches showed that organizational learning and knowledge management directly influenced organizational innovation, whereas organizational learning and organizational innovation directly influenced organizational performance. Similarly, Lin & Peng (2008) propose that performance is yielded from organizational operational activities including corporate goals achievement of both internal and external. In the study, business performance is further defined as organizational goals achievement on sales growth, profit and market share. Many organizations seek to adopt specific strategies to lead and achieve the predetermined goals (Panigyrakis &Theodoridis, 2009). One of the efforts to attain the goals and process control is through performance measurement. Huang, Chen & Stewart (2010) elaborate three concept dimensions that are able to measure business performance. The three dimensions are business competition, manufacture performance and process efficiency. The business competition covers profitability, sales growth, total quality cost and company's capability to establish a new business.

More so, Lee, Yoo, Choi, Zo & Ciganek(2016) explained that innovation is caused by an external factor. From said external factor, firms can carry out innovation activities that influence market performance. This study suggests that innovation activities consisting of organization innovations, product innovations, and marketing innovations can have an influence on market performance. If the firm is in a tight industrial competition, immediate innovation is recommended to continue to compete with its competitors. In another study, Quaye & Mensah (2018) found that marketing innovation through price and promotion can have an impact on marketing performance. Thus, the existing relation between innovation and competitive advantage is in the organization's fact to use more efficient its sources, in a way to manage them to generate innovations and those to be subjected to achieve competitive advantage (Ito et al., 2012).

It is through an innovative culture that organizations achieve the empowerment of its human resources for the generation of knowledge within the company, which constitutes the raw material for obtaining competitive advantages that can be sustainable and inimitable in the market as long as it is a difficult complex specific knowledge and decipher competition (Alegre, 2013), in this sense possible to relate the inclusion and use of innovation in companies with activities aimed at creating new knowledge and learning that occurs around it (Sergio & Guerrero, 2017).The inclusion of innovations in the business model has a major impact on the activities of the company considering that manages to go beyond the application of a new idea about a product or service, allowing to modify a series of activities around the building the value proposition to the customer, defining the distribution channels, customer segmentation, choice of key resources and customer relationship where the innovative impulse starts from the restructuring actions within the organization (Slavik, Stefan &Bednar, 2014).

Conclusion and Recommendations

The review of literature show a positive strong relationship between marketing innovation culture and competitive advantage given the interaction between different author's definitions and the context of their respective studies. Adequate implementation of an appropriate innovative practices enhance business effectiveness in the highly demanding and competitive business environment. Similarly, the major determinant of business survival in the face of the current global economy downturn depend majorly on the ability of business organizations in developing innovative service model through the use of new technology, effective implementation of a sustainable customer retention programme, constant communication with customers among others. An innovative business model allows all activities related to the business object of an organization, not only to achieve the creation of a value proposition for the end customer, but to ensure revenue generation for the company considering both the needs of market as investors, managers and administrators (Sergio & Guerrero, 2017). Therefore, the insurance penetration rate in Nigeria will experience a massive increase if insurers implement and cultivate a good innovative practices that enable a total transformation of their processes, activities, relationships and business strategies.

With the conceptual, theoretical and meta-analytical approach to this study, we can conclude that both marketing and technological capabilities are crucial innovative practices required to achieve a sustainable competitive advantage given the low insurance penetration rate in Nigeria with special emphasis on Ogun state in the pre and post covid-19 pandemic era as insurers need a better connection with their policyholders by providing them with hyper-personalized and experience-led engagement. Finally, it must be explicitly stated that this work is still a work in progress as effort are in top gear to carry out an empirical research work by obtaining a primary data through a well-structured research questionnaire in the nearest future.

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ASSESSMENT OF THE FACTORS CAUSING EXTENSION OF DELIVERY TIME OF BUILDING PROJECTS IN OKE-OGUN OF OYO STATE

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Abstract

Project success criteria are a set of principles or standards by which project success can be judged. These are the conditions on which judgment can be made. Despite the years of individual and corporate experience of managing projects and despite the fact that many projects meet the three constraints (cost, time, and quality), project results continue to disappoint stakeholders. This study assesses the factors causing extension of delivery time of building in Oyo State. The objectives are; to know the factors that causes extension of time on building project, to determine the effects on which time extensions have on construction projects delivery, to evaluate the impacts of non-compliance with the time to project delivery on building project, to provide probable solutions with the issue of time in meeting the project deadline as expected by project executor. Literature was reviewed based on the topic. 100 copies of questionnaires were administered to different professionals such as architect, Builders, Engineers and Quantity Surveyor in various firms and establishments and likewise to some selected public construction sites in Saki West Local Government, Saki East Local Government and Atisbo Local Government, Oyo State. The data gotten were analyzed with the aid of statistical package for social science (SPSS) in which frequency and descriptive statistics tools were used. Based on the findings time is money and time is an integral part of every construction plan and can affect each party's contractual obligations. Recommendations were made to reduce the factors causing extension of delivery time of building projects in Oke-Ogun area of Oyo State.

KEYWORDS: Causes, Construction Projects, Delivery, Time

Background of the Study

Construction of projects in the public sector has assumed different perspective, hence there is need for assessment on the cost and time impacts of construction of projects in order to achieve overall project objectives. Verzuh (2015) stated that: "we live in a world where change and the rate of change is constantly increasing. In order to survive and prosper, organizations need to continually modify their products and services. Projects are the means by which these innovations are affected. Greater change = more innovations = more projects." Projects are playing major role in the economic development of a country. During planning of economy of the country large amount of money is to be invested in projects related to industry, construction, minerals, power, transportation, irrigation, education etc. with a view to improve the socio-economic conditions of the people. These projects are designed and implemented with the plan of well-organized management, earning adequate return to provide for future development with their own resources. Professionals, expert, and practitioner have stated that project management is a vital strategic view. It provides entities with powerful set of tools that develop their ability to apply managerial functions to accomplish specific organizational goals. Project management is a results-oriented management style that places a quality on building collaborative relationships among diverse cast of characters. Exciting openings await people skilled in project management areas (Larson and Grey, 2011). Different researchers give various definitions for a project. Their definition depends on their areas of research studies and the point of view that each researcher used. But to have comprehensive understanding of a project, it is better to refer different definitions of a project. According to Oxford Dictionary (2016) in modern business and science, a project is an individual or joint enterprise, possibly involving research or design that is carefully planned, usually by a project team, to achieve a particular aim.

Delay involves multiple complex issues all of which are invariably of critical importance to the parties to the construction contract. These issues concern entitlement to recover costs of delay or the necessity to prolong the project with the consequential entitlement to recovery costs for adjustments to the contract schedules. Questions arise as to the causes of delay and the assigning of fault often evolves into disputes and litigation (Bolton, 2010). Today, many stakeholders in construction are becoming increasingly concerned about the duration of construction projects because of increasing interest rates, inflation, commercial pressures (Nkado, 2015), and of course, it's potential to

result in disputes and claims leading to arbitration or litigation. Generally, the delay in the implementation of many building projects undertaken by government leading to cost overruns is obvious to many. The construction industry plays a very significant role in the socio-economic development of the nation. The interrelationship between the construction industry and the broader economy emanates largely from three of the industry's characteristics namely: the public sector client as its major client, its large market size with the ability to produce investment or capital goods which contribute significantly to the national GDP, and as a major source of employment both directly and indirectly by its multiplier effect. In Nigerian, the construction industry is the highest recipient of government budget in terms of government development programmes. The building construction industry has special features that are not usually encountered in other industries. When conditions in the field tend out to be more complex than what was anticipated in the planning and design phase, additional cost and time are needed. Any extremes can affect productivity levels.
Paying attention to the three dimensions of time including time of new product and service development, time of response to customer and time of product delivery may cause activities to have timely measurable goals and it may improve responses and determine and remove reasons for poor quality. There is a close relationship between time of response to customers and product delivery and customers' satisfaction. It is generally realized that when project duration is compressed, the project will call for an increase in labour and more productive equipment and require more demanding procurement and construction management and then the cost will increase. To solve the problems of optimizing investment projects, one should consider delivery time to customer. On the one hand, very short time may have negative effect on the quality and cost and on the other hand, very long time may also have negative effect on the cost and often doesn't have much impact on quality. However, both cases, especially long time, may increase the risk of project. In the initial assessment of the project, time is supposed to be the most important factor calculating the present value and other time-based indicators and any changes in the time may turn the investment project into a non-economic one. During various stages of project implementation, time is considered based on shift work.

The time allowed for construction performance is an important consideration for both the project contractor and the project owner. It was concluded that auditing in construction project helps in adding a credibility in the financial statement to avoid fraudulent activities in line with the expected criteria, there should be adequate Monitoring of Cost Overrun and Cost Initiative which will serve as a means for effective determination of profit actualization for project delivery, the performance expected for an auditing process is design to evaluate the efficiency. In today's competitive business world, time management is a key factor to success. The organizations are required to reduce the time they spend responding to customers and developing new products. Less time means faster response to customers' and market conditions changes, i.e. feasibility of operational efficiency. Paying attention to the three dimensions of time including time of new product and service development, time of response to customer and time of product delivery may cause activities to have timely measurable goals and it may improve responses and determine and remove reasons for poor quality. There is a close relationship between time of response to customers and product delivery and customers' satisfaction. It is generally realized that when project duration is compressed, the project will call for an increase in labor and more productive equipment and require more demanding procurement and construction management and then the cost will increase. To solve the problems of optimizing investment projects, one should consider delivery time to customer. On the one hand, very short time may have negative effect on the quality and cost and on the other hand, very long time may also have negative effect on the cost and often doesn't have much impact on quality. However, both cases, especially long time, may increase the risk of project. In the initial assessment of the project, time is supposed to be the most important factor calculating the present value and other time-based indicators and any changes in the time may turn the investment project into a non-economic one. During various stages of project implementation, time is considered based on shift work. In the case used in this study, each shift work is known as a day. If a day is consisted of a morning and a night shift, the work time is considered as two days, but if there is only one morning shift, time is regarded as one day; or if there is only one night shift, the time is also known as one day.

Aim and Objectives of Study

The aim of this study is to assess the factors causing extension of delivery time on building projects with a view to improving project performance in the construction sector of Oyo State, while the specific objectives were to:

i. know the factors causes extension of delivery time of building project.

ii. determine the effects which time extensions have on construction projects delivery.

iii. provide remedies to extension of time in meeting project delivery time as expected by project executor.

REVIEW OF LITERATURE

The phenomenon of delays is being faced by the construction industry globally Sambasivan and Soon (2017) as delays are considered to be most recurring issues in the construction sector (Tumi, Omra and Pakir 2012).That is why, the level of risk and uncertainty in the construction sector is on the higher side as compared to other industries. In addition to the fact that the construction projects have complex and time consuming designs, the construction processes and methods are also subject to unprecedented events and circumstances (Acharya, Lee and Kim 2016). This has resulted in serious challenges and in effect risk management has become a major problem that confronts the construction industry. Delay may be defined as an event which results in or causes an extension of time to complete a whole or some part of a project (Sambasivan and Soon 2017). Another way to define delay is that it may be an overrun in time which has been specified for completion of work in the contract agreement or overrun in time which has been granted as an extension. Delay may also be defined as the time during which some part of the construction project has been extended or not performed due to an unanticipated circumstance (Larson and Grey, 2011).

Delays occur almost in every project but their effect varies from project to project. During a construction project, an event of delay may occur from any of the factors related to the interest of stake holders of the project which may affect adversely by causing disruption of work, loss of productivity, time loss, cost overruns, claims or sometimes termination of contracts (Tumi, et al 2012)

The key objectives of construction projects are time, cost, quality and safety. Unfortunately, the phenomenon of delays adversely impacts all the stake holders of the projects including owners, design professionals, construction professionals, users and others. . The delays, if occur, jeopardize the objectives and result in extension of time which lead to extra overheads that increase the cost of the project. Time is money and time is an integral part of every construction plan and can affect each party's contractual obligations. The time allowed for construction performance is an important consideration for both the project contractor and the project owner. In order to make sure that the projects are completed within the budgeted time and cost, identification of causes of delays is very much necessary so that once these factors become clear, the stakeholders can take proactive steps to avoid such situations. Therefore, knowledge and understanding of risk of delay is important to help identify and manage effectively and systematically to achieve the project objectives of time,

Time in Project

In today's competitive business world, time management is a key factor to success. The organizations are required to reduce the time they spend responding to customers and developing new products. Less time means faster response to customers' and market conditions changes, i.e. feasibility of operational efficiency. Paying attention to the three dimensions of time including time of new product and service development, time of response to customer and time of product delivery may cause activities to have timely measurable goals and it may improve responses and determine and remove reasons for poor quality. There is a close relationship between time of response to customers and product delivery and customers' satisfaction. It is generally realized that when project duration is compressed, the project will call for an increase in labor and more productive equipment and require more demanding procurement and construction management and then the cost will increase. To solve the problems of optimizing investment projects, one should consider delivery time to customer. On the one hand, very short time may have negative effect on the quality and cost and on the other hand, very long time may also have negative effect on the cost and often doesn't have much impact on quality. However, both cases, especially long time, may increase the risk of project. In the initial assessment of the project, time is supposed to be the most important factor calculating the present value and other time-based indicators and any changes in the time may turn the investment project into a non-economic one. During various stages of project implementation, time is considered based on shift work. In the case used in this study, each shift work is known as a day. If a day is consisted of a morning and a night shift, the work time is considered as two days, but if there is only one morning shift, time is regarded as one day; or if there is only one night shift, the time is also known as one day.

Factors Causing Extension of Time on Building Project Delivery

Construction plays a major role in the development of any nation and was considered one of the major indicators for measuring the economic growth of countries (Alzahrani and Emsley, 2013). The construction industry has unique characteristics, which include the construction process, project management knowledge areas and project management process group. According to Anbari (2015) projects and project management can trace their roots to major project such as the pyramids, the Great Wall of China, Roman roads and viaducts, and Greek architecture. Whereas, modern project management can be traced to the 1950s and the 1960s, with major project such as the Polaris project, space exploration, highways, nuclear power plants, and defense systems. Since then, project management has been growing rapidly and strengthened by new applications of project management in engineering, construction, information technology, pharmaceuticals, and government, as well as a better understanding of the effectiveness of project management for increasing resource productivity and producing successful project outputs and strategic outcomes (Anbari, 2010).

METHODOLOGY

The target population for this study are building teams and experts who execute the project in various construction sites in Oke – Ogun in Oyo State. Purposive sampling was adopted due to large area and population in different construction site in Oke Ogun Area of Oyo State. The population consists of the professionals involved in construction works within Saki West Local Government, Saki East Local Government and Atisbo Local Government Area, with targeted population of one hundred and thirty three (133). These include the Builders, Engineers, Architects, Quantity surveyors of which members were sampled from each of the professional bodies. The sample size were determined using the Yaro Yammen formular. Formula n = $\frac{N}{1+N(e)^2}$

Where n = Sample size

N = Population of the study

e = Tolerable error (0.05%)

Targeted population 133

$$n = \frac{133}{1+133(0.05)^2} = 99.8 \approx 100$$

Data were collected through questionnaire in closed ended with A 5-point ranking system and a five-level scale was utilized where the respondents is asked to indicate from the list. The data collected was analyzed using descriptive statistics and inferential SPSS software.

A total number of 100 questionnaires were distributed to some selected Construction firms in Oke –Ogun of Oyo States. Only 90 questionnaires were returned representing 90.00% while 10 questionnaires were not returned representing 10.00%

DATA ANALYSIS AND FINDINGS

Table 1 Questionnaires Distributed and Returned

Questionnaire	Frequency	Percentage (%)
Questionnaire Distributed	100	100
Questionnaire Returned	90	90

Source: Field Survey, 2020

Table 2 Professional Affiliation of Respondent

Profession of Respondents	Frequency	Percentage (%)	Ranking
NIQS	50	55.6	1
NIOB	15	16.7	2
NIA	14	15.6	3
NSE	8	8.9	4
Others	3	3.3	5
Total	90	100	

Source: Field Survey, 2020

Table 2 shows that 55.6% of the respondent are from Nigeria Institute of Quantity Surveying, 16.7% of the respondent are from the Nigerian Institute of Building, 15.6% of the respondent are from the Nigerian Institute of Architect, 8.9% are from the Nigerian Society of Engineers and 3.3% are from other professions. This shows that all the respondents are from relevant professions and highly competent and qualified to respond to the questionnaire

Table 3 Roles in the construction Industry

Roles in the Construction	Frequency	Percent	Ranking
Consultant	45	50.0	1
Contractor	21	23.3	2
Client	12	13.3	3
Sub-Contractor	11	12.2	4
Government Official	1	1.1	5
Total	**90**	**100**	

Source: Field survey, 2020

Table 3 shows that most of the respondents are Consultant having a percentage of 50.0%, 23.3% of the respondents are contractor, 13.3% of the respondents are Client, 12.2% of the respondents are Sub-contractor and 1.1% of the respondents are Government official.

Analysis of Factors that Causes Extension of Delivery Time of Building Project

Table 4 Factors that Causes Extension of Time on Building Project

Variables Names	Mean	Ranking
Inability of client to attract fund and lack of good planning	3.9000	1
Time and Budget Limits	3.7222	2
Change of design	3.7000	3
Competition from existing firms	3.6778	4
Lack of experience and collaboration between parties	3.6000	5
Inadequate tools, techniques and equipment	3.5667	6
Client level of negligence	3.5556	7
Environmental and Site Conditions	3.4333	8
Low decision making	3.3222	9

Source: Field Survey, 2020

Table 4 reveals the factors that cause extension of time on building project. From the data analyzed it has been revealed that the most factors that causes extension of time on building project are Inability of client to attract fund and lack of good planning, Time and Budget Limits, Change of design, Competition from existing firms, Lack of experience and collaboration between parties, Inadequate tools, techniques and equipment having a ranking of 1st to 9th and the mean value of 3.9900, 3.7222, 3.700, 3.6778, 3.6000, 3.5667, 3.5556, 3.4333 and 3.3222. It was deduced that the most three important factors that cause extension of time on building project are identified as follows; Inability of client to attract fund and lack of good planning, Time and Budget Limits, Change of design but based on the analysis it revealed that Client level of negligence, Environmental And Site Conditions and Low decision making were identified as the lowest important reason as ranks by the respondents.

Analysis of data on the effects of time extensions have on construction projects delivery

Table 5 Effects of which time extensions have on construction projects delivery

Variables Names	Mean	Ranking
Re-bidding of contract sum	3.6528	1
Change in project execution idea	3.5833	2
Project abandonment	3.5000	3
Reduction of cohesive agreement	3.5000	3
Reduction in reputation of contractor integrity	3.5000	3
Client un-satisfaction	3.4583	6
Increase in project cost	3.4306	7
Extension of project delivery deadline	3.3056	8

Sources: Field Survey, 2019

Table 5 shows the effects of which time extensions have on construction projects delivery. The major key effects are Re-bidding of contract sum, Change in project execution idea, Project the abandonment, Reduction of cohesive agreement, Reduction in reputation of contractor integrity and Client un-satisfaction being ranked from 1st to 8th and mean score of 3.6528, 3.5833, 3.5000, 3.5000, 3.5000, 3.4583,3.4306, and 3.3056.

Analysis of Data on the Remedy with the Issue of Time in Meeting the Delivery Time as Expected by Project Executor

Table 6 Remedy with the issue of time in meeting the project deadline as expected by project executor

Variables Names	Mean	Ranking
Collaboration between parties	3.8611	1
Financial Standing and Experience outage	3.8611	1
Adequate Project target	3.7361	3
Adequate forecast from contract execution process	3.7361	3
Professional advices	3.6944	5
Designing of minimal structure which the client can finance	3.6944	5
Budget Planning for task Project	3.6528	7

Source: Field Survey, 2020

Table 6 indicates the probable solutions with the issue of time in meeting the project deadline as expected by project executor. From the data it has been known that the probable solutions with the issue of time in meeting the project deadline as expected by project executor are
Collaboration between parties, Financial Standing and Experience outage, Adequate Project target, Adequate forecast from contract execution process, Professional advices, designing of minimal structure which the client can finance and Budget Planning.

CONCLUSION

The key objectives of construction projects are time, cost, quality and safety. Unfortunately, the phenomenon of delays adversely impacts all the stake holders of the projects including owners, design professionals, construction professionals, users and others. . The delays, if occur, jeopardize the objectives and result in extension of time which lead to extra overheads that increase the cost of the project. Time is money and time is an integral part of every construction plan and can affect each party's contractual obligations. The time allowed for construction performance is an important consideration for both the project contractor and the project owner. In order to make sure that the projects are completed within the budgeted time and cost, identification of causes of delays is very much necessary so that once these factors become clear, the stakeholders can take proactive steps to avoid such situations. Therefore, knowledge and understanding of risk of delay is important to help identify and manage effectively and systematically to achieve the project objectives of time, cost and quality.

Delays occur almost in every project but their effect varies from project to project. During a construction project, an event of delay may occur from any of the factors related to the interest of stake holders of the project which may affect adversely by causing disruption of work, loss of productivity, time loss, cost overruns, claims or sometimes termination of contracts. When there is a delay in the project, the project completion times are justified by extensions or the progress of works is accelerated, however each of the options results in additional costs to the project. The situations become serious between the owner and contractor of the projects when it is questioned that whether the contractor was entitled to claim the extra cost or not. Such situations usually involve questioning the facts, causal factors and contract interpretations. The emphasis that completion of project within the stipulated time, budget and level of quality standards specified by the client is an index of successful project delivery. Failure to achieve the completion within targeted time, budgeted cost and specified quality result in various unexpected negative effects on the projects.

Recommendations

Based on the conclusion the following were recommended;

- Comprehensive site investigation should be carried out at the design phase of the project in order to avoid variations (additions and omissions) that are likely to occur during construction. All aspects of possible changes should be considered thoroughly before construction begins in order to avoid undue changes and extensions.

- As much as possible, all design discrepancies and errors as well as omission in design work must be completed with clearly defined scope of work before construction starts.

- The client or funding agency should ensure that adequate funds and other sources of funds are available before construction work starts. This will ensure that, contractors are paid according to the contract agreement.

- All cumbersome processes (bottlenecks) involved in the payment of certified certificates to contractors should be eliminated. This will allow prompt payment and avoid unnecessary extensions in payment. The period for honouring interim certificates as indicated in the contract document must be strictly adhered to by the client.

- Government must help stabilize the Naira against the major trading currencies. This will eventually help keep prices of materials and labour stable.

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INTEGRATED APPROACH TO DAMP CONTROL IN RESIDENTIAL BUILDINGS IN OYO STATE: AN EXPLORATION ANALYSIS

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Abstract

Uncontrolled moisture entry through the envelope is the most common and harmful threat to success of a building's performance and its structural integrity. The study appraised damp control in residential buildings in Oyo State, while the objectives was to assess causes of dampness in residential buildings, identify the impacts of dampness on residential buildings, evaluate damp control techniques available for use. Purposive sampling was used to sample size of the study which based on the number of the professionals in the case study and occupants of Residential building in Oyo State. A total of Eighty-Five (85) respondents were targeted by this research but only seventy four (74) responses were obtained, the data was analysed by the use of simple percentage and ranking. The study revealed that causes of dampness are numerous but the most causes of dampness by the respondents are increase in water table, salt attack, inadequate drainage system, and poor workmanship during construction, porosity of building materials among others. While the notable impact of dampness in residential building are stain on walls, reduction in aesthetic value of building, crumbling of plasters, etc. Conclusion, if dampness is not properly managed, it would be a threat to build environment and the occupants. The recommendations made were application of damp-proofing cream, low permeability rendering and mechanical holes drilling are the main remedial measures for controlling.

Keywords: Residential Buildings, Damp Control, Built Environment, Exploration Analysis.

BACKGROUND OF THE STUDY

Building structures have been experiencing the phenomenon of rising damp. Damp is the upward movement of moisture through permeable materials by capillary action (Bornehag, Culligan, Ivanov, and Germaine, 2011). Water rises through the pores in the masonry via a process called capillarity. Capillarity is a process whereby water molecules are electrochemically attracted to mineral surfaces, enabling water to move vertically through pores of a certain size despite the counteractive force of gravity (Young, 2009). Rising damp is caused by capillary suction of the fine pores that occur in all masonry materials. The capillaries draw water from the soils beneath a building against the force of gravity, leading to damp zones at the base of walls. Large temperature changes and increasing rates of evaporation trigger more upward, water movement in walls, resulting in the process called salt crystallization. Moisture problems can be found in all kinds of buildings; they mostly occur as a consequence of leaks in roofs or in plumbing or capillary movement of water in the structures, but also condensation may take place in cases of poor ventilation or insufficient insulation (Nevalainen, Taskinen and Korppi ,2008). Moisture problems are common in the modern building stock; approximately 55% of Finnish residences have been estimated to be in need of repair or more thorough inspection due to moisture faults (Nevalainen et al. 2008). The costs to health care attributable to the moisture damage in residences have been estimated to be high, high enough to impact on the national economy (Nguyen, Dedman, Hayes, and Jacob, 2008). Moisture and associated health problems in building are a complex phenomenon involving several complicated and inter-related components. The understanding of moisture damage in buildings requires knowledge of building structures and moisture physics. Excessive moisture in buildings can cause microbial deterioration of the materials and microbial exposure to the occupants adding another factor to the equation. The detrimental consequence of moisture damage, the symptoms and diseases of people occupying the damaged building, demand for medical and epidemiological expertise. One of the underlying problems in this complex entity is that the causal agents of the exposure and the mechanisms of the health effects are not known (Bornehag et al. 2011). The exposure in moisture damaged buildings has been described with several methods showing several potential exposing agents. Because the causal relationships are still obscure, all these methods are probably only surrogates of actual exposure. To understand and prevent this complex phenomenon one has to ascertain, how the indoor environment of a moisture damaged building differs from that of a normal, non-damaged building. In addition, there is a demand to gain information for practical situations, how to detect moisture damage and how to reveal health outcomes and prevent them to occur.

The presence of groundwater is a common source for moisture rise contributing to rising damp in the building walls. The higher the groundwater table, the more severe the rising damp. Water table differs from one place to another depending on the geographical locations of buildings and the type of soils. According to (Charola, 2009), groundwater contains sulphates, chlorides, and nitrates, which are hygroscopic. The presence of these chemicals in large volumes result in visual signs of dampness and tidal marks on walls. Rising damp causes wall materials to disintegrate, leading to high cost of maintenance. Moisture penetrates permeable materials and dissolves soluble salts causing flaking of plastered surface, fungal and mould attack, and corrosion of reinforcements.

AIM AND OBJECTIVES

The aim of this research is to use integration approach to assess the damp control in residential buildings in Oyo State, while the stated objectives were to;

- assess causes of dampness in residential buildings,
- identify the impacts of dampness on residential buildings,
- evaluate damp control techniques available for use.

REVIEW OF LITERATURE

Dampness is the most common defect to affect building. Buildings can suffer wall moisture problems for a variety of reasons and in several cases the occurrence of damp is mistakenly attributed to efflorescence. Damp is the movement of moisture from the ground into the wall because of failure or lack of a damp proof course (Bornehag et al. 2011). Damp should not be confused with other wall moisture problems caused by faulty piping or guttering, or because of structural failures of building materials, e.g. fractured lintels and walls. Damp is the upward movement of moisture through permeable materials by capillary action (Phillipson, 2010).

Damp, accompanied with high concentrations of salts, may cause extensive fretting and crumbling of the lower parts of walls. A natural phenomenon that allows water to rise up a tube through the forces created by the surface tension of the liquid is known as damp (Oliver, Douglas, & Stirling, 2010). Damp can affect any porous construction material that is in direct contact with the ground, but it is generally used as a description for such dampness that affects the lower parts of ground floor walls (Hall, Hamilton, and Hoff, 2010).

There are two moisture transport modes that occur in building materials: diffusion which is employed in case of water vapour and convection that takes place in case of liquid water. The driving force of water vapour is represented by the gradient of pressure (Bornehag et al. 2011). other driving forces may be present as well, that is, thermal or Knudsen diffusion. While thermal diffusion is usually neglected in civil engineering, Knudsen diffusion takes place in very narrow capillaries in which the mean free path of water molecules is larger than the pore dimensions.

Moisture damage and health

Indoor air complaints are one of the most common environmental health problems. A great many complaints are connected with moisture problems and microbial growth in buildings, a phenomenon having several names depending on its appearance and severity, such as dampness, damp or moisture patches, water damage, moisture damage, condensation, visible mould, mould growth or fungal growth.

Exposing agents in moisture damaged buildings

Moisture damage is an event where undesired accumulation of water takes place, thus moistening structural components, insulation materials or the surface material of the building. Moisture damage may be a consequence of leaks in the roof or the plumbing, due to condensation in cases of poor ventilation or insufficient insulation or due to capillary movement of water from soil. Regular or extensive moistening of materials promotes various chemical and microbial deterioration processes, which may lead to release of chemical and biological emissions into indoor air. However, the relative importance of these various agents as possible causative factors to health effects remains obscure. Biological particles represent one type of the possible exposing agents with health significance in the indoor air of moisture problem buildings.

Penetrating damp via blockwork

Externally, the fourth and fifth block courses at the base of the front wall were noticeable, more perished and affected by greater deposits of efflorescent salts than the blocks in the adjacent courses. This type of wall deterioration is associated with dampness and in particular moisture originating from the ground: the block become damp, the moisture freezes in winter, and the brick faces spall and perish (Phillipson, 2010).

Significantly, the erosion and accumulated salt deposits corresponded with the uppermost position of dampness evident on the external face of the front wall. But, rather than a result of rain water penetration, the distribution of salts at the highest point of damp rise is a characteristic of rising damp. The locations of the fourth and fifth block courses, externally, corresponded with the second and third block courses on the internal side of the walls. In other words, the external erosion precisely aligned with the horizontal position of the damp stained plasterwork at the base of the ground floor walls, whether comprising external or internal parts, and rain water penetration seemed an unlikely cause of dampness to affect internal walls. Again, the precise cause of the eroded blockwork or of dampness affecting the internal side of the living room front wall is somewhat academic because neither this wall nor any other external wall parts were used for test panels.

Bridging of a damp proof course by solid floors

Despite clear evidence of prior remedial damp proof course work being discovered during the initial survey, and later when skirting boards and plaster were removed from the base of the ground floor walls, no signs of an original damp proof course were found. The survey established that the ground floors were concrete and a relatively recent addition to the house, yet sub floor air grates, visible externally in the base of the front and rear walls, suggested that the house had been built with ground floors of suspended timber construction. Assuming that this was the case then an original damp proof course, if present, would typically be located beneath the floor joists and timber wall (Oliver, Douglas, & Stirling, 2010).

Removing an original suspended timber floor and replacing it in concrete effectively bridges a damp proof course positioned beneath the floor timbers: the solid floor construction providing a mechanism that enables ground water to bypass the damp proof course and rise up into the walls. It was not possible to verify if a damp proof course had been built into the ground floor walls when the house was constructed or if the ground floors had been materially altered from suspended timber to solid concrete or, indeed, if these solid floors happened to bridge that damp proof course. In practice, and significantly for the purposes of this study, these matters are not a concern: no original damp proof course was found and even if such a damp proof course existed in the walls below the floor it was essentially redundant as a result of bridging.

Bridging of a damp proof course by plasterwork

A chemical injection damp proof course had been installed in the ground floor walls. At the time of the initial survey, the only signs of this work were characteristic holes drilled into the bricks at the base of the external face of the front wall, along with evidence that the internal sides of the ground floor walls had been re plastered with a cement rich render to a nominal height of one meter. Works undertaken at later stages of this study revealed the bottom edges of this render to have been taken down to meet the solid floors. Allowing the internal plasterwork to touch the solid floor, or more explicitly to pass over the chemical injection damp proof course, provides a bridging mechanism that enables moisture in the masonry below the damp proof course to pass up into the wall.

To prevent bridging requires the bottom edge of the plasterwork to be cut back or otherwise terminated above the damp proof course. The concern with respect to this study was whether bridging by the plasterwork had actually been the cause of the dampness that affected the ground floor walls rather than a defect to the existing remedial damp proof course. The works in setting up of the test panels would require this existing render to be removed or for its bottom edge to be trimmed. Thus, if rising damp stopped and the wall parts dried, it would be unclear if this was an effect of the applied treatments or simply because bridging of the existing chemical injection damp proof course was alleviated.

The mechanics of rising damp

The criticisms that rising damp is very rare or that it may not occur at all in building walls were presented. By extension, such criticism implies that capillary action as a mechanism to cause rising damp must be flawed. In fact, Howell argues that capillary action and thus rising damp cannot be replicated in a laboratory without resorting to the use of very weak mortars and that bricks placed in trays of water are either unaffected by rising damp or only exhibit modest water uptake because the size and distribution of their pores does not facilitate this mechanism. To establish if there is validity to these claims, the mechanism of capillary action in masonry will be examined; in particular, whether its pore structure can support rising damp, how this process is affected by evaporation and gravity, and how the theory underpinning rising damp compares to real world examples.

Capillary action

Capillary action is a natural phenomenon, allowing water to rise up a tube through the forces created by the surface tension of the liquid (Oliver, Douglas, & Stirling, 2007). According to Jurin's Law, the maximum height that water can attain in a capillary is inversely proportional to the capillary's radius; in other words, the narrower the pores in a material, the higher the liquid will rise. This theoretical maximum capillary rise height can be calculated from Equation 1(Rirsch & Zhang, 2010).

Equation 1:

$h=2\ y\cos\theta\ /r\rho g$

Where:

h = capillary rise height. y = surface tension. θ = contact angle.

r = capillary radius. ρ = liquid density. g = gravity.167

Oliver, Douglas, & Stirling, 2007) suggest that the pore size of capillaries in bricks and mortar lie within the range of 0.001-0.01 mm and which, applying the above formula to pores with these radii 4, equates to a theoretical capillary rise height of between 1.5-15.0 m. In practice, the author's argue that the height attained by the water is influenced by flow resistance within the pores, evaporation, the position of the water table, and the moisture content of the soil, which is required to be in excess of 20.0% (Oliver, Douglas, & Stirling, 2007). Use a simplified formula to calculate the equilibrium capillary moisture rise from the mean capillary pore radius, which when adjusted for radius in millimeters and height in meters is shown in

Equation 2:

$He= 15 \times 10{-}3/r$

Where:

He = equilibrium height in meters. r = capillary mean radius in millimeters.

The Effects of Rising Damp

The World Health Organization publications on "Damp and Mould" (WHO, 2009) indicated that, in Europe, between 10 and 50% of the indoor environment, where people live, work, and play, are damp as a result of humid conditions. Humid walls create coldness, which require more heating energy leading to increase in energy bills. This buttresses the need to consider thermal conductivity materials of various types in relation to dampness. The rate of evaporation on the external wall is related to the nature of wall surfaces, climate, orientation, and location. As moisture evaporates from both sides of the wall, more water is drawn from the ground and a continuous upward flow of water occurs. The upward movement of water causes stains on internal walls, crumbling of plastered surface, paint peel off, and leaving a musty smell. On the external walls, signs of rising damp can usually be seen at the base of the masonry walls, where crumbling plaster and peeling paint are evidence. Severely affected masonry exhibits extensive decay, and powdery salt residue can clearly be seen at the base of the wall resulting into efflorescence, tide mark, mould, and fungi (Bornehag et al. 2011).

Negative Effects of Moisture in Building Constructions

It is generally known that increased moisture of building materials is not desirable for several reasons. By absorbing moisture in form of water vapour or liquid water, building materials may increase their volume, more or less. It may cause serious problems, typically, for materials containing swelling clays that can generate damaging stresses during wetting and drying. Increased moisture content significantly contributes to decrease of mechanical properties of building materials, and it also affects the energy transport by changing the thermal conductivity and heat capacity of theirs. Furthermore, water can deteriorate building materials through soluble, acting as a solvent for one or more components that can be washed out. However, wash-out and dissolution majorly occur where great amount of water is collected, typically under windows. Increased moisture content brings complications also in combination with temperature. When exposed to low temperatures, fully saturated materials may be vulnerable to freeze/thaw cycles. However, presence of salts significantly decreases the liquid moisture freezing point and also the small pores may contribute to such a decrease. On the other hand, combination of increased moisture and high temperature may be convenient for the development of biological degradation of building materials.

METHODOLOGY

The study adopted descriptive survey in carry out this research work. It allows the researcher to carry out a field survey in order to solicit for information from the respondents. The targeted population for this research work comprises of professionals in the construction industry and selected occupants of residential buildings in Oyo State.

The study depends on both primary and secondary data. Primary data was the first-hand data collected by the researcher through the use of questionnaire which was designed to solicit for information from respondents. The secondary data was obtained from relevant books, journals, magazines and research paper. Purposive sampling was used to determine the sample size of the study which based on the number of the professionals in the construction industry and occupants of residential building in Oyo State. The researcher only considered Eighty-Five (85) respondents for administration of questionnaires. A well-structured questionnaire was designed based on the objectives of the research work and it was based on both open and close ended questions. While descriptive and inferential statistical tools were employed for the data analysis. Which includes percentage score and relative index.

DATA ANALYSIS AND FINDINGS

Eight five questionnaires were distributed to the respondents but seventy four questionnaires were returned.

Table 1: Years of residing in Oyo State

Years	Frequency	Percentage (%)
1-7years	12	16.22
8-14years	21	28.38
15-21years	37	35.00
Above 22years	4	5.40
Total	74	85.00

Source: Field survey, 2020.

In Table 1, 16.22% of the respondents have been living in Oyo State between 1-7years, those that have spent between 8-14years in Oyo State accounted for 28.38%, 35% of the respondents have been in Oyo State for 15-21years while those that have been in Oyo State for above 22years accounted for 5.40%. Majority of the respondents have been residing in Oyo State for over 7years. It implies that the respondents have seen a lot in the area and can contribute to the research.

Table 2: Profession of the Respondents

Profession	Frequency	Percentage (%)
Engineer	8	8.81
Architect	3	4.05
Businessman/woman	29	29.19
Civil Servant	25	30.78
Others	9	12.17
Total	74	85.00

Source: Field survey, 2020.

Table 2 shows that 8.81% of the respondents are Engineer, Architect accounted for 4.05%, Businessman/Businesswoman accounted 29.19% of the respondents, 30.78% are Civil Servant while respondents who belongs to other Profession accounted for 12.17% of the respondents. Majority of the respondents are either Businessman/Businesswoman. It means all the Respondents have experience in different field.

Table 3: Respondent's opinion on whether they have seen dampness before

Response	Frequency	Percentage (%)
Yes	68	76.89
No	6	8.11
Total	74	85.00

Source: Field survey, 2020.

Table 3 indicated that 76.89% of the respondents which form the larger percentage of the respondents said they have seen dampness before while 8.11% of respondents said they have not seen dampness before. It means dampness is not new and the respondents have familiar with dampness, and most of the respondents are people residing in Oyo State area with long term experience.

Causes of Dampness in Residential Buildings

Table 4: Relative index and rating of causes of dampness in residential building

Causes	Engineer Index	Architect Index	Businessman Woman Index	Civil Servant Index	Others Index	Relative Agreed	Rank
Increase in water table.	2.37	1.91	4.25	3.21	2.91	0.59	1
Salt attack	2.39	1.69	4.16	3.27	2.97	0.58	2
Inadequate Drainage Sytem.	2.42	1.85	4.33	3.19	2.86	0.57	3
Poor Workmanship.	2.30	1.74	4.33	3.31	2.58	0.56	4
Porosity of building material.	2.27	1.73	4.28	3.29	2.79	0.55	5
Use of substandard material.	2.31	1.77	4.19	3.11	2.86	0.54	6
Leakage of plumbing system	2.19	1.82	4.18	3.23	2.79	0.53	7

Blockage of DPC	2.30	1.79	4.22	3.17	2.67	0.52	8

Source: Field survey, 2020.

Table 4 shows the response of the respondents. It was rank based on relative index of the causes of dampness in residential building. Increase in Water table, salt attack and Inadequate drainage system are first three rank causes of dampness in residential building with relative agreed index of 0.59, 0.58 and 0.57 respectively while leakage of plumbing system and blockage of damp proof course are the last two rank factors with relative agreed index of 0.53 and 0.52 respectively.

From the above, it is noted that all the listed causes are agent of dampness but were rated based on the severity of havoc caused by each causes.

Impact of Dampness on Residential Buildings

Table 5: Relative index of impact of dampness on residential building and its rating based on respondent response.

Impact	**Engineer Index**	**Architect Index**	**Businessman Woman Index**	**Civil Servant Index**	**Others Index**	**Relative Agreed**	**Rank**
Stain on wall	2.38	1.89	4.51	3.32	2.79	0.60	1
Reduces aesthetic value of residential building	2.29	1.93	4.43	3.37	2.76	0.59	2
Crumbling of plaster	2.31	1.78	4.43	3.19	2.94	0.58	3
Affect quality of air in building	2.33	1.88	4.28	3.27	2.83	0.57	4
Leads to deterioration of residential building	2.27	1.66	4.29	3.11	2.81	0.56	5
Peeling off of paint	2.36	1.67	4.19	3.21	2.59	0.55	6

Sources: Field survey, 2020.

Table 5 indicated the response of the respondents on impacts of dampness on residential buildings and each impact was rank based on relative index calculated. Stain on wall, reduces aesthetic value of residential building and crumbling of plaster are most three rank impact of dampness on residential buildings with relative agreed index of 0.60, 0.59 and 0.58 respectively while it affect quality of air in residential buildings, leads to deterioration of residential buildings and peeling off of paint are the last three rank impact of dampness with relative agreed index of 0.57, 0.56 and 0.55 respectively. It signifies that all the above listed condition is as a result of activities of dampness in residential buildings; although impact of dampness on residential buildings is numerous.

Damp Control Techniques

Table 6: Relative index of techniques of damp control in residential building

Techniques	**Engineer Index**	**Architect Index**	**Businessman Woman Index**	**Civil Servant Index**	**Others Index**	**Relative Agreed**	**Rank**
Mechanical holes drilling							

method	2.41	1.99	4.12	3.62	2.99	0.61	1
Mechanical cutting system	2.73	1.87	4.31	3.33	2.79	0.60	2
Low permeability Rendering	2.77	1.78	4.11	3.35	2.89	0.59	3
Application of damp-proofing cream.	2.55	1.91	4.28	3.19	2.91	0.58	4
Osmotic System	2.33	1.85	4.37	3.41	2.76	0.57	5
Chemical injection system	2.19	1.91	4.19	3.49	2.88	0.56	6

Sources: Field survey, 2020.

Table 6 shows the responses of the respondents on methods of eradicating or controlling dampness. It was rank based on relative index of each method of controlling dampness. Mechanical holes drilling method, Mechanical cutting system and low permeability rendering are first three rank method of controlling dampness in residential buildings with relative agreed index of 0.61, 0.60 and 0.59 respectively while application of damp-proofing cream, osmotic system and chemical injection system are the last three rank method of controlling dampness with relative agreed index of 0.58, 0.57 and 0.56 respectively. It means if dampness will be controlled, the above listed methods must be employed.

CONCLUSION

This study identified that failure of not using damp-proof materials, damp-proof course, high water table, leakage of plumbing work, salt attack, use of substandard materials and poor workmanship are some of the causes of dampness in residential buildings. The use of common 600mm micron polythene for preventing moisture rise in buildings is necessary. The study concludes that all parties in the building industry (consultants and contractors) should ensure that works are done according to standards and specification with efficient supervision.

Poorly maintained buildings are vulnerable to damp problems. With correct maintenance, repair and adequate ventilation, residential buildings can be kept dry and healthy. To address damp problems the source of the moisture must be identified and addressed before other works are considered. With the right approach and correct use of materials the removal of internal linings is not normally required to enable drying. Treatments suggested for use in modern construction are often not appropriate for constructed buildings and may cause further problems. The measures to combat dampness in old buildings require prior review and study the surrounding conditions. The most successful technology could be used in an alternative perspective or even complementary to chemical barriers commonly employed within the rehabilitation of old buildings.

Recommendations

Based on the Findings of this study, the following recommendations were made;

1. The selected building Professionals for the study recommended that, application of damp-proofing cream, low permeability rendering, Mechanical holes drilling method among others are the main remedial measures for controlling and treating dampness in buildings that have already affected with damp.

2. The study recommend that all plumbing fittings and fixtures should be tested to detect leakages, making them good before finish works commence.

3. The use of Tyrolean, terrazzo, and tilling is not effective and efficient measures of remedy dampness, under setting and saw slotting are the most recommended methods.

4. Proper placement of damp proof materials in all foundation works for new buildings construction should be strictly enforced by consultants irrespective of the type of soil or geographical location. Consultants and site supervisors should ensure that damp-proof materials are always part of their

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THE PAINS AND GAINS OF COVID-19 PANDEMIC ON THE FISHERIES SECTOR IN LAGOS, NIGERIA

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Abstract

The disruption by COVID-19 from its entry into Lagos in February, 2020, has affected various sectors of the economy and particularly, the fisheries sector. While it has been reported that COVID-19 virus does not infect seafoods, it has been found to alter food systems. This study assessed the pains and gains (impacts) of COVID-19 pandemic on the fisheries at the fishing settlement, retail, wholesale and industrial levels using questionnaires, interview sessions with key management and relevant personnel, focused group discussions as well as secondary data from the target industry. It covered period before lockdown (pre-COVID-19; December 2019-February, 2020), during lockdown (COVID-19 lockdown; March-June, 2020) and that following the lockdown (post-COVID-19; July-August, 2020). Qualitative and quantitative data from artisanal, retail, wholesale and industrial sub-sectors showed that while the pandemic caused decline in income and impairment of livelihood, it increased costs of logistics, electricity supply, production and commuting while the quality of seafood harvested was unaffected. It had positive impacts on personnel health consciousness and hygiene, fish catch at both the artisanal and industrial sub-sectors, and reduced stress levels but varying effects on fish consumption, staff emolument and cost of products.

Key words: Industrial fisheries, impacts, COVID-19 pandemic, sea foods

INTRODUCTION

The novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that causes COVID-19 has public health implications as it was declared a pandemic by the World Health Organisation (WHO) on March 11, 2020 and belongs to the genus *Betacoronavirus* (WHO, 2020; Cucinotta and Vanelli,2020). Viruses are sub microorganisms consisting of protein and genetic materials and can multiply inside a host but when outside, can be infective (Bondad-Reantaso *et al*., 2020). The entrance of covid-19 into Lagos in February, 2020 led to restrictions and closures, in order to mitigate its effects on the citizenry. With the current cases of 55,829 and 18,504 infections in Nigeria and Lagos respectively (NCDC, Sep 11, 2020), COVID-19 has made intense impact on various sectors of the Nigerian economy. The predictions of soaring cases of COVID-19 cases by UNDP (2020) at an incremental rate of 50% did not occur in Nigeria. Pre-COVID-19, both the world and Nigerian economies did not fare well (Onyekwema and Ekeruche, 2020), with the 2019 GDP of the latter standing at 2.3%, increasing debt and dwindling income from petroleum, which is the mainstay of the economy. Commodity prices have crashed, food import bills have soared and the Nigerian currency has dipped against the dollar (Toda and Fregene, 2020).

The efforts of the Government to revamp the situation have not sufficed. With the advent of COVID-19, Government, both at Lagos State and National levels have managed the cases fairly well. However, there is evidence that various sectors of the economy have been gravely affected by the pandemic, with 55% decrease in petroleum income, a GDP decline of 6.10% and a marginal 1.58% increase in the non-oil and agricultural sectors respectively, during the second quarter of 2020 (UNDP, 2020; NBS, 2020). Although sea foods do not carry out any epidemiological roles in the transmission of the COVID-19 virus as they have not been reported to be infected by it (Bondad-Reantaso *et al.*, 2020), there are possibilities of infected handlers transmitting the viruses to sea foods and there have been reports of heavy viral loads on sections where seafood and meat were sold at a wholesale food market in China, consequent upon the second surge of human infection (Rueters, 2020).

Contamination of seafood by pathogens has caused 9 million food-borne diseases (like botulism, salmonellosis), hospitalisations and sometimes death, with the value put at US$83million (CDC, 2011; FDA, 2013). Contamination of surfaces of sea foods like fin and shell fishes, their product as well as food contact surfaces may occur when contacted by any infected food handler (Bondad-Reantaso *et al.*, 2020) but these can be remedied by proper sanitation practices and good hygienic practices (GHP) which are pre-requisites programmes to Hazard Analysis Critical Control Points (HACCP).

According to Laxminarayan and Malani (2012), the impacts of infectious disease include 25% premature death, reduction in consumption and earnings as health affects human productivity and the duration an individual is available for work. It was postulated that an infectious disease rate of 20% in a developing country could cause a 50% decline in 4 generations.

Fish greatly contributes to livelihood especially in low-income countries that are food-deficient and in coastal locations where they richly supply the required high quality protein, omega oils as well as some micronutrients. The highly globalised food has reached 38% in world trade (FAO, 2020b) with global fish production figures of 179mllion tonnes and valued at US$ 401billion (FAO, 2020a). As posited by the Food and Agriculture Organisation (FAO, 2020b), the pandemic has globally affected the sea food supply system in an unprecedented manner, from production, processing, transportation, wholesaling and retailing. Its socio-economic effects have had consequences on the bid by FAO to contend with poverty and hunger (FAO, 2020a). While China reported fluctuating fish production levels, some countries have experienced decline in fishing. As at March 2020, Clavelle's (2020) representation of Automatic Identification Systems (AIS) data by Global Fishing Watch showed that fishing trend was about 10% less for industrial fleet. AIS transponders are installed for monitoring, control and surveillance measures. From nearly zero fishing during the lockdown in January, 2020, China recorded a heightening in fishing operations by March, 2020 and the levels declined again, causing a 40% reduction while figures of 50% were recorded in Europe and some other countries.

The fisheries sector of the economy is largely informal, with stakeholders having small holdings. The informal sector contributes about 65% to the economy. The lockdown is therefore expected to generate some pains and possibly some gains.

The Lagos State is said to be the largest economy in Nigeria, having earned N366 billion in 2019 and with a revenue of 645billion, which reduced marginally by 1.26% (LASG, 2020). The Lagos State Government implemented the recommendations of WHO to address the pandemic. The incidence brought environmental, economic, social as well as public health challenges and these ultimately and negatively impacted on the revenue earnings of the State, with a 21% budget cut.

If the pandemic affected varied sectors, how much did it affect the fisheries sector? Evaluating the pains and gains (or impact) of the pandemic will involve looking at the causes, comparison of values and the cost (Lazzarini, 2018). McKibbin and Fernando (2020) discussed the global macroeconomic impacts of the pandemic in the world; Otitoju *et al* (2020) examined the varying mortality and morbidity associated with COVID-19 in 3 continents while Walter *et al* (2020) explained mitigation strategies utilised by low and medium-level economies to control the impact of covid-19. So far, studies on the evaluation of the pains and possible gains due to the entrance of COVID-19 into Nigerian fisheries industry are scarce. Their presence will enable the Lagos Government, other stakeholders to take adequate measures to mitigate these where necessary. Since the impacts of COVID-19 on various sectors are just evolving and the extent is still unclear, this paper seeks to evaluate the impacts of the pandemic on the fisheries sector in Lagos. The specific objectives are:

1. To identify the gains and pains (impacts) of COVID-19 on the fisheries sector in Lagos and

2. To evaluate the impacts of the pandemic on the fisheries sector, that are consequent upon the entry of the public health disease into Lagos, Nigeria.

METHODOLOGY

Study area

Lagos metropolis is situated at the South West coastal part of Nigeria, with the latitude $6^{0}27'$ and longitude $3^{0}24'$ as coordinates, 22% land mass and it consists of lagoons and creeks (Fig.1). An industrial sea food processing and exporting plant located at Otto, an artisanal fishery (small scale fishery) at Makoko having a retail outlet, as well as a wholesale fish market at Ijora, all situated in Lagos Mainland Local Government area, were selected for the study.

Sampling and Data Collection

Information on the gains and pains (impact) of COVID-19 were collected using semi-structured questionnaires, focus group discussions, in-depth interview sessions with key informants and secondary data from different segments of the fisheries industry.

Fig.1: Map of Lagos

Respondents randomly selected were 15 fishermen from the small scale (artisanal) fisheries, fifteen (15) retailers from the fishing settlements and six (6) wholesalers from the sea food market. The leaders at some of these locations were selected for interview sessions. Three (3) management and 3 operational staff at the fish processing and exporting industry were also interviewed.

Methods

Semi-structured questionnaires and focus group discussions were administered on artisanal fisher folks, retailers at Makoko fishing settlement and the wholesalers at the Ijora seafood market, in order to collect data which include their demography, fish types handled, weight and/or volumes of the fishery, production costs, income, fish consumption patterns (where applicable), personnel costs as well as logistics. These were to identify and evaluate the positive and negative impacts of COVID-19 pandemic on their fisheries. Similar studies were carried out on the industrial exporter using interview of key informants in management and operations, some operational personnel as well as secondary data from the company. The focus was on the impact evaluation covering pre-COVID-19 outbreak (December, 2019-February, 2020), during the restriction (COVID-19 lockdown) period (March-June, 2020) and post-COVID (July-August, 2020) period. The qualitative and quantitative data generated were subjected to descriptive statistics and appropriate recommendations were made.

RESULTS

The fisheries industry in Lagos recorded a lot of pains and some gains before, during and after the COVID-19 lockdown.

Artisanal fishery and Impact of Lockdown

From the demographic studies, all the fisher folks at Makoko fishing community were men (100%), aged between 31 and 50 years (Tables 1 and 2). These men engaged in capture fisheries possessed the least educational qualification, holding mainly primary school certificates (Table 3) and had between 11 and 15years work experience. Some mentioned that they have been exposed to fishing at very tender ages.

Voyages done pre-pandemic using motorised wooden boats lasted between 2-3 days where the fisher folks (men) brought in their mixed landings which included croacker (*Pseudotolithus*), sole fish (*Cynoglossus*), lady fish (*Elops*), tilapia (*Oreochromis*) and silver catfish (*Bagrus bajad*). Other species were electric fish (*Gymnarchus niloticus*), scallops, shrimps (*Farfantepenaeus notialis*), tiger shrimps (*Penaeus monodon*), prawns and crabs (*Portunus*). Qualities of their catches were optimal (prime quality) because they utilised ice for preservation of seafood species kept in insulated boxes on board. The restriction consequent upon the COVID-19 outbreak impacted on the artisanal fishermen.

Fig.2: Retail displays at Makoko

Fig.3: Cleaned cuttle fish at Ijora market

During the lockdown, Marine Police were on patrol on the water bodies to enforce the restriction requirement, leading to the arrest of some of them for engaging in fishing and these had to pay their way through, to be released. Since they were prevented from fishing (though this should not have been the case), they had challenges.

Table 1: Sex of respondents at Fisher folks, wholesalers and retailers

Sex	Fisher folks Frequency (%)	Retailers Frequency (%)	Wholesalers Frequency (%)
Male	15(100%)	-	1 (16.67%)
Female	-	15(100%)	5(83.33%)
Total	15(100%)	15(100%)	6(100%)

Hence, few fishermen operated and fishing time reduced to 12hours, implying 25-33% of the previous voyage time, as they had to monitor the Marine Policemen to be able to avoid arrests. Since this period coincided with the peak season, and with the high salinity of the water and delayed rains, their catches increased. Their daily catch weights were between 11 and 20 kg pre-pandemic but these increased during covid-19 restrictions, reaching 26 to over 31kg but dipped to below 15kg after the lockdown (Table 5) with mean values of 18kg, 28kg and 8kg respectively (Table 7). However, catch values could not be easily determined due to price inconsistencies, poor record-keeping and variation in catch quantities. This decline in catch occurred as the poor patronage discouraged them from going to sea, coupled with the risk of arrest. As the increased catches did not translate into profitable returns as customers were few, livelihood was negatively affected. It is note-worthy that sales were not done by these fishermen and they did not incur costs of personnel emoluments as male members of the family engaged in fishing. There were no costs for product, commuting or haulage/ logistics. Production costs covered expenditure for fuel, ice and other bills incurred during voyages which fluctuated from ₦8,200 to ₦5375 and ₦11,450 per trip (34,5% dip; 113% rise). However earnings were shared with the women into 3 portions with the man, woman and operation getting a portion each.

The gain of the higher catches (though there were poor sales) encouraged higher fish consumption hence, increased protein intake for their families who also did not readily get other protein sources like beef, consequent upon the lockdown.

Table 2: Demographic characteristics of Respondents at Makoko and Ijora

	Fisher Folks (100% males)		Retailers (100% females)		Wholesalers (16.67% males; 83.33% females)	
Age of respondents	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Below 20	-		-		-	
21 – 30	3	20.00	4	26.67	-	-
31 – 40	5	33.33	7	46.67	-	-
41 – 50	5	33.33	3	20.00	3	50
51-60	2	13.33	1	6.67	3	50
Above 60	-		-		-	
Total	15	100	15	100	6	100

Retail Marketers

The retailers were exclusively women (100%; Fig. 2) and the off takers of the landings of the male counterparts (as the businesses were family-owned). Mainly aged between 31 and 40, they possessed primary education and between 6-10 years' work experience (Tables 1- 4). Quality of the catch was good and unsold fresh fish were either preserved on short-term basis until use or smoked. Prior to COVID -19, the female retailers had fairly good daily sales of the sea foods with most recording between ₦11,000 to ₦15,000. Table 6 showed that a small proportion of them (6.67%) recorded up to ₦21,000-₦25,000. The disruption, which caused Government to mitigate effects of the pandemic, reduced their period of operations by 50% as they had to market their wares only on 3 approved dates namely: Tuesdays, Thursdays and Saturdays instead of the previous 6 working days. This ultimately affected patronage hence income also nosedived. Although supplies increased during the lockdown, this did not improve their income (Table 6)

Sales during lockdown hovered around ₦6,000 - ₦10,000, with a maximum of ₦15,000, with similar figures post-COVID. After the lockdown, they complained about poor demand and therefore reduced income which impacted negatively on their livelihood. Cost of the sea food previously sold for example, at ₦5000 dropped to ₦3000 during the lockdown and remained at same price post-pandemic. Transportation and haulage costs did not constitute major factors here and were negligible since movement was within the community. Also, personnel costs were not considered as they were family businesses.

Table 3: Educational Qualification of Respondents

Educational Qualification	Fisher folks Frequency (%)	Retailers Frequency (%)	Wholesalers Frequency (%)
Tertiary	0	0	4(66.67)
Secondary	2(13.33)	4(26.67)	2(33.33)
Primary	13 (86.67)	11(73.33)	0
Total	**15(100%)**	**15(100%)**	**6(100%)**

The higher fish volumes in-COVID were consumed by family members or friends. The positive impact of the pandemic was the increase in fish consumption patterns within the families, which improved their protein nutrients intake. Income generated was often shared into 3 portions among the male, female and operations.

Table 4: Level of experience for the respondents

Years of experience	Fisher folks Frequency(%)	Retailers Frequency (%)	Wholesalers Frequency (%)
1-5	1(6.67)	2(13.33)	-
6-10	5(33.33)	6 (40.00)	-
11-15	6(40.00)	4 (26.67)	-
16-20	3(20.00)	3(20.00)	-
Above 20	-	-	6 (100.00)

Wholesale Marketers

The wholesale marketers were predominantly women (83.33%), aged between 41-60 years and with experience exceeding 20 years. They had a minimum of secondary education (Tables 1-4).

The seafood types sold were a bit varied from the Makoko settlement and included croaker (*Pseudotholitus*), sole (*Cynoglossus*), grunter (*Pomadasys)*, moonfish (*Lampris*), lobster, barracuda (*Sphyraena*), red snapper (*Lutjanus*) and grouper (*Epinephelus*). Others were eel (*Anguilla*), bonga (*Ethmalosa* fimbriata), catfish (*Clarias)*, shrimps (*Farfantepenaeus*, *Parapaenopsis*, *Penaeus*), prawns, calamari (*Sepia*), squids (*Loligo*), octopus (*Octopus vulgaris*) and crabs (*Portunus validus*). Apart from captured fish, they also sold imported fish and some of them distributed poultry.

Table 5: Total weight of fish catch at Makoko

Variable	**Total Catch Weight for Respondents**							**Total (%)**
Catch weight (kg)	0-5	6-10	11-15	16-20	21-25	26-30	>31	
Pre-covid(% respondents)	0	0	13.33	66.67	20	0	0	100
In-covid (% respondents)	0	0	0	0	0	53.33	46.67	100
Post-covid (% respondents)	26.67	66.67	6.67	0	0	0	0	100

The major operation of the wholesale marketers is cold storage hence, their electricity bills constituted a huge chunk of their running costs and so significantly affected their businesses. Generally, the COVID-19 season saw a general increment in monthly bills for all operators, reaching ₦39,000 (Table 7). For individuals sharing facilities, such bills were shared.

Table 6 : Value of retail fish sold pre-COVID, in-COVID and post-COVID

Variable	Value of Fish Sold							Total
Catch value (₦)	<5000	6000-10000	11000-15000	16000-20000	21000-25000	26000-30000	>31000	
% respondents, pre-covid	0	33.33	40	20	6.67	0	0	100
% respondents, in-Covid	46.67	40	13.33	0	0	0	0	100
% respondents post-covid	40	60	0	0	0	0	0	100

While the restriction lasted, the wholesalers had to keep visiting their stalls and cold rooms to ensure that there was regular supply of electric power to run their facilities and maintain stock quality. Fifty percent (50%) reported free access, 33.33% had some restrictions while the remainder (16.67%) had no access. This was dependent on their locations and possession of personal motor vehicles. Initially, those who were denied access by law enforcement agents who manned the roads, were later granted such since they obtained permits and means of identification, being food vendors and essential service providers. Commuting costs generally increased by 50% (Table 7).

Fish wholesale business owners voluntarily closed their outlets alongside the compulsion by the Lagos Government and this negatively affected their incomes and livelihood. Up till now, post-COVID-19, a lot of wholesalers are still suffering massively, the effects of the pandemic. Some of the traders interviewed said they currently sell their wares on credit and would only be paid when their customers return to take new consignments on credit. One of them even mentioned that she had to send commodities to Osun State without being paid. They noted that they had to engage in credit sales as that was the only way they could generate income, though delayed. There is also the ripple effect of the 50% downtime in operations as they, also open on Tuesdays, Thursdays and Saturdays, instead of the previous 6 days.

Costs of transportation of their stock was actually negotiable but depended on the number of packs to be conveyed. This value increased by 50% post-COVID as outlets were closed during the lockdown. Quantity of fish sold ranged from 20-500kg (mean 240kg) but dropped to 12-350kg (mean 158kg) which was a 34% decrease after the pandemic. Cost of peeled shrimp pack rose by 11%, from ₦2500 to ₦2800. Staff completely lacked remuneration at the wholesale market during the lockdown. Most of them (83.33%) maintained the pre-COVID salary figures but 16.67% received increased figures post-COVID.

The gain spelt out here was that hygiene improved among the personnel and operators. The people have also become health-conscious sequel to the disruption by the pandemic.

Industrial Fisheries

The fish products exporting industry that was sampled processes sole fish (*Cynoglossus*), shrimps (*Penaeus monodon, Farfantepenaeus notialis, Parapaenopsis atlantica, Penaeus kerathurus*), crab (*Portunus*) and cuttle fish into various products by filleting, peeling, cutting or mincing. Products include peeled shrimps, peeled and deveined (PD), peeled undeveined (PUD), crab legs, crab body, sole fillets, medallion balls and cleaned cuttle fish (Fig.3). These are exported to the European Union after Health certification by Federal Department of Fisheries and Aquaculture (FDF). Quality was assured for their landings.

The industrial fishery sampled reported that they only ceased processing during the initial complete lockdown but commenced production soon after. Their voyages were prolonged to 55days, but they had landings. Catches have slightly increased by 3-6%, with values for 2 vessels given as 39.5tonnes (t), 40.6 t and 43.2 t respectively for pre-, during and post-COVID while income dipped by 15%. The cost implication of a voyage could not be ascertained, but the cost of production at the processing plant moved from ₦150/kg to ₦225/kg and has maintained that level. Product cost has however remained unchanged as a 20kg bag of small croacker has remained at ₦36,600.00 since January, 2020.

Staff emoluments were reduced in proportion to earnings where the least paid got full salaries and the highest paid got 40% cuts. However, the contract staff members were unpaid (100% cut) and these were mainly production staff. During the curfew, maintenance and security staff who could not return home, stayed at the factory and the company had to hire a caterer for them at no cost to them. Restrictions and physical distancing meant that staff worked for 2 weeks in a month. With local sales of products, the company's earnings were slightly enhanced.

Transportation was a major problem around Otto and Apapa, not necessarily mainly due to the pandemic, but also due to poor road access to the Port caused by road closures due to construction. After stuffing, containerised reefer (refrigerated shipping containers) vehicles containing up to 250tonnes of fish and 25tonnes of prawns, set at -20^{0}C that hitherto spent about 3hours pre-COVID, spent 40-48 hours in transit, being a huge 1233-1500% extension of haulage time. This put a lot of stress on the truck drivers who had to sleep on the road for those periods. Moreover, there were bureaucracy, multiple agencies to be attended to, restrictions in movement of reefer containers as they were given 50% access only on Tuesdays, Thursdays and Saturdays. There were complaints of extortion by security agents who sometimes diverted containerised vehicles or collected up to ₦150,000.00 (One hundred and fifty thousand naira) after paying a freight charge of about ₦400,000.00-₦ 500,000.00 (Four hundred thousand or five hundred thousand naira) per trip. While the containers were leased, the company had ownership of the trucks. The containers were often delayed for up to 4 days even before getting to the factory for stuffing.

While transportation of reefer containers took a lot of time, vehicular movement for company staff was enhanced as fewer vehicles plied the Lagos roads. Costs of commuting rose from monthly pre-pandemic figures of ₦16,000 to ₦30000 (over 80% rise) and have since remained unchanged post-COVID -19 (Table 7). In order to cushion the negative effect on their personnel, the company gave ₦1000 (One thousand naira) as daily subsidies for transportation. For fish industry workers who had private cars, transit to work was easier, less stressful and faster as there was reduced traffic, except for commuters around Apapa who complained about heavy traffic.

During COVID-19 lockdown, there was limited export of products since the exporters' demand dwindled. The months of March and April were difficult. Income accrued from sales to the Nigerian market. Inputs like spare parts for vessels, nets and other maintenance materials had to air-freighted, leading to high logistics charges. Costs of deliverables were 3-4 times higher due to the disruption and receipts of these were delayed because of travel restrictions. Electricity bills rose by 44.78% during the pandemic and still soared post-pandemic by a further 34.29%, thus heightening operational costs. COVID caused loss of productivity, sales reduced and a lot of raw materials from landings was available under cold storage, as processing was not optimal. Livelihood for operational staff slightly declined.

Gains of the disruption were that commuting was easy as traffic was light. Stress associated with work was reduced as the people had opportunity to rest and reduce pressure.

Table 7: Impact Evaluation of COVID-19 on various parameters

PARAMETER	FISHERIES SUB-SECTOR	PRE-COVID	COVID	POST-COVID	IMPACT/% CHANGE*
Livelihood	**Industrial**	**Good**	**Fair**	**Good**	**-; +**
	Wholesale	**Good**	**Fair**	**Fair**	**-**
	Retail	**Good**	**Fair**	**Poor**	**-**
	Fishing	**Good**	**Fair**	**Poor**	**-**
Staff emolument	**Industrial**	**100%**	**0-100%**	**100%**	**-100%, 100%**
	Wholesale	**₦20,000**	**0**	**₦25,000**	**(25% rise)**
	Retail	**0**	**0**	**0**	**Nil**
	Fishing	**0**	**0**	**0**	**Nil**
Commuting cost	**Industrial**	**₦16,000**	**₦30000**	**₦30000**	**+87.5% rise, nil**
	Wholesale	**₦20000**	**0**	**₦30000**	**(+50% change)**
	Retail	**0**	**0**	**0**	**Nil**
	Fishing	**0**	**0**	**0**	**Nil**

Production cost	**Industrial**	**₦150/kg**	**₦225/kg**	**₦225/kg**	**+50% , no change**
	Wholesale	**₦250/kg**	**0**	**₦400/kg**	**-100%; +160% (60% rise)**
	Retail	**NA**	**NA**	**NA**	**Nil**
	Fishing (voyage)	**₦8,200/trip**	**₦5375/trip**	**₦11,450/trip**	**-34.5%; +113.0%**
Product/cost	**Industrial**	**₦36,600**	**₦36,600**	**₦36,600**	**No change**
	Wholesale	**₦2500**	**0**	**₦2800**	**-100%; +111% (11% rise)**
	Retail	**₦5000**	**₦3000**	**₦3000**	**(40% drop)**
	Fishing	**NA**	**NA**	**NA**	
Logistics	**Industrial**	**350,000**	**400,050**	**400,050**	**+14.3%; 0**
	Wholesale	**Initial**	**50% rise**	**50% rise**	**+50%**
	Retail	**0**	**0**	**0**	
	Fishing	**0**	**0**	**0**	
Income	**Industrial**	**Initial**	**15% decline**	**15% decline**	**-15%**
	Wholesale	**₦310,700**	**0**	**₦502,450**	**-100%; +161.7% (61.7% rise)**
	Retail	**₦13000**	**₦5000**	**₦3000**	**-61.5%; -40% (76.9% dip)**
	Fishing	**NA**	**NA**	**NA**	
Catch/procured quantity	**Industrial**	**39.5tonnes**	**40.6tonnes**	**43.2 tonnes**	**+2.78%; +6.4%**
	Wholesale	**NA**	**NA**	**NA**	
	Retail	**NA**	**NA**	**NA**	
	Fishing	**18kg**	**28kg**	**8kg**	**+55.6%; -71.4%(26.4% dip)**
Electricity cost	**Industrial**	**2,426,117.40**	**3,512,588.10**	**4,717,073.70**	**+44.78%;+34.29%**
	Wholesale	**₦29000**	**₦0**	**₦39000**	**+34.48% rise**
	Retail	**NA**	**NA**	**NA**	
	Fishing	**-**	**-**	**-**	
Fish consumption	**Industrial (staff)**	**Optimal**	**Decline**	**Optimal**	**-;+**
	Wholesale	**Optimal**	**Decline**	**Decline**	**-**
	Retail	**Medium**	**Optimal**	**Optimal**	**+**
	Fishing	**Medium**	**Optimal**	**Optimal**	**+**
Seafood quality	**Industrial**	**Optimal**	**Optimal**	**Optimal**	**No change**
	Wholesale	**Good**	**Good**	**Good**	**No change**
	Retail	**Good**	**Good**	**Good**	**No change**
	Fishing	**Optimal**	**Optimal**	**Optimal**	**No change**
Value of seafood purchased	**Industrial**	**NA**	**NA**	**NA**	
	Wholesale	**₦216600**	**₦0**	**₦454900**	**+110%**
	Retail	**NA**	**NA**	**NA**	
	Fishing	**NA**	**NA**	**NA**	

+, rise = increase; -, dip =decline; NA= not available/applicable, *= changes during lockdown and post-COVID

DISCUSSION

Using the postulation of Lazzarini (2020) in evaluating impact, with the cause being COVID-19 pandemic, which led to worldwide disruption and subsequent restrictions, we have compared various variables before, during and after the lockdown and the cost implications have been determined. In agreement with FAO (2020b), the pandemic impacted seafood production, processing, wholesaling and retailing.

Just like UNDP (2020) observed, the pandemic led to reduced operational time, negatively affected the earnings, livelihood and wellbeing, and increased expenditure (like costs of production and electric power supply), of the fisheries stakeholders in the various sub-sectors studied, with the consequent worsening of unemployment and underemployment among Nigerians. This rate currently stands at 55%, as trade, services and the financial sectors contracted as a result of the pandemic (NBS, 2020). At the artisanal sub-sectors, the high catches were poorly demanded during the movement restrictions. So also for the wholesale marketers, the hoteliers, who were the major buyers, had their businesses shut down, leading to poor sales. Subsequently, prices fell by 15% and fishing activities also declined. This was similar to what was observed by Clavelle (2020). There were reports of decrease in what households of fish workers could afford hence a lowering of livelihood.

For communities close to fishing grounds with increased catches, owing to limited transportation facilities to convey fish to other locations like the Ijora wholesale market, and very limited supplies of other protein sources like meat, poultry and pork, there was an increase in the consumption of fish, thus improving on their nutritional status and food security. This gain was in agreement with Bondad-Reantaso *et al.* (2020). Though this study showed a positive correlation for the fisher folks, for the other sub-sectors, this was not the case as their earnings decreased.

The decrease in export, reduced earnings, lower demand for goods and negative investments were predicted by Onyekwema and Ekeruche (2020). The Lagos Port was congested and the banking sector was shut so, imports and exports were hampered as the only Bank that was operational was at the Ports.

Improved hygiene and health consciousness occurred like the hand washing, use of hand sanitizers, reduced contact with other persons, as a result of distancing, therefore reducing contamination and incidence of gastro-intestinal illnesses. These hygienic protocols are still being retained as members still utilise hand sanitizers.

The social and physical distancing prescribed allowed for fewer staff reporting for work at the fisheries sector thus, much of the personnel had time to rest and reduced stress. This was not the case with the truck drivers who handled reefer vessels. Strains and stresses were on the drivers and crew of the freighting vehicles, who had to endure the delay and gridlocks on their journeys to the Port increased, as they spent 3days instead of the usual period of 3hours. With these, products from the export processing factory were greatly delayed, and the cooling systems had to remain functional thus, increasing logistics.

Variation of impacts occurred in some fisheries sub-sectors. For example, the cost of seafood remained unchanged in industrial fisheries, whereas this cost increased at the wholesale market. An increase in cost connotes a negative impact. Also, while consumption increased during the restriction at the artisanal fishery, it dwindled among staff at the industrial sector.

There are indications that the fisheries subsectors are bouncing back as the wholesalers procured 110% more than they did before the pandemic. This trend is predicted to continue in every segment of the industry.

There was a general absence of proper record-keeping at the fishing, retail and wholesale outlets. The irregularities in the frequencies of procurements and sales made it difficult to gather monthly records. Some respondents were also unwilling to divulge some details.

Conclusion and Recommendation

While the pandemic positively impacted on personnel hygiene, health consciousness, fish harvest/catch quantities and shortened the time to commute, there was fluctuating impact on staff emolument, fish protein consumption pattern, and product cost (price) but it did not alter seafood quality. The negative impacts were on livelihood and income obtained from fish business (which generally declined), and costs of production, energy supply, commuting and logistics that increased. It is recommended that Government should reduce the tariffs on fuel and electricity which were recently hiked, to help cut overheads for the fisheries stakeholders.

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COVID-19 IN POLITICS: NIGERIAN EXPERIENCE

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Abstract

COVID-19 is a global issue which started as health problem but turned socio-political crisis with systemic implications for the entire world. Countries have taken various preventive and control measures against this crisis. The study generally aimed to examine COVID-19 in politics: Nigerian experience. The study specifically aimed to explore the role of conspiracy theory in simplifying COVID-19 in Nigeria. It also aimed to critically interrogate the realities of COVID-19 in Nigeria. The study will adopt Conspiracy theory as its theoretical framework. The Conspiracy theory offered an explanation for the societal crisis when scientific evidence is in doubt. In gathering data, emphasis will be placed on secondary sources, while for analysis, critical and qualitative methods will be employed. The findings revealed that conspiracy theory was a way the people were making sense of the COVID-19 crisis. It also showed that the realities in Nigeria was tough due to missing infrastructures. Recommendations were therefore made accordingly.

Keywords: Conspiracy theory, COVID-19, Palliatives, Politics, Societal crisis.

Introduction

Many societal crisis situations had taken place, and people have continuously experienced substantial uncertainty and fear due to societal crisis situations, such as terrorist attacks, plane crashes, natural disasters, or war; and the circumstances leading to them are being questioned (Van Prooijen & Douglas, 2017:323,325-326).

Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:6-7) wrote that COVID-19 which at the beginning had been compared with an ordinary flu, now represented very complex events, complex in its origin, its spread, its effects and its consequences at multiple levels and fields; medical, social, political, economic, religious, cultural and civilizational. Figus (2020:2) assertedd that the virus had spread to over 209 countries.

Also, Van Prooijen & Douglas, 2017:327) citing Van den Bos (2009) observed that people's motivation to make sense of a given situatioin increases when they feel that they are not in control of the situation or when thy experience subjective feelings of uncertainty.

Against this background and amids this global health crisis, the likely implication of this crisis if not properly managed could shake up geopolitics, change the use of technology, challenge worldviews as well as life values and also force human race to redefine priorities in order to prevent or prepare for new crisis (Jakovljevic, Bjedov, Jaksic, & Jakovljevic, 2020:6).

Statement of the Problem

Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:11) citing Harari Y.N. (2020a), declared that "today humanity faces an acute crisis not only due to the coronavirs, but also due to the lack of trust between humans". The causes and origins of COVID-19 have remained unclear as there are contentions between the scientists and the conspiracy theorists. While the scientists based their point on scientific evidence, the conspiracy theorists are attributed to political manoeuvring or divine intervention. Van Prooijen & Douglas (2017:324) citing Pipes, (1997) noted that some conspiracy theories in history have turned out to be true (e.g. the Watergate and Iran-Contra scandals), nonetheless, most conspiracy theories in history have no evidence to support them. Furthermore, Van Prooijen &

Douglas (2017:325&327) declared that conspiracy theory was part of human nature, provided people with simplified answers specifically on how certain crisis situation emerged, which societal actors could or could not be trusted and that people have been susceptible to such beliefs throughout history due to societal crisis situations.

Nevertheless, Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:8-9) posited that with only one side of the story then conspiracy theory might look convincing, and that it was important to remain critical, search for evidence of the opposite and that the COVID-19 crisis was an important test: to trust scientific data and healthcare experts or unfounded conspiracy theories and self-serving politicians.

In view of the above, an examination of this study investigated the topic by answering the following questions:

1) What role has conspiracy theory played in simplifying COVID-19 in Nigeria?

2) What were the realities of COVID-19 in Nigeria?

Objectives of the Study

Generally, this study aimed to investigate rural development in Nigeria. Specifically, the study aimed to:

1) Explore the role of conspiracy theory in simplifying COVID-19 in Nigeria.

2) Interrogate the realities of COVID-19 in Nigeria.

Theoretical Framework

The main thrust of conspiracy theory, according to Van Prooijen & Douglas (2017:324), is a group, or coalition, of powerful and evil-minded individuals, distinguishing conspiracy beliefs from other forms of belief (e.g. religion, paranormal belief, and superstition).

EU DisinfoLab (2020) linked the conspiracy theory to power theory and that conspiracy has to do with a group of people who entered secret arrangements to reverse power dynamic with the aim to advance their personal interests but consequently causing harm to their community. The theory aims to blame someone (or a clear enemy: outside power, minority power within or government itself) for the problematic aspects of a complex world (EU DisinfoLab, 2020).

Lewandowsky, Cook, Ecker, & van der Linden (2020) stated that consiracy theoriests can hold incoherent beliefs as well as disbelieving the "official" account. Summing that the telltale traits of conspiratorial thinking include: contradictory logic, overriding suspicion of official explanations, nefarious intent (suggesting that something must be wrong), self-sealing narrative of persecuted victim, and immune to evidence. They distort the facts.

THE CONCEPT OF COVID-19

Eranga (2020:220) noted as an infectious disease the acronym: 'CO' for corona, 'VI' for virus, 'D' for disease and '19' for 2019. The viruas is transmitted through direct contact with respiratory droplets of an infected person (generated through coughing and sneezing). Individuals can also be infected from touching surfaces contaminated by the virus and touching their face (e.g., eyes, nose, mouth). It all started in November 2019, when a 55-year old man from the Hubei province in Wuhan province of China was diagnosed with a new disease caused by a new virus SARS-CoV-2, and by early 2020, the crisis has affected an enormous amount of people worldwide (Imhoff & Lamberty, 2020). Ghada & Aseel (2020:122) coronaviruses (CoV) are a large family of viruses that cause flu in humans. The World Health Organisation declared COVID-19 pandemic on March 11. 2020 (Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:7).

Ghada & Aseel (2020:122) citing Paules C.L.; Marston, H.D. & Fauci A.S. (2020) stated that the COVID-19 was zoonotic, meaning that it could be transmitted from animals to people. Tanhan, et al. (2020:1) the disease's most well-known symptoms were fever, cough, and shortness of breath.

Relatedly is the link between COVID-19 and conspiracy theory. Ghada & Aseel (2020:123) citing Millett P. & Snyder B.A. (2017) stated that conspiracy theories viewed the virus outbreak as the result of a biological warfare rather than a natural occurrence. Closely linked is COVID-19 and hybrid warfare. Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:9) the COVID-19 as a hybrid warfare with two different meanings: a war between countries using coronavirus and a war against coronavirus. According to Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:9) citing Baumann J. (2020) remarked that the concept of hybrid warfare emerged just after the 2006 Lebanon War as a way to categorize and define unforeseen threats on that battlefield.

Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:9) citing Savin L. (2020) stated that the story about COVID-19 as a hybrid warfare started when some Chinese and Iranian officials declared that the coronavirus was created in the US military laboratories as a biological weapon in order to undermine economy of these countries. Similarly, Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:9) quoting Savin L. (2020) & Mahar I. (2020) wrote that the Chinese foreign ministry spokesman Zhao Lijian claimed that the US military brought coronavirus to China during the Military World Games in Wuhan, China, in October 2019 where the Pentagon sent 17 teams with more than 280 participants and other staff members.

Also, Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:9) citing Mahar I. (2020) wrote that in 1981, an American fiction author Dean Koontz described in his book “The Eyes of Darkness” the virus Wuhan-400 as the most dangerous biological weapon which spread throughout the world. Again, Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:9) citing Baumann J. (2020) noted that the coronavirus is defined as a hybrid warfare threat because humans carry and spread the virus which wages war against humans so that we can design defeat mechanisms to neutralize the threat.

Relatedly is the way out of COVID-19 crisis, Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:11) stated that to defeat an epidemic, people need to trust scientific expects, citizens need to trust public authorities, and countries need to trust each other”. Tanhan, et al. (2020:2) observed that the government recommended to maintain physical and social distance rules, online or distant education, vacating all schools and related buildings, staying at home, and stopping inner and acros the country transportations. They also gradually closed places of worship among others. Bisson, Schmauder, & Claes (2020:1) recommended that the policy-makers should not let this crisis go to waste and consider the crisis as an invitation to increase consultation with affected communities and engage in locally acceptable solutions.

Across the world, governments are employing two fundamental Non-pharmeceutical Interventions (NPI) to respond to the COVID-19 outbreak; suppression and mitigation. The objective of suppression is to reduce the transmission rate, whereas mitigation aimed at getting the numbers to decline or slow its speed. Population wide social distancing combined with home isolation of cases and closure of schools and universities are minimum policy requirements for effective suppression (UNDP, 2020). Politically speaking, Lewandowsky, Cook, Ecker, & van der Linden (2020) noted that conspiracy theories can be used by either side of politics to undermine the other.

COVID-19 IN POLITICS

Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:7) citing Hefarty S. (2020) stated that the first doctor who alarmed on the seriousness of the situation was accused by the Chinese Public Security Bureau as a whistleblower for spreading rumours. Shahzad (2020) argued that Chinese claims on US seems more powerful and logical. Citing a molecular epidemiologist, Shahzad (2020) stated that COVID-19 has no roots or engineering history by which we can say that it was man-made. Shahzad (2020) noted that China wanted enhancement of its trade all over the world and it could use any strategy. Shahzad (2020) argued that COVID-19 was not a biological blast or natural virus, but a man-made virus that contains viruses of many other types. He however cautioned that it was too early to say whether the US was responsible or it was the conspiracy of China. Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:7) citing Tedros Adhanom Ghebreyesus (WHO Director-General) stated that “It’s easy to blame, it’s easy to politicize, it’s harder to tackle a problem together and find solution together”.

United Nations (2020:2) stated that COVID-19 has given rise to a new wave of hate speech and discrimination including scapegoating, stereotyping, stigmatization and the use of derogatory, misogynistic, racist, xenophobic, Islamophobic or antisemitic language. The dissemination of ‘disinformation’ or ‘misinformation’ related to COVID-19.

The Lancet editorial 2020 cited in Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:6) indicated that many countries have not followed WHO's clear recommendations of containment such as widespread testing, quarantine of cases, contact tracing, and social distancing which are basic principles of public health and infectious disease control.

Closely related is the defeatist mechanisms, According to Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:9) citing Baumann J. (2020), 'Defeat mechanisms' involves: (1). Attrition: quarantine operations and self-isolation to minimize the spread of viruses, (2). Dislocation: offesive operations to prevent the enemy to seize the initiative, e.g, closing borders, city lockdown, curfew, shutdowns of schools and public gatherings, etc. and (3). Disintegration: vaccine operations which provide a more permanent solution to bioweapon.

Also, Jakovljevic, Bjedov, Jaksic, & Jakovljevic (2020:11) citing Escobar P. (2020) stated that at symbolism level, Saint Corona was a Christian killed in 165 AD during the rule of Marcus Aurelius and has been respected for centuries as one of the patron saints of pandemics. Looking at the implication of conspiracy theory, Van Prooijen & Douglas (2017:326) citing Snyder (2015) stated that the Jewish conspiracy theories were responsible for the defeat of Germany during the world War I with this forming a major part of Hitler's speeches and a potent force in inspiring the Holocaust. Shahzad (2020) wrote that since the epidemic of Coronavirus, some people have started hating other people from China, whether COVID-19 was created by China or created for China remained unclear.

Methodology

The paper adopted documentary approach. The method of data gathering method emphasised secondary sources and the method of analysis was mainly qualitative and logical. Relevant scholarly publications were extensively sourced from the internet. This was necessary as the study essentially made use of documentary analysis.

Results and Discussions

Consipiracy Theory and COVID-19 in Nigeria

Kalu (2020:556) as with the rest of the world, Nigeria is currrently dealing with the COVID-19 pandemic, but in a somewhat different fashion. On February 27th 2020, the first official case of COVID-19 in Nigeria was announced. The Federal government promised the citizens some palliative measures, which include disbursing of funds and food items to those most affected. The Study aimed to explore the role of conspiracy theory in simplifying COVID-19 in Nigeria.

Amzat, et al. (2020:3) noted that during the first 30 days of COVID-19 in Nigeria, the disease distribution was elitist. Some people claim that cure for the virus already existed but that the elite, in line with the theory of power, does not want to share it with the whole population. There is also economic side to it which borders on selling an overpriced antidote. Some sceptics refute the mortality of the virus per se and condemned the use of masks and hand sanitisers for allegedly preventing our body's natural defences from naturally defeating the virus. We also have covid-19 deniers, who reject the very existence of the virus, maintaining that all victims died of previous pathologies.

There are different conspiracy narratives based on the origin, cures, and instrumental use of the virus to push secret agendas. The origin-based theories defended the artificial nature of the virus, which spread either accidentally or intentionally. The accident-centred thread blamed without any scientific evidence the virus' spread on the carelessness of the actors involved, who conducted covert activities (e.g. a bio-weapon program that went wrong). Bacteriological war intent of the pandemic believed that the virus was created in a lab (whether in the United States or China) and released voluntarily in order to achieve geopolitical or economic gains. The 5G conspiracy stated that the virus was transmitteed through 5G antennas or that the 5G technology had a negative health impact and thus made individuals vulnerable to the virus (EU DisinfoLab, 2020).

Some people claimed that the cure for the virus already existed but that the elite, in line with the theory of power, does not want to share it with the whole population. There was also economic side to it which borders on selling an overpriced antidote. Some sceptics refute the mortality of the virus per se and condemned the use of masks and hand sanitisers for allegedly preventing the body's natural defences from naturally defeating the virus. There were also COVID-19 deniers, who reject the very existence of the virus, maintaining that all victims died of previous pathologies.

Conspiracy theories systematically advocated the existence of secret plots, which the powerful wish to hide from the public eye, as they entail forms of political manipulation

(EU DisinfoLab, 2020).

While many conspiracy theories nowadays implicated governmental institutions or major companies, various other societal groups have also frequently been implicated in conspiracy theories (Van Prooijen & Douglas, 2017:326).

Conspiracy theories systematically advocate the existence of secret plots, which the powerful wish to hide from the public eye, as they entail forms of political manipulation. In the context of the pandemic, we encounter two opposite conspiracies rooted in distrust towards official authorities. On the one hand, conspiracy theories denouce that the government is understating the death toll to keep the population quiet and avoid taking responsibility for the mismanagment. On the other hand, national authorities are acused of exaggerating the gravity of the situation to divert public attention from other problems the country is facing.

Population cleansing is a widespread theory that emerged in different terms, suggesting the China created the virus to solve the overpopulation problem, but apparently so did European countries to get rid of the elderly.

Conspiracy theorists also fear that the pandemic will be used as an excuse to impose needless mass vaccinations, whose real purpose is a political means of achieving social control (or biopower) through microchip to subjugate receivers. A common goal is to show the collusion of political and economic powers for evil intent.

Conspiracy theories are based on the idea that a powerful minority is keepiing relevant information from the majority of the population. These theories aim to make sense of the complexity of reality by finding someone to blame. They are manufactured through the biased connection of unrelated events, whose validity is unprovable. As the pandemic is transnational event, so is the driving infodemic, that is to say the same coronavirus-related conspiracy theories are difussing across different countries.

Focusing on current events, we identified three major conspiracy narratives: (i) the man-made origin of the virus, either accidental or intentional, (ii) the existence of a cure detained by a small group, (iii) the exploitation of the pandemic as a distraction to forward a secret agenda (EU DisinfoLab, 2020).

Adedayo, Sennuga, & Sennuga (2020:154) wrote that people read on pages of newspaper and social media of distribution of billions of naira to Nigerians. Ozili (2020:10) noted that the Central bank of Nigeia provided support to affected households, businesses, regulated financial institutions and other stakeholders to reduce the adverse economic impact of the COVID-19 outbreak in six ways: (i) granted extension of loan moratorium on principlal rapayments from March 1, 2020. This meant that any intervention loan currently under moratorium would be extended by one year. (ii) it oferred interest rate reduction on all intervention loan facilities from 9% to 5% begininng from March 1, 2020. (iii) It offered a ₦50bn targeted credit facility to hotels, airline service providers, health care merchants, among others. (iv) It provided credit support to the health care industry to meet the increasing demand for healthcare services during the outbreak (however, the loan was available only to pharmaceutical companies and hospitals. (v) It provided regulatory forbearance to banks which allowed banks to temporarily restructure the tenor of existing loan within a specific time period particularly loans to oul and gas, agricultural and manufacturing sectors. (vi) It strengthened the loan to deposit ratio policy which allowed banks to extend more credit to the economy.

The Realities of COVID-19 in Nigeria

The study also sought to interrogate the realities of COVID-19 in Nigeria. Amzat, et al. (2020:4) the extent to which public health education has influenced postive behavioural changes among Nigerians remain vague. Generally, the reponse to the coronavirus outbreak in Nigeria could be described as medico-centric and reactionary. The federal and state governments only set up isolation centers after positive cases were confirmed in the country.

Nigeria's health system before the pandemic was nearly non-existent. In most of the cities, health systems are completely dilapidated as they have not received adequate attention, and some government officials have contributed to health system collapse by encouraging medical tourism. But the reality on the ground is a far cry from the promises made; only a small proportion of the population attest to reciving any support. A large number of citizens have disobeyed the lockdown order in the hope of making sales or trying to earn money through other services, but they were apprehended by the security personnel. The combined effort of the security personnel to enforce the lockdown may have caused more deaths than the infection itself (Kalu, 2020:556). There is hope that the health sector will finally receive the attention it needs from the government in response to the lessons learned from this pandemic.

Kalu (2020:556-557) despite the socioeconomic differences seen across Nigerian communities, there has been a sense of togetherness during this time.

Kalu (2020:557) some feared that the number of deaths as a result of lockdown measures will be greater than those due to infection. Social distancing assumes a certain level of spatial freedom. In densely populated pockets in Nigeria's urban centers – this assumption may not hold. The difficulty in enforcing social distancing in congested IDP camps. There is also a risk of further fragmenting the social values – and the very safety nets required for healing and recovery (UNDP, 2020).

However, there were criticisms that these palliatives have been politicised rather than been sincerely deployed (Eranga, 2020:221). Identifying ground for the criticisms, Eranga (2020:222) noted that there were no laid down parameters for determining the most vulnerable, thereby making it possible for party faithfuls to turn themselves to be vulnerable.

Ozili (2020:11) noted that the public health sector in Nigeria had poor infrastructure such as poor emergency services, few ambulance services, ineffective national health insurance systems in the country, insufficient primary health care facilities. Similarly, Ozili (2020:12) stated that the failures in Nigeria's public health sector made it difficult for Nigeria to cope with the fast spreading COVID-19 disease druing the outbreak. Local drug manufacturers could not manufacture drugs that could temporarily suppress the disease in infected patients because the APIs used to manufacture suppressant drugs could no longer be imported because China had shut down its factories and closed its borders to control the COVID-19 in China.

According to Ozili (2020:12-13), digital technology helped many businesses in developed countries survive the effect of the COVID-19 outbreak but because Nigeria already had a weak and underdeveloped digital economy before the COVID-19 outbreak, many businesses operated using the traditional 'come-to-the-office-to-work' model as opposed to the 'working-from-home' model. He suggested that the digital economy would have played a major role in driving recovery from the economic crisis if Nigeria's digital econoy was robust and well-developed.

(Ozili, 2020:14) lack of social welfare program. Social welfare activities in Nigeria is under developed, poorly funded and is unavailable to majority of those who need them.

Criticising the N-Power, (Ozili, 2020:14) noted that it isolated uneducated people, needy children, and older adults that need to be empowered as well.

(Ozili, 2020:15) stated that social welfare has not been a policy priority. (Ozili, 2020:12-13) before the COVID-19 outbreak began, Nigeria already had a weak and underdeveloped digital economy. Currently, Nigeria has 8 operational telecom service providers, namely, MTN Nigeria, Globacom, Airtel, 9Mobile, M-Tel, Telkom, Econet Wireless and Vodacom. According to the Nigerian Communications Commission (NCC), the number of mobile phone subsribers in Nigeria decreased by 49,060 in April to 173.38 million from 173.43 million in March. Statistia reported that there are 96 million internet users in Nigeria. Yet, during the COVID-19, there were hardly any university or school that offered a full educational curriculum online from start to finish. Many businesses operated usiing the traditional 'come-to-the-office-to-work' model as opposed to the 'working-from-home' model. The crisis brought challenges to the business environment in Nigeria. It impacted industries and markets in the short term. The operations of these markets and industries would have been minimally affected if they had a large digital infrastructure. The only services that were offered through the existing digital infrastructure during the COVID-19 outbreak were telecommunication services, digital bank transfers and internet services.

Outside Nigeria, digital technology helped many businesses in developed countries survive the effect of the COVID-19 outbreak, and it created an opportunity to enhance the country's digital economy (Ozili, 2020:12-13-14).

Nigeria was severely affected because Nigeria is an import-dependent country, and as a result, Nigeria witnessed shortage of crucial supplies like pharmaceutical supplies, spare parts, and finished goods from China.

The public health sector in Nigeria has poor infrastructure such as poor emergency services, few ambulance services, ineffective national health insurance systems, insufficient primary health care facilities (Ozili, 2020:11).

Ozili (2020:14) also noted the challenge of national social welfare program. During the lockdown, people had little to rely on, many poor citizens did not have welfare relief that could help them cope with the economic hardship at the time. There were no housing subsidies, no energy and utilities subsidies to individuals that were most affected by the outbreak.

Conclusion

The overall intention of this study was to examine COVID-19 in Politics: Nigerian Experience. The specific objective of the study was to explore the role of conspiracy theory in simplifying COVID-19 in Nigeria. The study also sought to interrogate measures that complicated COVID-19 in Nigeria. The study adopted systemic approach as its theoretical framework. The key thrust of the Conspiracy theory suggested that the people seek to understanding a complicated situation when scientific evidence is in doubt. The study essentially adopted documentary approach. Critical method was also employed. The results from the study indicated that with conspiracy theory, the people are helping themselves to understand the likely issues surrounding COVID-19 with or without evidence. The results also revealed that the crisis is tough for Nigeria because of missing infrastructures.

The study concluded that COVID-19 though health crisis has indeed become political tools too.

Recommendations

In line with the findings, the following recommendations are hereby made:

1) Political leaders should provide needed infrastructural facilities.

2) The political elites should use the COVID-19 as a stepping stone in planning for future crisis.

3) Political leaders should genuinely bridge the trust deficit between them and the people.

4) National social welfare should be a policy priority for the policy makers in Nigeria.

5) The Nigerian economy should be positioned toward digital system.

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MANAGEMENT OF BANKING SYSTEM LIQUIDITY AND PROFITABILITY IN NIGERIA

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Abstract

This paper seeks to analyze the liquidity management system and profitability within the Nigerian deposit money banks. This will cover the period of ten years (2000-2019). Five banks have been chosen to represent the population of the twenty-four deposit money banks in Nigeria. The liquidity indicators square measure quick ratio, cash ratio, current ratio and liquidity coverage ratio, whereas return on equity (ROE) and return on assets (ROA) were proxies for profitability. Regression analysis was used to test the hypothesis. The findings indicate that liquidity management considerably impact on the performance of deposit money banks The empirical results additionally shows that a rise within the quick ratio of accessible funds results in a rise within the profitability, whereas a rise within the cash ratio and the liquidity coverage ratio results in decrease within the profitability of the deposit cash banks in Nigeria. Recommendation therefore is that for economic, effective, efficient management of liquidity, the banks ought to adopt a general framework for liquidity management, additionally competent personnel's ought to be used to enable them get optimum result for profitability.

Keywords: liquidity; profitability; return on asset; return on equity.

Introduction

Generally, the maintenance of adequate liquidity level plays a really vital role within the effective operations of all organisations and all over the globe; liquidity management could be a notion that's obtaining serious attention above all thanks to the present financial situations and the state of the global economy, (Kehinde, 2018). Some of the outstanding corporate goals embody the necessity to maximise profit, sustain a high level of liquidity so as to ensure safety, reach the best level of owner's internet value as well as the attainment of alternative company objectives. The importance of liquidity management as it affects the company gain in today's business can't be over stressed. Liquidity plays a serious role within the effective functioning of a business organisation. Therefore, a firm ought to make sure that it doesn't suffer from lack of or excess liquidity to fulfil its short compulsions (Agbada & Osuji, 2018).

The Basel committee, in response to the worldwide monetary crisis of 2007 – 2010, has projected a replacement set of liquidity needs to enhance its revised framework of capital needs (Olagunji, A. Adeyanju & Olabode, 2016). As a results of the significant reliance of banks on financial organisation loaning throughout the crisis, policy manufacturers clearly would love to scale back the dependence of deposit cash banks on the investor of expedient, and therefore encourage banks to limit or self-insure (through money asset holdings) a number of their liquidity risk. In every system, there are major elements that are vital for the survival of the system; this is also applicable to the financial system. The financial institution have contributed vastly to the growth of the entire financial system, as they provide an efficient institutional method through which resources can be mobilized and directed from less productive uses to more productive uses (Uremadu, 2017).

Deposit money banks have become a very necessary establishment within the financial system as it helps in facilitating the movement (of financial/ monetary/economic) assets that are less desirable to the more desirable public who requires the financial assets. An adequate financial intermediation needs the attention and focus of the bank management to the profitability and liquidity, which are the two conflicting objectives of the deposit money banks. These objectives are parallel in the sense that an attempt for a bank to attain higher profitability can bit by bit destroy its liquidity and solvency position and contrariwise (Obiakor & Okwu, 2016).

Practically, profitability and liquidity is an effective indicator of the company wealth and performance of not solely deposit money bank but to all or any profit orienting venture. These performance indicators are vital to the shareholders and depositors who are major publics of a bank. because the shareholders expect the bank to extend loaning so as to grant them maximum return in money invested with whereas the investor expect the bank to keep abundant idle cash in order to fulfil their demand. With the conflict arising between profitability and liquidity, shareholders and depositors interest, there is a need for reconciliation and harmonization through effective and efficient liquidity management to ensure the survival and growth of deposit money banks (Agbada & Osuji, 2018)

Deposit money banks that aim to survive must be aware of the challenges of its liquidity and profitability as both factors can affect a bank's growth and sustainability. Therefore, the main purpose of this study is to examine the relationship between liquidity and profitability on deposit money banks in Nigeria (Heibati Nourani & Dadkhah, 2019). From the roles of the financial institution, the deposit money banks make use of idle funds borrowed from the lenders (those who deposit their money into the bank) by investing such funds in other classes of financial assets investment for profit purposes. However, they can be faced with problems, since these deposits which have been invested by the banks for profit maximization can be demanded for at any time by the owners. When the bank is not able to meet their financial obligations, the public begins to lose confidence and these will cause lot of competition to the financial sector. With the increasing level of competition in the banking industry (currently twenty-four deposit money banks in Nigeria), every deposit money bank would strive to operate on profit and at the same time meet the financial demand of its depositors by maintaining adequate liquidity (Javaid, Anwar, Zaman & Gafoor, 2016).

Problem of the study

The operational activities carried out by banks are hardly devoid of risks and problems, because the bank is seeking to maximize its expected profits. This requires optimum utilization of the available resources. Since the banks are expected at any moment to meet the obligations of its clients and depositors who want to borrow or withdraw their savings, the problem arises when the Bank is not able to meet these obligations especially those unexpected ones. This may cause embarrassment for the bank. Its clients may lose their trust and confidence leading to bank run. Therefore, as each commercial bank tries to maximize its profits, it must also be able to meet the financial obligations of its depositors by holding a sufficient amount of liquidity. In order to achieve this delicate balance between the profitability and liquidity, Banks should determine the optimal amount of cash that will enable them to achieve the balance between profitability and liquidity together, because each level of liquidity has a different effect on the levels of profitability. it was against this backdrop this study was undertaken to ascertain the management of banking system liquidity in Nigeria.

The outline of the paper are as follows: Section one is the introduction, section two reviews related literature, section three is the research methodology and section four is the summary, conclusion and recommendations of the paper.

Research Question

The study seeks to answer the question below:

- Is there any significant relationship between liquidity management system and profitability on deposit money banks in Nigeria?

Literature Review

The Concept of Liquidity

Liquidity is defined in different ways by different people and for different reasons. The CBN Monetary Policy Series No. 4 (2011) viewed liquidity as a macroeconomic concept which refers to the overall monetary conditions, indicating the extent of mismatch between demand and supply of monetary resources. It also considered liquidity in the context of the financial markets, as the ease of undertaking transactions in financial assets at narrow bid-ask spreads. Still from the financial market perspective, Allen and Carletti (2013) defined liquidity as the ease to raise funds by selling asset instead of borrowing against it.

From corporate finance point of view, Olagunju, Adeyanju and Olabode (2011) defined liquidity as the ability of a company to meet its short term obligations or the ability of a company to convert its assets into cash.Thus, an asset is liquid if it can be turned into cash quickly without loss (Kohn, 1994). Bank liquidity therefore, means the ability of a bank to maintain sufficient funds to meet financial commitments or pay for its maturing obligations at a reasonable price. In a rather technical sense, PricewaterhouseCoopers (PwC) (2015) in a global Study of Financial Market Liquidity, defined liquidity as a multi-dimensional concept, generally referring to the ability to execute large transactions with limited price impact, and tends to be associated with low transaction cost and immediacy in execution. The study identified the different dimensions of liquidity as follows: i) Immediacy: This refers to the time it takes to complete a transaction under an agency trading system. ii) Depth and resilience: A market is deep when there is a large inflow of trading orders on both the buy and sell side. There should be a sustained interest and willingness to trade with large orders with minimum price impact, iii) Breadth: This refers to the consistency with which liquidity is distributed within asset classes and the differences in liquidity characteristics across markets. iv) Tightness: This refers to the financial cost of completing the transaction, it is measured by the bid-ask spread. v) Stability: The price of the asset should remain stable regardless of the level of transaction. There should be no price loss at the time of resale. From the foregoing, liquidity can be seen as the ability to ensure the availability of funds to meet financial commitments or maturing obligations at a reasonable price at all times. It measures the extent to which financial assets can be sold at, or close to, full market value at short notice.

It could also be defined as the availability of funds, or assurance that funds would be available, to honour all cash outflow commitments (both on-and-off balance sheet) as they fall due. To this end, the most liquid financial assets are currency and transferable deposits as they are exchangeable immediately at their full nominal value. Money in its basic form of bank notes and coins is the most liquid asset and is held as a medium of exchange and store of value. On the contrary, some assets are described as illiquid because they may not be easily traded or their full market value realized at short notice. Such assets include unsecured loans to bank customers, shares of moribund companies or real estate (CBN, 2011).

Types of Liquidity

From a liquidity management perspective, there are three broad types of liquidity. These are central bank liquidity, market liquidity and funding liquidity (CBN, 2011; CBN, 2013; Buschmann and Heidorn, 2014). Central bank liquidity: This refers to deposits of financial institutions at the central bank, often known as reserves or settlement balances. These reserves are held by financial institutions to meet statutory prudential requirements, if any, and to achieve final settlement of all transactions in the payments system. Such reserves are traded in the interbank money market.

Market liquidity: This relates to the ability to buy and sell assets in reasonably large quantities without significantly affecting the asset price. Funding liquidity: This describes the ability of an individual or corporation to raise cash or its equivalent in reasonably large quantities either through asset sales or by borrowing. According to Buschmann and Heidorn (2014), while funding liquidity and market liquidity are crucial elements of a bank’s liquidity management which heavily rely on the bank’s business model, and therefore are intrinsically linked to both sides of bank’s balance sheet, central bank liquidity is measured by money supply and is influenced by a country’s economic growth and stability, monetary circulation and monetary policy.

Sources of Liquidity

In respect of central bank liquidity, five primary sources of liquidity in the financial system have been identified. These are monetary financing by the central bank, net foreign assets, monetary operations, bank rescue and fiscal operations of the government (CBN, 2011).

Monetary Financing: This involves central bank's accommodating monetary policy of lending to the government in the form of Ways and Means Advances (WMA) as in the case of Nigeria or outright deficit financing in other jurisdictions. Any time the central bank lends to the government to finance its deficits, it is injecting liquidity into the system.

Net Foreign Assets/External Reserves Build up: The level of net foreign assets of the Central Bank and Deposit Money Banks (DMBs) could lead to an increase in the net domestic assets of the economy. This can occur in two ways, either by government monetizing its foreign assets, and hence increasing domestic liquidity or through the monetization of private flows by individuals and corporate organizations. Through this process, liquidity is injected into the financial system.

Monetary Operations: Central banks intervene in the domestic money market from time to time to alter the liquidity conditions through open market operations (OMO). This is achieved through treasury bills and foreign exchange transactions, which are complemented by REPO, Reverse REPO, standing deposit and lending facilities as well as special instruments.

Bank Rescue: This is another source through which liquidity is injected into the financial system. As the central bank or government injects funds into a bank to shore-up its capital base/liquidity, liquidity is injected into the banking system.

Fiscal Operations: The sales proceeds from NNPC are deposited in the domestic banks, which after a few days, are transferred to the statutory account in the CBN. The distributed oil and tax revenues are subsequently credited to the accounts of various tiers of the government. Moreover, oil revenues are used for (extra-budgetary) payments for fuel subsidy and other discretionary spending programs. Thus, spending oil revenue beyond the levels dictated by the budget oil price rule and the current practice of once-a-month distribution of oil and tax revenues generate large movements in the available liquidity (IMF, 2013).

The Challenges of Liquidity Management

The pursuit of multiple objectives by CBN the Banking Act of 2007assigned to the CBN multiplicity of objectives which tended to be at conflict with one another, leading to policy inconsistencies. For instance, after the 2009 financial crisis, the CBN decided not to raise interest rate in view of poor liquidity and solvency position of banks. This was in conflict with the significant pressure on the currency and prices due to expansionary fiscal policy of the government. The use of excessive foreign exchange sales to arrest the Naira depreciation led not only to the depletion in international reserves but also to double digit inflation.

Market Segmentation: Market segmentation in the money market on the basis of perceived credit risk has remained a daunting challenge despite efforts by the CBN to redress the situation. As rates for standing facilities increased, banks with excess liquidity appear to prefer deploying their funds to the CBN Standing Deposit Facility (SDF) instead of supplying them into the interbank market. Thus some banks considered as high credit risk have little or no access to credit from banks with excess liquidity. This created a situation whereby some banks have liquidity shortages while others are awash with excess liquidity. This has compounded the problem of determining the optimal liquidity needs for the system.

Persistent Excess Liquidity: One common feature of the Nigerian money market is the prevalence of excess liquidity. This is caused largely by lodgment of large funds by bankers bidding for foreign exchange during the weekly or daily auctions. Furthermore, admitting AMCON bonds for discount window operations was another factor contributing to excess liquidity (IMF, 2013). Besides, banks are said to be reluctant in giving credit to private sector operators due to their poor credit ratings.

Fiscal Operations of the Government: One major source of liquidity in the financial system is the monetization of oil receipts and other oil related inflows from the government. The spending of this oil revenue beyond the levels dictated by the budget oil price rule and the current practice of once a month distribution of oil and tax revenues makes forecasting and managing liquidity in the banking system difficult. Moreover, fiscal operations of states and local governments, which account for about half of public spending, are not fully reflected in the liquidity projection plans. Therefore, effort to improve liquidity forecasting must focus on better coverage of fiscal operations of government at all levels (IMF, 2013).

Money Market Volatility: Money market volatility is largely caused by sporadic injection of liquidity through monetization of oil receipts and related foreign exchange inflows. Other sources of instability include lumpy disbursement from the federation account and the maturity of government bonds and securities. Often, the CBN responds to these shocks through foreign exchange sales and issuance of government securities to sterilize the excess liquidity. These policy responses by CBN are not without trade-offs in terms of rising interest rates in the case of open market sales or an appreciated exchange rate in case of foreign exchange sales. The goal of liquidity management should be to seek the “least cost” mix of sterilization.

Frequent Changes in CRR: These have been identified as major challenge to liquidity management. When CRR is changed, banks are required to make necessary adjustment in their portfolio which may alter finance market prices. According to IMF (2013), CRR is best used to create stable demand for reserves consistent with the level of systematic liquidity. An increase in the CRR, particularly when it is unremunerated imposes additional cost on banks, which can be passed on to the economy in the form of wider interest spreads. Therefore, changes in the CRR should be infrequent and made only when there is a strong reason not to use market bond instruments.

Theoretical Review

Anticipated Income Theory: This theory holds that a bank’s liquidity can be managed through the proper phasing and structuring of the loan commitments made by a bank to the customers. Here the liquidity can be planned if the scheduled loan payments by a customer are based on the future income of the borrower. According to Nzotta (1997) the theory emphasizes that the earning potential and the credit worthiness of a borrower are the ultimate guarantees for ensuring adequate liquidity. Nwankwo (1991) posited that the theory pointed to the movement towards self-liquidating commitments by banks.

Shiftability Theory: This theory posited that a bank’s liquidity is maintained if it holds assets that can be shifted or sold to other lenders or investors for cash. This point of view contended that a bank’s liquidity could be enhanced if it always has assets to sell and provided the Central Bank and the discount Market stands ready to purchase the asset offered for discount. Thus this theory recognized and contended that shiftability, marketability or transferability of a bank's assets isa basis for ensuring liquidity (Ibe, 2013).

Empirical evidences

A study which investigated the relationship between liquidity and profitability of some selected banks and companies quoted in Nigerian Stock Exchange was carried out by Obiakor and Okwu (2016). The central objective of the study was to examine the nature and extent of the relationship between liquidity and profitability and also to determine whether any cause and effect relationship existed between the two performance measures. Analysis was based on accounts of the banks and the companies for the relevant period. A model of perceived functional relationship was specified and estimated using correlation and regression analysis. The results indicated that while a trade-off existed between liquidity and profitability in the banks with a negative but insignificant impact, the two variables were positively correlated.

Heibati et al. (2019) examined and compared the performance of private banks in Iran and Arabic countries of Persian Gulf area. The empirical results from regression analysis of cross-country panel data of the banks showed statistically significant relationship between liquidity and profitability of the banks especially during initial years of their activity.

Ibe (2018) investigated the impact of liquidity management on the profitability of banks in Nigeria. Three banks were randomly selected to represent the entire banking industry in Nigeria. The proxies for liquidity management include cash and short-term fund, bank balances and treasury bills and certificates, while profit after tax was the proxy for profitability. Elliot Rosenberg Stock (ERS) stationary test model was used to test the association of the variables under study, while regression analysis was used to test the hypothesis. The result showed that there is a statistically significant relationship between the variables of liquidity management and profitability of the selected banks. The study by Kehinde (2018) critically examined the relationship between credit management, liquidity position and profitability of selected banks in Nigeria using annual data of ten banks over the period of 2006 and 2010. The results from ordinary least squares estimate found that liquidity has significant positive effect on Return on Asset (ROA).

Agbada and Osuji (2018) explored the efficacy of liquidity management and banking profitability performance in Nigeria. Profitability and Return on Capital Employed (ROCE) were adopted as proxy variables. Findings from the empirical analysis were quite robust and clearly indicated that there was a statistically significant relationship between efficient liquidity management and banking performance, and that efficient liquidity management enhances the soundness of the banks. It was discovered that liquidity and profitability are indicators of bank risk management efficiency and cushion against losses not covered by current earnings.

Javaid et al. (2016) analyzed the determinants of top ten banks' profitability in Pakistan over the period 2004 to 2008. They used the pooled ordinary least square (POLS) method to investigate the impact of assets, loans, equity, and deposits on one of the major profitability indicators of banks which is return on assets (ROA). The empirical results found strong evidence that these variables have a strong influenceon profitability. However, the results showed that higher total assets may not necessarily lead to higher profits due to diseconomies of scale. Also, higher loans contribute toward profitability but the impact is not significant. Equity and deposits have significant impact on profitability.

Imad et al. (2016) studied a balanced panel data set of Jordanian banks for the purpose of investigating the nature of the relationship between the profitability of banks and their liquidity level for ten banks over the period 2001 to 2010. Using two measures of bank's profitability: the rate of return on assets (ROA) and the rate of return on equity (ROE), the results showed that the Jordanian bank's liquidity explain a significant part of the variation in banks' profitability. High Jordanian bank profitability tends to be associated with well-capitalized banks, high lending activities, low credit risk, and the efficiency of credit management. Results also showed that the estimated effect of size did not support significant scale economies for Jordanian Banks.

The relationship between liquidity and the profitability of banks listed on the Ghanaian Stock Exchange was investigated by Lartey and Boadi (2018). The study was carried out on seven of the nine listed banks. The researchers made use of the longitudinal time dimension model. Specifically the panel method time series analysis and profitability ratios were computed from the annual financial reports of the seven banks. The trend in liquidity and profitability were determined by the use of time series analysis. It was revealed that for the period 2005 to 2010, both liquidity and profitability had a downward trend. The main liquidity ratio was regressed on the profitability ratio. The result revealed that there was a positive and statistically significant relationship between liquidity and profitability of the listed banks.

From an academic perspective, the literature on the twin concepts of liquidity and profitability is broad and varied. However, until recently, the empirical evidence within the Nigeria context had been rather scanty. In addition, some of the studies carried out on Nigeria such as Olagunji et al. (2016) made use of questionnaires. The results of such studies need to be taken with caution because of biased responses based on the position/prejudice of the respondents. Some others such as Uremadu (2017) made use of time series data with aggregate macro-economic variables of the banking system. This implies that the data were not drawn from the actual financial statements of the commercial banks. In effect, there are missing gaps in the Nigeria literature as there are few studies that have extracted data from the annual statements of deposit money banks to empirically investigate the profitability-liquidity nexus. Thus, this study will not only investigate the effect of liquidity levels on profitability of commercial banks, it will also contribute to the missing gap in the extant literature.

Methods and materials of the study

This study employed descriptive survey research design and the target population for this study covers the 24 deposit money banks in Nigeria. As such, the study adopts stratified random sampling technique to select, the sample size using five selected banks; UBA, ACCESS, ZENITH, ECO and FIRST Bank. The research study adopts data from the financial annual reports of the banks for the period of 10 years 2000-2019. It is Descriptive in nature and makes use of quantitative analysis. Our main focus is Profitability and Liquidity. To understand approximately the connection between dependent proxies of profitability and independent proxies of liquidity variables of banks, a pooled analysis will be used. This will help us find the correlation and regression between profitability (dependent variable) and liquidity (independent variable).

ROAit=β0+β1QR+β2CRi+β3LCRi+εi………………...1

QR= Quick Ratio

CR=Cash Ratio

LCR= Liquidity coverage ratio

	N	Minimum	Maximum	Mean	Std. Deviation
ROA	50	.009	.250	.06116	.076999
ROE	50	.060	1.290	.16812	.165386
QR	50	.130	1.500	1.25620	.194158
CR	50	.220	.660	.49620	.086753
LCR	50	.390	1.050	.57330	.222028
Valid N (list wise)	50				

ROEit=β0+β1QR. +β2CRi+β3LCRi+εi…………....……2

TABLE 1
This table shows the mean, standard deviation, count, minimum and maximum qualities of data.

Correlation	ROA	ROE	QR	CR	LCR
ROA	1	-.021	.073	-.312*	-.358*
ROE	-.021	1	.178	-.083	-.280*
QR	.073	.178	1	-.099	-.187
CR	.312*	-.083	-.099	1	.308*
LCR	-.358*	-.280*	-.187	.308*	1

Correlation[1] is significant at the 0.05 level (2-tailed) *TABLE 2*

a. Dependent Variable: ROA
b. Predictors: (Constant), LCR, QR, CR

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.416[a]	.173	.119	.072255

Table 3: The R square from the table is at 17.3%. This shows the level of dependence on the independent variable. The dependent variables have a strong relationship with the independent variables. The dispersion of data is at 11.9%.

Anova

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	.050	3	.017	3.215	.031[b]
Residual	.240	46	.005		
Total	.291	49			

**TABLE 4*

The significant level is 0.031; we accept H1 and reject H0. There is a significant level of relationship between Return on asset and liquidity.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	.219	.097		2.259	.029
QR	-.001	.054	-.003	-.022	.983
CR	-.198	.125	-.223	-1.584	.120
LCR	-.101	.050	-.290	-2.029	.048

TABLE 5

Likewise the ROE,

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.308[a]	.095	.036	.162388

a. Dependent Variable: ROE *TABLE 6*

b. Predictors: (Constant), LCR, QR, CR

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	.127	3	.042	1.609	.200[b]
Residual	1.213	46	.026		
Total	1.340	49			

TABLE 7

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.130	.218		.595	.554
QR	.111	.122	.131	.914	.366
CR	.019	.281	.010	.067	.947
LCR	-.193	.111	-.259	-1.731	.090

Analysis and Discussion of Results

From the table, the relationship between the variables are been shown, the cash ratio has a positive relationship with the ROE and quick ratio but has a positive relationship with ROE,Coverage ratio has a negative relationship with ROE. Cash ratio and quick ratio have a negative relationship with ROA, while the liquidity coverage ratio has a positive relationship. The R square also shows a positive relationship between dependence and the independent variable. Based on the research findings, it can be concluded that there is an effect of the liquidity management on profitability as measured by return on asset or equity (ROE or ROA), where the effect of the quick ratios on the profitability is positive when measured by ROA and ROE, and the effect of cash ratio on profitability is positive as measured by ROA.

Conclusion and Recommendation

This research aims at investigating empirically the liquidity management system on profitability of Nigerian deposit money banks, and how these banks can keep balance between liquidity and profitability. Thus, there is a need to invest the excess of liquidity available at the banks, in various aspects of investments in order to increase the banks' profitability and to get benefits from the time value of the available money, also the banks should adopt a general framework for liquidity management to assure a sufficient liquidity for executing their works efficiently.

Recommendations

Based on the critical evaluation of the findings, made in this study, we hereby make the following recommendations with the sincere conviction that they will help to reduce if not totally eradicate the problems associated with liquidity management and profitability in deposit money banks in Nigeria.

(i) Since the survival of deposit money banks depend on liquidity management and profitability, they should not solely concentrate on the profit maximization concept but also adopt measures that will ensure effective liquidity management. The measures will help to minimize or avoid cases of excessive and deficient liquidity as their effects are negative.

(ii) Instead of keeping excessive liquidity as a provision for unexpected withdrawal demands of the customers, the deposit money banks should find it reasonable to adopt other measures of meeting such requirements, which can include borrowing and discounting bill.

(iii) The deposit money banks should create a customer forum where their customers will be educated on varieties of deposits and the operational requirements of each of them. A situation where the customers operate any of the deposits as required, the deposit money banks should be able to estimate the liquidity level to be maintained.

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LANGUAGE AND SUSTAINABILITY IN A POST-COVID-19 PANDEMIC NIGERIAN ECONOMY: A CASE FOR AFFECTIVE LANGUAGE

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Abstract

This paper examines the role of language for sustainability in a post-pandemic economy. It is no longer news that coronavirus (COVID-19) has dealt a heavy blow on the global economy, and Nigeria is not an exemption Many scholars such as Ozili and Arun (2020), Altig, et.al (2020), Mckibbin and Fernaando (2020) had critically exhumed the far – reaching effects of COVID-19 on global economy, particularly, as it affected critical economic values such as national health care system, events industry, travel business, the food industry, global trade and education. Undoubtedly, major global economies have begun to shrink into recession as a result of the effects of the pandemic. Nigerian mono-economy was never spared when the crude oil price abysmally went down. Periodic intervention strategies were demonstrated by the government through the central bank, yet inflation rate was on the high side thereby making life unbearable to the lion share of the populace. All this was seen as a major economic upshot of the pandemic on the country. However, human sustainability is key both in the pandemic and post-pandemic periods in Nigeria. This paper therefore x-rays the role of language for sustainability, particularly, in a post-pandemic Nigerian economy, with a particular attention on affective language use. The study ended with a number of recommendations on how to forestall future occurrence or mitigate its effect for human sustainability and economic viability.

Key Word: Language, Sustainability, Covid-19, Pandemic, Economy.

INTRODUCTION

The world is currently viewed macroscopically as a global village. Thus, inter-dependency on one another for economic and political factors is sacrosanct. The ravaging Covid-19 brought about economic crises, even though, such crises are not alien to Nigeria economy. During the 2016 economic crises, the monetary authority in Nigeria defended the local currency from forced devaluation against the dollar, and adopted a managed-float foreign exchange system, which worked well from 2016-2019. After the 2016 economic recession, it was believed that the unexpected and sustained decline in oil price was the most important cause of economic crises in Nigeria. In the year 2020, however, no one ever thought that a public health crisis could trigger an economic crisis in the country. What made 2020 economic crisis largely different in Nigeria was that most economic agents, who could have extended a helping hand to revive the economy were unable to engage in economic activities owing to the fear of contracting Covid-19 disease. Also, economic agents did not engage in economic activities when the government imposed and enforced its social or physical distancing policy and movement lockdown in most states of the federation (Ozili, P.K.

2020). This paper therefore looks at the role of language for sustainability in a post Covid-19 pandemic economy in Nigeria.

COVID-19 in Perspective: Nigerian Experience

Coronavirus disease 2019(COVD-19), which was previously known as 2019-novel coronavirus(2019-nCoV),was first reported in Wuhan, China in December 2019. The disease evolved into a serious global emergency, leading to its declaration as a pandemic(Li et al.2020). Nigeria also experienced the direct effect of the pandemic when she recorded her index case in February 2020, with an increasing number of cases everyday, with a fatality ratio of 0.03 as at April 2020. Although the recorded cases may seem low, it was forecast that Africa would have some of the worst effects of the disease by the end of the pandemic, the prediction which did not come to fruition by Providence. The virus belongs to a family of viruses identified as coronaviruses which are known to infect vertebrates, Olusola et al (2020) quoting Yadav and saxena(2020). Being a zoonotic R N A virus, this pathogen has the potential to cause a global pandemic partly due to their unique proteins (enzyme) make-up and the plasticity of their genomes as noted by James, et al. 2020. As a RNA virus, coronaviruses can easily mutate thereby making it possible to jump from one species to the other as well as transmit from humans to humans (Woo/house et al. 2014)

Studies have shown that both symptomatic and asymptomatic infected persons are infectious and can transmit the virus to other humans (Sanche et al. 2020). The response of Nigeria to the COVID-19 outbreak is worth commending judging from the relatively low increase in the confirmed cases despite the high population densities in most urban centres. The country took a giant stride of closing all land borders like several other countries. The closure of all airports also limited drastically mobility, including local flights. The seemingly most striking step was the lockdown in some states of the federation, preventing many Nigerian working in informal sectors from travelling to work or conducting their business. The government of Nigeria consequently, made attempts to cater for the most vulnerable in the society by distributing cash and food items to over 3 million households in the country (https://iclg.com/briefing/11746-covid-19additional-palliatives-issued-by-the-federal-goevernment-of-nigeria

Confirmed COVID- cases in Nigeria by States as at October 7, 2020 (en.m.wikipedia.wiki.com)

State	Cases	Active	Recovered	Deaths
Lagos	19,776	4322	15,250	204
FCT	5765	467	5219	79
Plateau	3498	617	2848	33
Oyo	3279	716	2523	40
Edo	2634	32	2495	107
Rivers	2632	159	2414	59
Kaduna	2463	48	2375	40
Ogun	1898	137	1733	28
Delta	1803	17	1737	49
Kano	1738	9	1675	54
Ondo	1638	57	1545	36
Enugu	1289	102	1166	21
Kwara	1050	43	982	25
Ebonyi	1042	4	1008	30
Abia	898	18	872	8
Kastina	894	9	861	24
Gombe	883	111	747	25
Osun	874	51	806	17
Borno	745	4	705	36
Bauchi	704	3	687	14
Imo	577	18	547	12
Benue	481	58	413	10
Nasarawa	468	130	325	13
Bayelsa	401	7	373	21
Jigawa	325	6	308	11
Ekiti	322	4	312	6
Akwa-Ibom	294	8	278	8

Niger	261	7	242	12
Anambra	250	12	219	19
Adamawa	248	23	208	17
Sokoto	162	-	145	17
Taraba	106	11	89	6
Kebbi	93	01	84	8
Cross River	87	4	74	9
Zamfara	79	1	73	5
Yobe	76	6	62	8
Kogi	5	-	3	2
Total	59,738	7222	51403	1113

Discussion

The above table shows the state of coronavirus disease infections per state of the federation as at October, 2020 in terms of active cases, number of recovered patients, as well as deaths' rate per state. As at the time of writing this paper, there was a total of fifty nine thousand, seven hundred and thirty-eight (59738) reported cases of coronavirus infections in Nigeria, out of which seven thousand, two hundred and twenty-two (7222) were active cases; fifty one thousand four hundred and three(51403) recovered cases as well as one thousand, one hundred and thirteen (1113) deaths.

Post Covid-19 effects on Nigerian Economy

There is no denying that the pandemic has brought untold hardships on Nigeria on many spheres. It has resulted in losses of countless number of jobs, lives and businesses. The economy has also not been left unaffected. The pandemic has terribly dealt heavy blows on education, banking, aviation, agriculture, sports, transportation, hospitality and many more. Generally speaking, the coronavirus disease (Covid-19) has socio-politico-economic and religious effects on the economy. As Brito, (2020) Posits, 'coronavirus pandemic may not go away anytime soon or completely'. Also, at present, there has never been a world acclaimed 100% cure for the virus. Hence, the need to discuss some post-pandemic effects of the virus so that actions shall be promptly taken to cushion the said effects in Nigeria. The following are the unfortunate post-Covid-effects in Nigeria, as pointed out by Otache, (2020).

1. Job Losses:

Many people have lost their jobs as a result of the outbreak of COVID-19 pandemic, as many jobs are in jeopardy in the near future. Unemployment situation has been worsened in Nigeria. Before the pandemic, unemployment rate stood at 23.1 percent (CSEA, 2019): National Bureau of Statistic, 2018; NSEG, 2019). Unfortunately, owing to the pandemic, unemployment rate is expected to rise to about 33% by the end of 2020 (Obiezu, 2020). Rise in unemployment has adverse effects on the economy undoubtedly. Likely upsurge in crimes and criminal activities is potentially a possibility in the country.

2. Decline in oil revenue:

Furthermore, there is possibility of sharp decline in oil revenue. Otache, I. (2020) citing Agbaeze and Ukoha, (2018); National Bureau of Statistics, (2019), posits that Nigeria as a mono product economy tends to suffer heavily as it depends largely on export of crude oil for economic growth and development. The outbreak of coronavirus pandemic has negatively impacted on price of crude oil in the international market. For instance, Ozili, (2020) claims, the price of crude oil dropped from about $60 per barrel to less than $30 per barrel. The demand and patronage of Nigeria's crude oil has dropped drastically due to the pandemic. This unfortunate reduction has precipitated downward review of the 2020 budget, from N10.594 trillion to N10.276 trillion

3. School Closures:

The Covid-19 pandemic undoubtedly posed a huge challenge to education systems in the country. With the government's directive on physical distancing as a means of safeguarding possible contract of the disease, academic activities were suspended and most institutions' academic calendars were disrupted. The resultant effect of all this is that students would not graduate at the record time. Social vices have been on the increase as a result.

4. Death Toll:

The Coronavirus pandemic has claimed many lives across the country. As at the time of writing this paper, the death toll has risen to 1113, according to NCDC, (2020). This is a serious cause for concern considering the poor state of health facilities in the country.

5. Economic Uncertainties:

Otache, I (2020), posits that Nigeria's economy is bleak. In his words:

> *……indices of economic recession abound Prices of goods and services have skyrocketed during this pandemic. Unemployment has increased and exchange rate has become volatile. Moreover, economic activities have been greatly disrupted and the COVID-19 pandemic has no cure for now. This situation makes the economy unpredictable (Otache, I, 2020).*

In the light of all the above unfortunate circumstances, government should know how to exploit use of language for sustainable development in the post-covid-19 pandemic Nigerian economy.

Affective use of language for National Sustainability.

The affective function of language refers to the use of language to address others for peaceful co-existence and national cohesion. Therefore, in using language, the speaker is conscious of the relationship he holds with the listener including the environment in which the speech is made. Language is an affective weapon that can be exploited to maintain national security and cohesion in any nation. It depends on how it is used, whether to tear apart or to bind together. The emotive function of language shows the state of mind of the speaker. If the mind of the speaker is filled with wickedness or hatred against their interlocutor, they cannot be effective in the use of language. Thus, their use of language or choice of words will be repulsive and uncomplimentary to their listener. It therefore means that the communicator will not be able to use language to build or maintain good relationships with others.

Affective use of language depicts showing affection and love, it entails being considerate and empathetic. It can also be described as the use of language to address individual differently and satisfactorily. The prime aim in affective language is to establish the relationship between a speaker and the person they address (Eziafa, N. C &Olubunmi, A.A(2018)). The user of language is so conscious of the relationship they hold with every listener, as well as the environment they find themselves if they would not want to use language that will cause offence or disaffection. The affective language will respect the dignity, integrity and rights of the listeners and readers. The affective language is considerate and the aim of the speaker is to add values and promote peace and wellbeing of others. Affective language involves ability to tolerate others, respect and accommodate the views of others.

Considering the significance of affective language, its adoption by all and sundry, particularly, the handlers of governments communication agencies or offices in Nigeria will promote peace, unity and national socio-politico-economic sustainability. It will foster and cement relationships among the diverse tribes and peoples in this multi-cultural, multi-religious and multi-ethnic nation. It is imperative for Nigerian government to embrace and imbibe the culture of affective language use, particularly at Post-Covid-19 pandemic period when every place is volatile and every section of the country is dangerously combustible. This is appositely imperative in order to live together in a secure, peaceful and prosperous country. Provocative and inciting utterances that can plunge the entire nation into war, penury and disintegration should be avoided and passionately discouraged in all forms of communication and interaction among Nigerians, and between the government and the governed.

Conclusion

This study scholastically exhumed the global coronavirus 2019(Covid-19) pandemic in Nigeria with its adverse effect on every aspect of the national realisations. It x-rayed the latest infection records of the pandemic in the country, as released by Nigeria Centre for Disease Control (NCDC). Going forward, it chronicled the heavy blows the pandemic has dealt on Nigerian economy. The work carefully examined Post-Covid-19 effects on socio-politico-economic realities in order for the government and all other stakeholders to brace up for possible upshots. As the Post-Covid-19 effects are not possibly palatable, government should device a means to ensure the corporate existence of the Country is not threatened. Thus use of affective language is recommended to ensure peaceful co-existence in a volalite post-covid-19 period. The study dwelled much on characteristics of affective language use and its soothing effects on seemingly potentially combustible Post-Covid-19 Nigeria.

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ROLE OF LIBRARY AND INFORMATION PROFESSIONALS IN MANAGING PANDEMIC FOR SUSTAINABLE INFORMATION SERVICE

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Abstract

This paper looks at the various roles of library professionals during the pandemic situation. It also trace the number of digital platforms available for sharing immediate information to curb the spread of the COVID 19 pandemic. It highlights the use of social media /networks. The role of the Library Professionals is to trace down information material as the users requirement, serves as an information selection, organization, dissemination, of knowledge through the various information materials available in the library. Library Professionals provide E-books, information links, their commitment to user services. As a result the role of Library Professionals defines the whole community a new way of doing work and received the information remotely in the period of pandemic situation. This study also discussed challenges that face the Library Professionals and possible solutions.

Keywords: COVID 19, E-Resources, Digital Classrooms, Library.

Introduction

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Scientists, health professionals and herbalists are working day and night, tirelessly to limit COVID-19 from further infections. COVID-19 is a new strain of corona virus that has not previously been seen in humans with symptoms such as fever, cough, loss of smell, tiredness, muscle pain and mostly difficulty breathing. According to the World Health organization (WHO), cumulatively, nearly 27 million COVID-19 cases and 900 000 deaths have been reported to WHO to date. Over 1.8 million new cases and 37 000 new deaths were reported for the week ending 6 September, a 5% increase in the number of cases and a 2% decrease in the number of deaths compared to the previous week (24 to 30 August)

As scientists and health professionals search for solutions to COVID-19, Librarians have the important role of disseminating COVID-19 related information and resources to the public through various virtual media channels available to them, especially as most people may not come to the library because the library may be closed during the pandemic.

COVID-19 seems to spread from person to person by the same mechanism as other common cold or influenza viruses i.e. By face to face contact with a sneeze or cough, or from contact with secretions of people who are infected. The role of fecal oral transmission has yet to be determined in COVID-19 but was found to occur during the earlier

Severe Acute Respiratory Syndrome (SARS) outbreak. (Heymann & Shindo, 2020). The COVID-19 pandemic is rapidly spreading to countries around the globe (Lipsitch, et. al, 2020). Libraries, as a social institution, are responsible for ensuring public health awareness and the provision of up to date information to clinicians and managers. However, in the age of multiple information sources and diverse communication channels users do not always access the most valid information. Specialist in the field of infectious diseases suggest that during a pandemic virtual communication provides a good way to inform patients who are in isolation wards (Hollander & Carr, 2020). Google Trends has become a useful tool for monitoring awareness about public health at both national and international levels. It shows a relationship between topics related to COVID-19 and search volumes (Hu & et, al, 2020).

Librarians and information professionals disseminate information as often as they have access to authoritative information and resources. Information dissemination, according to Wu et al. (2016), is the transportation of information to the intended recipients while satisfying certain requirements such as delays, reliability and so forth. Stating that these requirements vary, depending upon the information being disseminated, Dhawan (2018) notes that information dissemination is a proactive information service designed to educate and inform various groups of users on social, economic and educational issues, problems, and opportunities of interest to them. It requires systematic planning, collection, organization, and storage of information for its delivery to the target.

IMPORTANT ROLES PLAY BY PROFESSIONAL LIBRARIANS DURING A PANDEMIC

1) Promote Public Health Awareness Regarding COVID-19

To succeed public health strategies, require social acceptance of measures such as school closures, remote working, home isolation, the monitoring of health symptomatic individuals using telephone or online health consultations (Heymann & Shindo, 2020). There are various topics which need to be embedded in awareness campaigns about COVID-19, for example the steps individuals can take to prevent transmission, general instructions on using masks, hand washing, and the use of sanitizers, the avoidance of handshakes and various other ways to control the spread of the virus. All librarians (public, private, specialist, and academic) have a responsibility to share evidence-based information about this epidemic.

2) In Nigeria, during the lockdown period, all people were unable to move from one place to another. The physical interface of libraries already shut down to follow the lockdown conditions but many libraries around the world offer its digital collection for the whole community for easy access. Library users who have library cards or not, can easily access and take advantage of available e resources like eBooks, e-journals, and online programs offered by different universities, Polytechnics, and colleges.

3) Support Research Teams, Researchers and Academic Faculty

Librarians can support medical staff, academics, research teams and para medical staff by drawing attention to the latest developments regarding vaccination, diagnosis kits, and relevant studies published in medical journals. All the well-known databases provide free access to articles relating to COVID-19.

4) Maintain Core Library Services for Users

During a pandemic the library must also continue support its regular users. During the recent lockdown many libraries in Pakistan have managed to provide virtual support to their users, such as provision of references, document delivery, literature searches, and systematic reviews. Some libraries have initiated online webinar and sessions to keep in touch with their users via Google Classroom, Google Hangouts, Skype, or Zoom.

TOOLS FOR REMOTE ACCESS TO CONTINUE TEACHING AND LEARNING PROCESSING

● Google Classroom (https://classroom.google.com/) Teaching and Learning Platform: An online teaching and learning platform Teacher can make online classrooms, upload teaching material, and conduct online quizzes.

● Zoom Classroom (https://www.zoom.us/) For Virtual classrooms and Video Conferencing: It is a platform for organizing meetings, interactive classrooms for teaching virtual and hybrid techniques and micro learning.

● Padlet (https://padlet.com/):it is a platform to develop the boards, documents and webpages. It is used to upload videos, record your interview, and snap your photos and text posts.

● Open Broadcaster Software (https://obsproject.com/): It is an open-source software for streaming and recording video. Video Ask by Type form (https://www.videoask.com/): Interactive Video Chat for remote face to face interactions.

● YouTube Videos: You can make your classroom channel and upload your lecture videos.

LIBRARIAN AND INFORMATION RESTRUCTURE

Today, Librarians are expected to manage digital libraries, organize digital knowledge and information and disseminate digital information owing to the fact that we are all have become a global village as a result of the internet. Pal (2013) notes that today's librarians must also acquire new psychological, praxeological, social and professional capabilities. Additionally, Sreenivasulu (2000) notes that the ultimate goal of a digital librarian is to facilitate access to information just in time to the critical wants of end users and additionally to facilitate electronic publishing. Many libraries are renovating their library's physical spaces and environments around the concept of "learning commons" (Litzenberger, 2016).

In this era of information explosion where thousands of bits of information are chunked out on daily basis, Librarians are expected to collect, organize, store and disseminate the information for consumption of the users. In the current global pandemic, there are new ways to deliver information both real and fake; it is left for librarians to sort out the real information for their users to avoid misinformation. It is expected that librarians work independently to deliver service-oriented, researcher-centered applications, instructional programmes, projects and services. Tait et al. (2016) note that the tools and resources used to supply required information and transform it into knowledge have changed, but the librarian's role has remained unchanged. Especially now, it seems necessary to re￿ect and rede￿ne the characteristics of a modern librarian that would best serve all users.

Librarians may be indispensable in the era of the information dissemination because they play a distinctive and dynamic role in providing easy access to authoritative information at the right time and disseminating to the user in appropriate formats based on local user needs. Librarians must also possess high level of security to prevent hackers from users' personal details and the type of information they accessed. Okike and Adetoro (2019) con￿rmed in their study that it is pertinent that librarians re-tool and up-skill themselves in information and communication technology to ensure secure information systems.

INTRODUCTION TO DIGITAL INTERACTIVE CLASSROOM

Library Professionals can set up a digital library by using various tools which are given below for faculty members or officers of the Institutions/organizations.

● Library Professionals can provide the details of remotely accessed software for teaching

● In this period of lockdown most organizations prefer work from home, "at this stage the concept of these types of Software is really helpful".

●Delhi Public Library working professionals are using these software's for official meetings.

● Many Library associations (Madhya Pradesh library association, Orissa library association, Bengal library association, Madras library association etc.) are organizing the webinar services through these platforms.

● Even the Governments are taking conferences through these platforms.

● Helpful in organizing the webinars/conferences, official meetings, virtual social interaction

SOME OF THE METHODS USED BY LIBRARY PROFESSIONALS FOR ACHIEVING ITS GOAL DURING PANDEMIC

Librarians have to reach user populations and their need for up-to-date relevant information. When this is done, there can be limitless access to the library and information resources by millions of users and information seekers and their optimal use. Echezona (2007) writes that by delivering high quality services, libraries and information centres have contributed immensely to ensure greater access to information resources.

Shonhe and Jain (2017) observed that publishers presently provide a wide range of e-resources that are accessible through mobile technology. Going with the study by Okiy (2010), is an example of one study that revealed that students and lecturers in learning institutions increasingly demand and prefer access to electronic sources and networked information from their respective libraries. In the quest to meet up with the needs of library users, Shonhe (2017) suggests that libraries can use various information dissemination techniques such as personalized collections, SMS/text noti cations, Quick Respond Codes (QR), online reference services, social networks, websites, mailing lists and OPACs. Below are just a sample of existing digital strategies but many new opportunities continue to be developed. Personal space/My Library is a self service platform where library users manage their personalized accounts with custom-made collections. Here users can set up and manage their pro le, preferences for searching library collections, receive alerts on reserved items, check their records, track interlibrary loan requests and renew borrowed items and document delivery requests (Saxena and Yadav, 2013; Verma and Verma, 2014). In this regards, librarians are able to send customized scanned documents, images, audio books and e-books to library users' personalized accounts. Text noti cations via the use of mobile devices can disseminate information and multimedia content such as videos, images and audio les. Librarians can use this service to alert patrons regarding the latest information on happenings around COVID 19 on how to stay safe or other related information. In a study conducted by Shonhe and Jain (2017), most respondents prefer to access library collections or resources through mobile devices. Social media are more appropriate for use on marketing information and delivering personalized information resources to groups of people or individuals. Quick response (QR) codes, two dimensional barcodes that direct users to desired websites, can be used by libraries on a certain topic or subject area. Verma and Verma (2014) noted that QR codes are akin to mobile tagging.

CHALLENGES FOR LIBRARY PROFESSIONALS DURING COVID 19

- All over the world, Library Professionals are facing different challenges which services to offer and how to handle these situations of lockdown, ranging from minimal restrictions to full closure.

- Many reputed Libraries like the National Library of India, Delhi Public Library, and other reputed libraries all over the world are affected due to lockdown conditions and it is affecting the whole community of researchers, students, scholars, readers, etc. Shutting down libraries has a tremendous impact on the communities that we serve.

- University, Polytechnic, college Libraries, & school libraries are also closed and many competitive exams, as well as academic exams, are still pending, therefore in this critical time Library Professionals can serve those students of our country, they need information through the digital platform.

- It is human nature to feel from normal to sad, stressed, confused, and scared/angry during a crisis. For Library Professionals the biggest challenge to cope up with these conditions during this lockdown & engage the whole community in a healthy environment.

- For opening the libraries for users under the government guidelines & human interest. Library services restriction or closing a library for the following social distancing principles is a difficult task.

HOW TO TACKLES THE ABOVE MENTIONED CHALLENGES BY THE LIBRARY PROFESSIONALS SOCIETY DURING COVID 19

- By following the government guidelines Library Professionals can break the chain of corona virus as well as provide the different services remotely.

- Collect the factual data & convert it into useful information that will help the whole community of different fields accurately.
- Engage the whole Community through Social media and organize the Reading Books challenge, Poster writing competitions, skill development program, etc. that have helped people to manage normal life as previously and develop skills that will help to reduce their stress during the challenging time of this pandemic.
- We are aware that Central & state governments themselves are making many decisions and applying different approaches to serve better.
- Library Professionals can publish all the information through Social Media Platforms.
- Library Professionals can provide Cloud-based Library Services, Authentication technologies: Remote Access, Electronic Resource Management System ERMs: CORAL, Discovery Services, Library Service Platform/ LibGuides /IRs, Advocating of OA resources, Marketing of Library Services through Blogs and other Social Networking tools.

ROLES OF LIBRARY PROFESSIONALS IN PANDEMIC SITUATION LIKE COVID-19

To provide the information regarding the available various digital platforms for Users

- During the lockdown period in the USA, "National Emergency Library" is developed by the Internet archive blogs which has a wide range of collection around 1.4million books on its digital library platform.
- The Library Professionals can provide various online digital platforms where users can easily access their information. These online digital platform links can be shared on organization websites as well as through social media platforms. Delhi Public Library provides the various links of the digital platform on its website.
- Library Professionals can create a new app with freely available e-contents to access different resources on a single platform.
- Assist those people who are not familiar with digital tools.

By providing the various E-Newspaper & Magazines Links

- Many leading newspaper or magazine owners now provide the facility of E-newspapers and E-magazines facilities for their users.
- Many online platforms provide the E-Newspaper & magazine facility, Paytm (https://paytm.com/) is one of them. Even many newspaper sites provide the same.
- Magzter (https://www.magzter.com/) also provides the access of leading newspapers and magazines though its digital platform.
- Paperboy (https://www.paperboy.com/) is another provider of leading newspapers and magazines though its digital platform.
- Jio App (http://apps.jio.ril.com/jiomags/) provides the facility of many famous magazines through apps.
- HdfcBank (https://www.hdfcbank.com/personal/offers-by-hdfc bank/newspapersmagazines) provides the facility of newspapers and many famous magazines.

To work as a stress buster by engaging people in productive work, healthy environment, latest updates, and inter connected with each other:

Libraries all over the world are trying to provide it services through online presence, Delhi Public Library is one of them. “We are trying to make a normalcy for them by using proper social distancing guidelines, but we should try to live with these new obstacles to offer our services in different and efficient ways. We are dealing and working on it. Library professionals are excited, challenged, and ready to learn new techniques. To resolve this kind of stuck situation, professionals are coming up with new solutions, creative ideas and ready to beat this stuck situation.”

There are various way to keep healthy and stress free in this pandemic situation:

- Follow your hobbies
- Reading Novels
- Sleep better
- Meditation
- Exercise
- Virtual social interaction.

Utilization of Social Media Platforms as a Digital Library

Library Professionals can work as a Digital Library Professionals through social media platforms. Social media is a very vast platform to share information among users.

Social Media platforms are widely popular:

- WhatsApp (https://www.whatsapp.com/)
- Instagram (https://www.instagram.com/)
- Facebook (https://www.facebook.com/)
- LinkedIn (https://www.linkedin.com/feed/)
- Telegram (https://telegram.org/) and many more

The above mentioned Social media platform can be used through the following ways:

a) WhatsApp Group/Facebook messenger group: Library Professionals can create a Social Media group on any of the following social media platforms like WhatsApp, Facebook, telegram, etc. Groups can be categories as per the need of the Institution. In this group Faculty members or Library Professionals of the institutions can share the study material & various information with the students and also can give different tasks. The faculty member can record his/her course video lectures or do a voiceover on the ppt slides and upload on any LMS or even instructors can use social media Facebook or WhatsApp or YouTube.

b) Reading Books & give Book review: It is a unique concept in which the followers of the Institution social media platform can easily participate in the book reading contest & can also give the book reviews of different books. Many libraries have started offering free online e-books which were paid before lockdown, and organizing online reading sessions. Library Professionals can set various timelines for the follower & announce the winner on a daily / weekly basis in this period of quarantine.

Library Professionals can give a book reading challenge to different followers & that followers also nominate another follower & can give the challenge to another user. The 2/4/6/8/10 Book Reading challenge is a campaign to promote Book Reading habits. It is a concept that comes from the Ice bucket challenge.

c) By organizing Poster making/Essay writing/singing through social media platforms for different age groups: It is a concept for all age group people in which participants can share their posters with his selfie & on a regular basis the Library Professionals can announce the result. Dr. Neeza Singh, Library Professionals T.S Central state Library started a poster making contest which Theme is "Life during the lockdown on the Facebook page of central state library Chandigarh. The effort is really appreciated.

d) E-Book competition: Concept is slightly the same as reading books but in this type of competition we are talking about the E-Books which is easily accessible through mobile, laptop, Computer system & many users have also used kindle & this device act as a real book.

Libraries are the most trusted place for valuable information. Many libraries are updating their websites and meet the user requirement through social media platforms that will attract more users. It is easy practice to provide various information like health advisories, health services, health centres, public service information and, COVID-19 resources. Library services need to be personal, caring, kind, and respectful.

Social Initiatives and precautions while managing the library resources.

● Delhi Public Library is planning to organize a sanitization drive for the library and also planning for cleaning the study materials in some way to prevent corona virus spread.

● Library Professionals of DPL are working as per the guidelines of the Government of India by using sanitizer, masks, and maintaining the social distancing principle while working in offices.

● After the lockdown period, Library professionals must mark the return books after the cleaning and sanitization process, the books should be placed inside the racks.

● Library users can be aware of the use of masks and this should be implemented after lockdown.

● Library staff should be given proper training for work safely during this period and provide safety measures to the users of the library in this critical situation.

Library Professionals involving in social initiatives around the world

● In Ireland, library professional's work as a volunteer and help in contact tracing.

● In Mexico, library Professionals are updating and improving the quality of Wikipedia data. ● In Toronto, Public libraries are doing community service and distributing food. Acting like a food bank.

● In Penn State University, the library is providing laptops and other electronic gadgets for students who do not have, to continue their study from home. Many libraries work as the emergency coordination centre for the needy.

● In Oregon, libraries are converting into homeless shelters.

● In Oakland, book drop boxes are being used to collect spare masks.

● In the USA, Kansas City Library has been delivering bags of books to underprivileged areas.

To Promote Free Wi-Fi Access:

● Library Professionals can provide the Wi-Fi facility for its nearby user/university students inside the campus etc. in this lockdown period for accessing the information.

EFFECTIVE UTILIZATION OF LIBRARY MANAGEMENT TOOLS

Extend checkout date of Books

● In this pandemic situation, users can't go outside their houses therefore Library Professionals can provide the platform for extending the due date of book return and also give concession in fine. User login ID and password can give flexibility to users.

● Delhi Public library provides this kind of facility for its users. In this facility, users can extend the due date up to 2 times.

● Library card expirations and issue return dates should be extended in lockdown period.

To provide digital access for information through E-format/Media

● Digital access to information can be a challenging role for library professionals. Within the COVID-19 emergency situation, to provide valuable information to its reader is the most crucial issue.

● Various platforms are providing electronic access to various journals, mostly related to health systems. It should be one of the ways for library professionals to deal with the new technologies.

● Electronic access to the users is an excellent method for time. Information should reach the users in a frequent way, like weather reports, News, stock exchange news, pollution levels and population statistics of particular areas.

● Digital access provides the ability to digitize printed material so that users can easily access it anytime from anywhere without attending a library.

To maintain and restructure information

● Traditionally, Library Professionals have managed the libraries/information resources according to the various classification systems. The whole system takes time in a physical way, so it is necessary to use the latest library software for the same.

● The storage and retrieval of information is a more complicated task in a traditional library therefore to meet the expectations of the user and to provide the information in the right time, for storing and retrieving the data or information, digital gadgets and latest technology can be used.

● Library Professionals can effectively organize and structure information available on the internet, they require more than basic ICT skills.

To work as a preservative of information

● Library Professionals should follow the well-designed standards and guidelines for the preservation and storage of print materials.

● Electronic and digital data should also preserve as per the proper guidelines.

● Library Professionals can store the library data on the cloud server which minimizes the issue of data loss problems.

● Increasing the life of print material preservation should be compulsory of rare study materials.

To develop new skill sets and train the subordinate staff members

● It is the role of the Library Professionals to organize the training sessions for subordinate staff and trained them.

● The digital environment provides an opportunity to learn various ICT skills.

● Special training programme for paraprofessional staff, when required.

● Library Professionals are developing various skill sets like organizing webinars, developing courseware, database management, staff training programme, etc.

Other Roles of Library Professionals

● Many libraries are already providing assistance for unemployed people.

● Many libraries are distributing the food to the needy.

Library Professionals is required various Skills in this pandemic situation which are given below:

● Technical skills

● Communication skills

● Marketing skills

● Managerial skills

● Information Communication Technology (ICT skills)

● Library and information handling skills

● Understanding of cultural diversity

● Lifelong Learning Skills

● Evaluation and assessment skills

● Service orientation

● Customer service

● Presentation skills

● Knowledge mapping skills

● Soft Skills and more

Findings

● Presently, Library Professionals are playing various integrated/Multiple roles beyond their traditional job. With the help of modern technologies or tools, we can provide the e-resources during the lockdown period.

● Library Professionals from around the world are now understanding the need of changing their roles from traditional practice to multidimensional roles. As a result, Library Professionals are now playing multidimensional and versatile roles to meet the demand and expectations of societies, organizations, institutions, libraries, etc. and this is the need of the present situation in Covid19.

● In a pandemic situation, Digital platform is the best way to serve the whole community.

Conclusion

In this Covid19 pandemic situation, Library Professionals have to do all the things

● Easy access to information is an essential prerequisite.

● It is necessary for the enormous needs of all its potential users.

● Digital platforms for education is the futuristic demand of the user.

● Digital Library is in more demand in this kind of pandemic situation.

● Library professionals can act as stress busters in this situation.

Library Professionals and information professionals must be ready to meet the requirement of readers whether it is for COVID 19 or any other pandemic situations. Social distancing is the only way to control the transmission of this virus COVID 19 from one person to another. The social responsibility of library professionals is to provide the information access to the users. Information demand is also increasing in this kind of pandemic situation.

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THE USE OF COMPUTER AIDED DESIGN SOFTWARE IN ARCHITECTURE AS A TOOL FOR E-LEARNING IN THE PANDEMIC: A CASE OF AKANU IBIAM FEDERAL POLYTECHNIC, UWANNA AND ABIA STATE POLYTECHNIC, ABA

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Abstract

The spread of covid-19 has led to the closure of educational institutions globally. All over the world, academic institutions have been forced to completely cancel face –to- face teaching and learning, which includes; architectural studio interactions, laboratories and classroom learning in order to stem the tide of the aggressive spread. The closure of these institutions has accelerated the development of electronic teaching and learning for those institutions that were proactive, and for those that were not, like in many institutions in Nigeria, the pandemic has brought academic activities to a screeching halt. Just like many academic activities affected, Architectural education is no exception, as the present pandemic has made it almost impossible for design classes and studio interaction to take place thereby causing serious academic setback, this is largely due to, the unique way of architectural education and the priority given to face- to-face learning in the form of, studio interactions between architectural students and mentors. It's well documented that most architectural schools and faculties in Nigeria, are yet to embrace the use of computer aided design software in their assessment of student either in preliminary juries or final juries, this is because some school of thought believes that conceptualization in student design work is negatively affected. This papers tries to compares the traditional freehand and drafting design test results and computer aided design software test results of architectural students of Akanu Ibiam federal polytechnic Uwanna. This paper concludes that with proper supervision, the level of proficiency will not be negatively affected, as the present pandemic has made face- to face teaching and learning impossible and computer aided design software has offered a way out, as it can be applied electronically and virtually unlike the traditional freehand sketching and drafting design technique which encourages *face- to face teaching and learning.*

Keywords: Architectural Education, CADD.

1.1 INTRODUCTION

The architectural world has long been designing, and the tools have significantly advanced over the years from auto cad to Revit to 3d printing. Computing in architecture has posed new challenges since its early beginning it has changed the working methods in architectural profession and Education (Benton, 2007), and the pandemic has sped up the transition process. One of the skills which is increasingly seen as important for dealing with these issues is the ability to be creative in seeking digital solution to design problems (Musta'amal, Norman, Rosmin, & Buntat, 2014). Architectural practice, like any other endeavor in contemporary world is wholly embedded in computer and its application. Computer aided design and drafting (CADD) is the most employed computer application in the architectural profession for drawing production and construction job administration. The technology has enhanced how to facilitate various users' needs in designing activities including sketching tools in two dimensions (2D) and three dimensions (3D). (Musta'amal, Norman, Rosmin, & Buntat, 2014). CADD tools are used by architectural firms and they greatly help in the production of drawing from inception to completion (Sadar, 2008). (Spendlove & Hopper, 2004) Suggested that CAAD should be seen as a set of tools, which can be adopted and appropriated within the broad creative process.

Global trends and improvements in computer technology have made the production of CAAD proficient graduates feasible and imminent even within the spheres of creativity and functionality (Ogunsote, Prucnal-Ogunsote, & Umaru, 2007). CAAD software is now well established and commonly used in the design process. Consequently, it has also been introduced in design education worldwide (Hatib, Amal, Hodgson, & Norman, 2008) However, in architectural education, most faculties and schools of architecture in Nigeria, restricts students from using CADD in there studio design program at any level, while very few architectural schools and faculties allow student in the third and fourth year of their architectural education, to use both traditional method of freehand sketching and drafting and computer aided design method.

The current situation in academic institution across the country occasioned by the pandemic has made studio interaction impossible and CADD is the solution. The major advantage of this method, in respect to the pandemic is that CADD designs can be easily shared between, students, supervisors and studio mentors on academic interactive platforms like the e-mail and goggle classroom and students can apply computer aided designs in practice of the profession, out of school, were traditional freehand sketching and drafting design method is becoming obsolete. Some professional in the architectural field have even predicted that in the coming years, drafting boards and sketch pads would be replaced by computer in offices and gradually schools (Benton, 2007).CADD offers the means of evolving designs ideas in three a dimensional(3D) space that addresses all designs issues that would have otherwise been ignored in two dimensional drawing on a sheet (Batchway, Abanyie, & Afram, 2015).CADD tools enable the architect to better understand the various component of the project, it's structural integrity, heating ,ventilation and air conditioning, analyzing the environmental performance of the building and performing real-life simulation in virtual reality systems. This is why (Utterback, 2006) posits that CADD causes designers to focus on details instead of under laying principle, and that it concentrates on the essentials rather than the bells and whistles.

1.2 .WHAT IS CADD?

(Curls., 1999.) , Defines CADD as the use of computer in the design and representation of complicated three dimensional forms, which can be easily stored and manipulated. Images can be printed, architectural projections can be produced, and interiors can be explored in virtual reality, details can be stored for reuse, thus avoiding the drudgery of repetitive handmade drawings. Computer aided design (CADD) is a software that is use by architects, engineers drafters, artist and many others to create precision drawing or technical illustrations. CADD software can be used to create two dimensional (2-D) drawings or three dimensional (3-D) models.

2.1. ACADEMIC CURRICULUM AND STATE OF CAAD EDUACTION IN AIFPU.

CADD was introduced from the inception of the department in 2010/2011 session and the department can boast of a well-equipped CADD studio with a state of the art table top, core i.5 computer, numbering over 90,with associated hardware and software. The CADD software used in the department and common in architectural practice is AutoCAD developed by auto desk and archicad developed by graphisoft, Atlantis studio is used for rendering in the HND classes, auto-cad release 14, archicad 19 and Atlantis studio 5 are currently taught in the department. Architecture students are taught auto-cad two dimension in the second semester first year and in the first semester second year, and in the second semester second year, they are taught auto-cad three dimension. This exposes and encourages them, to learn the skill, but unfortunately its level of penetration in design education is restricted, because the use of CADD tools in design by first and second year student in AIFPU is restricted.

2.2. METHODOLOGY

A quantitative approach was used to sample opinion of students in the department of architectural technology AIFPU, and the department of Architecture Abia state polytechnic, through the use of electronic structured questionnaires .The opinions of one hundred students (100) were sought on the awareness of online information sharing and learning on academic platforms, this is to ascertain the possibility of holding, design studio classes and presentation online without face to face interaction. The results for both computer aided drawing and traditional freehand sketching and drafting were ascertained and compared, also through unstructured interviews, opinions of CAAD tutors in the department were sought concerning the state of CAAD in the department. The data collected were categorized under primary and secondary source.

2.3. FINDINGS AND DISCUSSION

A format of an electronic questionnaire was forwarded to students in the department of architectural technology, and Abia state polytechnic, on their various online learning platforms, from NDI to HNDII. The number of students in each studio was used to determine, the percentage of response or returned questionnaire, which in this case amounts to 93%.Students are allowed to use CAAD in varying degree, but the focus of this study, are students in the HNDII studio who are allowed to design using any of AutoCAD, achicad or Revit architecture design software and whose, CAAD software design result are available or can be provided by the student.

Student awareness of CAAD curriculum in the department is generally high at 97%, (figure 1) and also student awareness of online information sharing and learning on academic platform is also high at 94% (figure 2),students questioned confirmed the existence of CAAD curriculum and an online information sharing and learning academic platform. Moreover,85% of the students said they belong to an online academic platform and 9% said they are aware of the online academic platform but do not have the necessary gadget to go online,6% said they are neither aware nor do they have the necessary gadget to go online (figure 3). However, when asked if they have used the online academic platform of the department to share their works, views and ideas in design done with CAAD software, with their mentors, studio coordinators or supervisors, 23% agreed that they have once shared their design done with CAAD with their colleagues, mentors, studio coordinators and supervisors. Expectedly, this percentage was found out to be mostly students in HNDII, who are at liberty ,in the first semester HNDII to present their design in CAAD and traditional freehand sketching and drafting technique, whilst 19% said they have shared CAAD designs on class social platforms and these were designs that were not actually departmental work schemes and presentation, whilst 58% said they have never shared their CAAD designs on online information sharing and learning platforms or class social platforms.(figure 4).

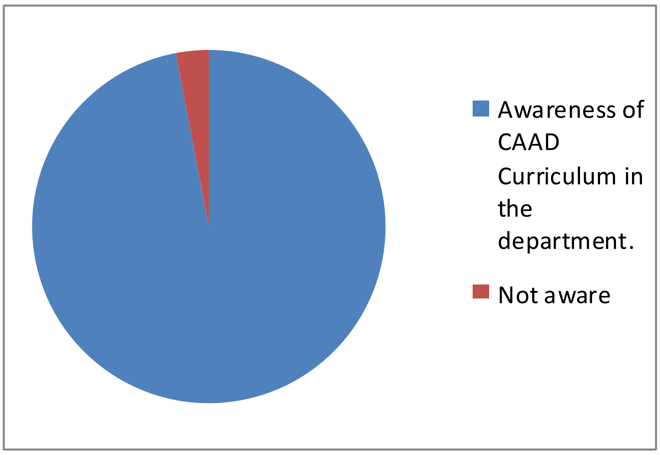

Fig.1: shows the percentage of student's awareness of CAAD curriculum in the department.

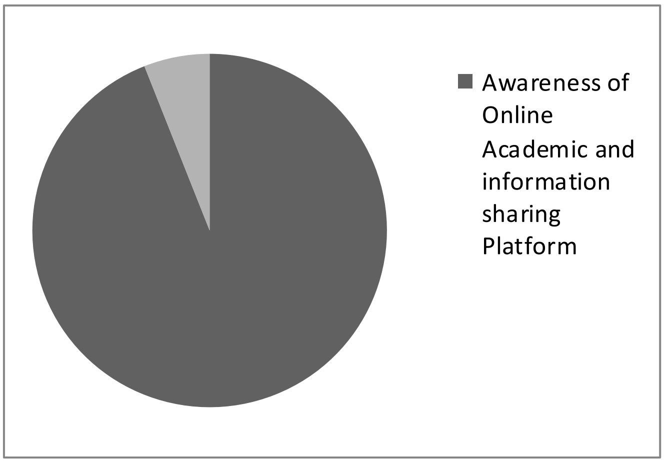

Fig.2: shows the percentage of students that are aware of online academic teaching and learning platform.

Figure 5, are students who were questioned, on the possession of a personal computers, 67% of the students in the department had personal computers, while 8% said they shared with someone, 17 percent said they had personal computers which is not functional, but have intentions to fix it, while 8% said they do not have a personal computer even though, they consider it necessary.

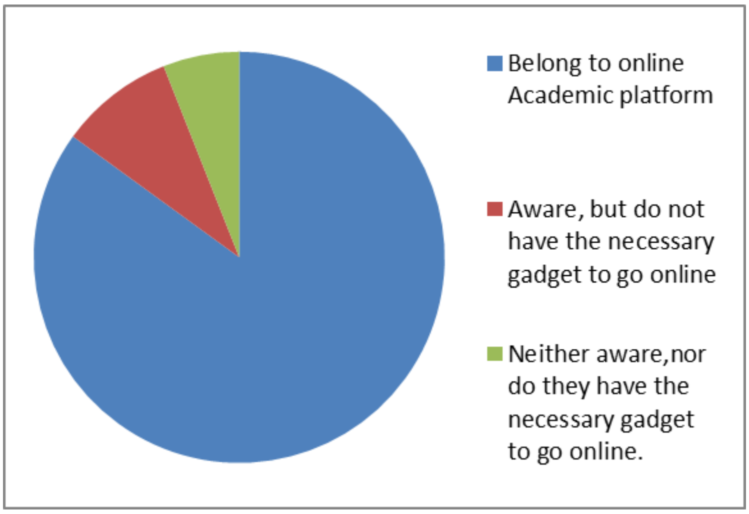

Fig 3: Shows the percentage of students that belong to an online academic teaching and learning and information sharing platform.

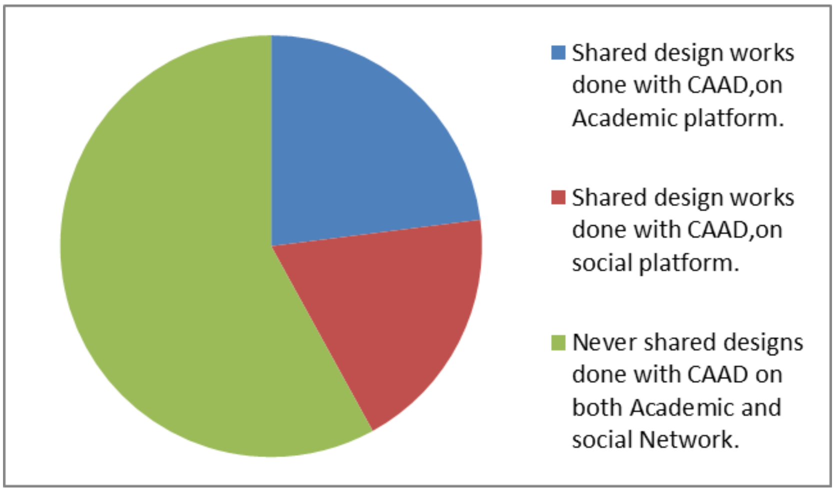

Figure 4: shows the percentage of students that have once shared their works on academic platforms.

Based on the above parameters, students views were solicited on how the CAAD curriculum should be restructured in the present pandemic to include online information, learning and sharing academic platforms to incorporate CAAD at all levels, in respect to designing with CAAD or whether the CAAD curriculum should be maintained as it is, 95% called for the CAAD curriculum to be restructured in the present pandemic to include online academic sharing and learning platform for all levels since face to face studio discussion is no more feasible, whilst 5% called for CAAD curriculum to be maintained as it is (figure 6).

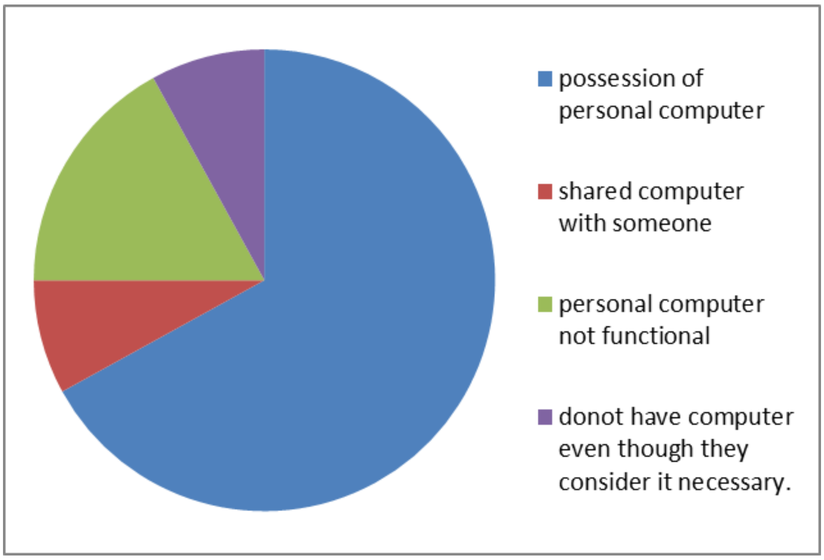

Figure 5: shows the percentage of students with personal computers.

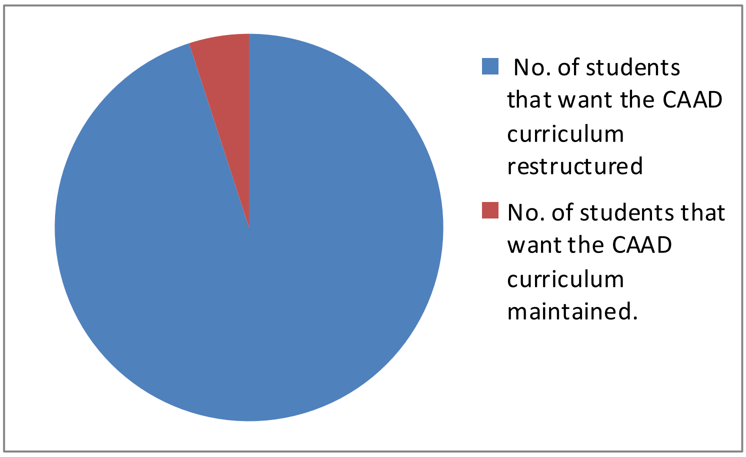

Figure 6: shows the percentage of student that wants the CAAD curriculum to be changed to include online teaching and learning.

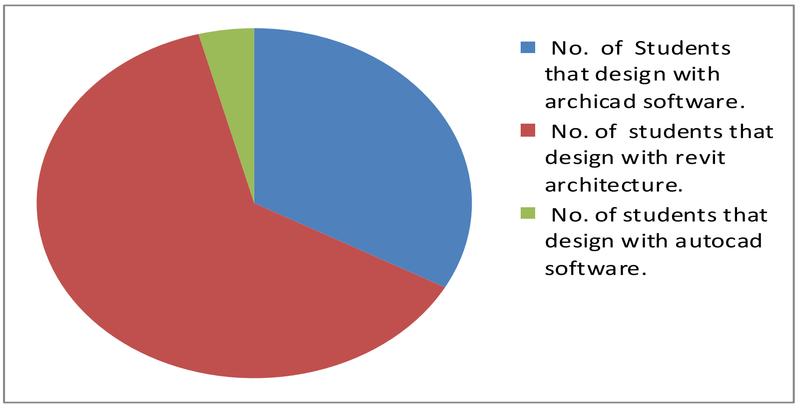

Figure 7: shows the percentage of student with designing with different software.

Figure 7, were students questioned on the CAAD software they employ and prefer in their design,97% of the students of the students questioned used CAAD software in their design, but different softwares.32% of the students use archicad, whilst the most prevalent software used in the department by the student is Revit architecture, of which 61% of the students use. Only 4% of the student use AutoCAD in their CAAD design. They were further asked to state their preference and level of proficiency

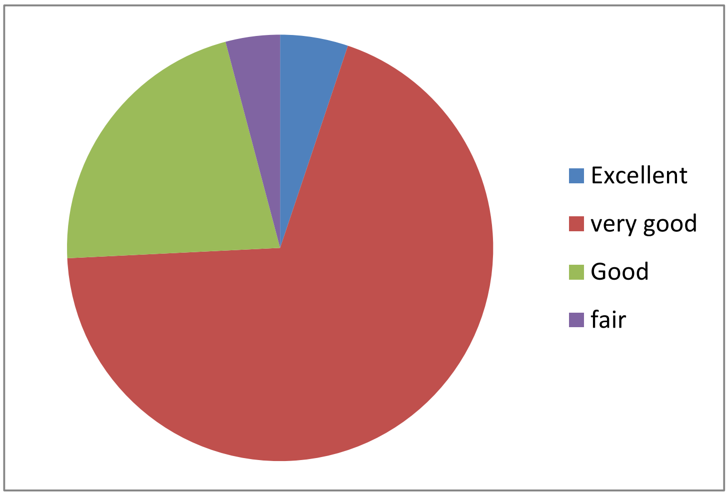

Figure 8: shows the proficiency level of student in CAAD usage.

labeled 1-5,5= excellent,4= very good,3=good,2=fair,1=poor,5% said they were excellent in CAAD usage, while 67% said they were very good,21% said they were good and 4% said they were fair, none of the student had a poor proficiency level in CAAD software application (figure 8). Figure 9, shows the result when students were asked to provide their CAAD results and their traditional freehand sketching and drafting result, but since 20% of the CAAD result is added to the overall design result, the CAAD result was graded as follows; 15-20=A, 14=AB, 13=B, 12=BC, 11=C, 10=CD, 9=D, 8=E, 0-7=F. This conforms to the design grade format and allows for easy comparability in both schools. Table and table shows the assessment model of the traditional freehand sketching and drafting and that of the computer aided design

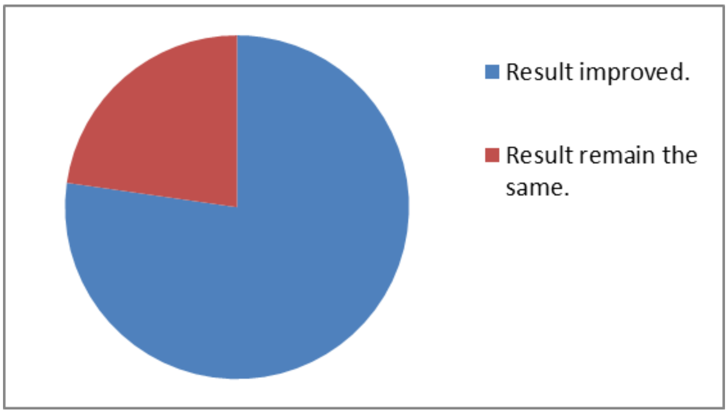

Figure 9: Compares the traditional freehand sketching and drafting result with the CAAD result.

The result shows that 85% of the students questioned had almost the same grade or improved grade, say from AB-A whilst 25% of the student grade remained completely the same, no respondent recorded a poorer result, which goes to show that CAAD does not impede or negatively impact, on the level of proficiency in the overall design result and the level of proficiency in design of students remains the same or even improve by the application of CAAD software.

2.4. SUMMARY OF FINDINGS

The primary focus of this research is to determine if CAAD tools impede, or negatively impact student design performance and how CAAD tools can be applied to online architectural education in the department of architecture, AIFPU and other schools of architecture in the present pandemic. It has been stated earlier, that in the department of architecture, AIFPU, the method of architectural design involves the combination of traditional method of freehand sketching and drafting, which involves the use of tee square on drawing boards, paper and modern method of design education involving CAAD tools. Based on the research conducted the following findings are summarized;

1.It was realized that the level of application and integration of CAAD in architectural design education is low, compared to internationally recognized departments of architecture, this is why transition from face to face teaching and learning to online architectural design education is difficult, because student of architecture in NDI to HNDI are taught CAAD in varying degrees but cannot apply same in their studio programs and are expected to use the skills learnt from NDI to HNDI in their first semester HNDII were they will be assessed. Unfortunately most students forget this skill during this period because there is no in depth teaching and skill acquired cannot be applied in design studio programs for assessment. Although most student do not rely solely on the departmental CAAD programs as they tend to improve their CAAD proficiency level during their six months and one year industrial training sandwiched in between their studies, this is evident because out of the hundred respondent with varying level of proficiency in different CAAD software none of the students relied solely on the departmental CAAD programs to improve their proficiency, but a combination of self –taught and the application of the CAAD software in industrial training.

2. It’s evident that there was no proactive measure or forethought to include online teaching and learning in the CAAD curriculum of AIFPU to facilitate the smooth transition from face to face studio mentorship and supervision to the use of CAAD in online studio mentoring and supervision for architectural education in the present pandemic. Students were not guided to apply their CAAD skills to online teaching and learning and how to share their designs in academic teaching and learning platform. The varied levels of participation of architectural students in online learning and the application of CAAD skills in architectural education, shows that online architectural education is feasible, with the right electronic tools and that students are able to transfer their CAAD skills if guided to facilitate online architectural education. This can be seen in the awareness of students in the online academic teaching and learning platforms and also the information sharing platforms, which stood at 94% and it can also be seen, in the 23% that agreed that they have once shared their works, views and ideas, in designs done with CAAD with colleagues, studio mentors and supervisors. Moreover, 97% are aware of the CAAD curriculum taught in the department, 95% called for the CAAD curriculum to be re-structured to include online teaching and learning and information sharing techniques on academic platforms, which will overtime improve the teaching and learning of CAAD and facilitate online architectural education and studio experience in the present pandemic.

2.5. CONCLUSION

Findings reveal that, CAAD does not impede or negative impact student’s studio design performance in departments of architecture, AIFPU and Abia state polytechnic. CAAD can be applied to a very large extent on online architectural education and studio mentorship and supervision in the face of the prevalent pandemic. Moreover with student’s awareness of various online academic learning and teaching platform and many social platform which can also be used as academic platforms with strict guidelines, online architectural education is not impossible and should not be seen as mirage. Though CAAD is encourage by the department but it’s integration in architectural education and its application in online design education is still very low, due to the fact that assessment does not cut across all level, resulting in very little interest in CAAD and the application of CAAD in online architectural education is not streamlined and organized.

2.6. RECOMMENDATIONS

In order to generate interest in CAAD in students, assessment of design done with CAAD should cut across all levels from NDI-HNDII. 20% or more of the overall design score should be allocated to the design done with CAAD as applicable in the HNDII first semester.

The present pandemic has made face to face studio interaction, supervision and mentorship almost impossible and traditional method of sketching and drafting is becoming less and less applicable. Various forms of interactive education system such as video tutorial as seen in popular zoom app, electronic handbooks in PDF formats and other formats should be encouraged in the teaching and learning of architectural design. The purchase of online learning equipment like the electronic smart board to augment the already existing well equipped CAAD laboratory to enhance online architectural teaching and learning and facilitate the much needed studio experience. Also CAAD laboratory should be designed to create a conducive for teaching and learning of CAAD. Collaborative learning of CAAD software should be prioritized using the work sets and work sharing capabilities of Revit architecture where individuals that are in groups of two, collaborate in a particular project using work sets. This will create team work which is very important in the practice of architectural profession and evoke parallel processing of CAAD application to arrive at an end product. It order to make less proficient students (that is, those student who fall under the fair and good category) to be at par with the more proficient student (that is, those students who fall under the very good and excellent category), the less proficient students should be paired with the more proficient ones. Furthermore, since many student students use Revit architecture it should be taught in the department, since it has work sharing and work set capabilities.

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IN VITRO ANTIOXIDANT ALPHA-AMYLASE AND ALPHA GLUCOSIDASE INHIBITORY PROPERTIES OF ETHANOL EXTRACT OF *PHYSALIS ANGULATA L.*

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Abstract

This study reports the α-amylase, α-glucosidase, and antioxidant properties of the ethanol leaf extract of Physalis angulata. The Folin-Ciocalteu reagent and $AlCl_3$ were used to estimate the Total flavonoid and Total phenol contents of the extract. The radical scavenging properties of varying concentrations of the extract (25-100 µg/ml) were evaluated; using in vitro assays to assess the antioxidant properties against 2, 2-diphenyl-1-picryl hydrazyl (DPPH), ABTS and lipid peroxidation. α-amylase and α-glucosidase inhibitory activities of the extract were also investigated using standard protocols. The extract displayed concentration-dependent repression of the investigated parameters. Extracts manifested marked ($P \leq 0.05$) inhibitory effects against α-amylase with 81.15 ± 0.1556 % (IC_{50} 23.88 µg/ml), α-glucosidase with 77.73 ± 0.0721% (IC_{50} 41.74 µg/ml), DPPH with 70.34 ± 0.4908 % (IC_{50} 58.12 µg/ml), lipid peroxidation with 78.30 ± 0.0970 (IC_{50} 58.78 µg/ml) and ABTS with 81.29 ± 0.2433 (IC_{50} 46.34 µg/ml), with maximum inhibitory concentration of 100 µg/ml respectively. TPC was 28.93 ± 0.115 GAE/g d.w. while the TFC was 25.98 ± 0.09 mg Quercetin equivalent/g of extract. These outcomes showed that the extract of P. angulata could be used for the development of α-amylase and α-glucosidase inhibitors with high antioxidant activities.

Keywords: α-amylase, α-glucosidase, antioxidant, Lipid peroxidation

1.0. INTRODUCTION

Diabetes is a complex and chronic disorder that modifies the metabolism of proteins, carbohydrates, and fat arising from insulin insufficiency in the body and/or establishment of resistance to insulin (WHO 2012; Oyedemi *et al*., 2011). Consequently, there is an elevation of blood glucose level (hyperglycemia) which predisposes to a variety of health maladies and complications such as heart diseases, kidney diseases, blindness, stroke (WHO, 2012).

The severity of the metabolic malady has skyrocketed substantially over the last three decades and gauged to reach 439 million among adult patients by 2030 (Shaw *et al*., 2010).

Oxidative stress has been reported to play a significant role in the pathophysiology of diabetes and its associated complications such as heart diseases, neurodegenerative diseases, and kidney diseases. The inhibition of alpha-amylase and alpha-glucosidase, which are key enzymes involved in the breakdown of carbohydrates, is an important therapeutic approach for reducing postprandial hyperglycaemia (Shobana *et al*., 2009). The search for potent antioxidants, α-amylase, and α-glucosidase inhibitors from plant extracts has been one of the strategies used in the discovery of antidiabetic drugs. Several synthetic drugs such as acarbose, voglibose are widely used as inhibitors of these enzymes in patients with Type 2 diabetes (Yee and Fong, 1996). Concerns have been raised over the use of synthetic antioxidants, α-amylase, and α-glucosidase to combat progressive hyperglycaemia and oxidative stress associated maladies due to their attendant side effects (Tahrani *et al*., 2010; Lobo *et al*., 2010). Therefore, endeavours have been enthralled to diminish the side effects of these synthetic drugs and to find natural and safer antioxidants, α-amylase, and α-glucosidase inhibitors.

Therapeutic plants are being used and are contemplated as prospective sources of drugs and/or as sources of lead compounds in drug development (Lulekal *et al*., 2013). Plants are used in managing diabetes and its associated complications, due to their active components such as phenols and flavonoids with strong antioxidant qualities (Allouche *et al*., 2004).

Physalis angulata is an herbaceous annual plant belonging to the Solanaceae family. It is commonly called varying names such as camapu; cut leaf groundcherry; wild tomato, Mullica, winter cherry, etc. In Southwest Nigeria, it is commonly called Koropo. According to previous studies, the plant possesses anti-mycobacterial, anti-cancerous, anti-tumorous, anticoagulant, hypotensive properties and used as immune-stimulant (Krishna *et al*, 2014; Januário *et al*., 2002; Pietro *et al*, 2000).

Hence, this study sought to investigate the in vitro inhibitory ability of the ethanol extract of *Physalis angulata* leaves on α-amylase and α -glucosidase activities as well as to assess their antioxidant property.

2.0 METHODOLOGY

2.1 COLLECTION, IDENTIFICATION, AND PREPARATION OF PLANT

Leaves of *Physalis angulata* were freshly harvested from a garden in Pahayi Ilaro, Ogun State, South West, Nigeria ($6^0$53’41’’N $2^0$59’31’’ E). February 22, 2019. Authentication was done by Dr. Nodza George with plant identification no LUT: 8242.

Leaves were thoroughly rinsed and dried at room temperature for 15 days. Dried samples were smoothly pulverized into a fine powder using a Master chef electric blender Model MC-BL 1644 and preserved in an air-tight container and kept in a refrigerator until use.

2.2. EXTRACTION

Dried powdered plant material (100 g) was macerated in 1 litre of 70% ethanol in a clean 5 L capacity round bottom flask and the closure was sealed with aluminum foil, then kept at 37 ^{0}C for 72 hours (for thorough extraction). After the extraction, the extract was filtered through a Whatman's filter paper No. 1 (125 mm) and funnel. The ethanol extract (filtrate) obtained was kept in a sterile bottle and freeze-dried.

2.3. PHYTOCHEMICAL SCREENING

Phytochemical screening was carried out on the extract using standard procedures as described by Edeoga *et al*. (2005), Sofowara (1993), and Harborne (1973).

2.3.1 Total phenol estimation

Folin- Ciocalteu reagent (0.5 N) was added to 0.5 ml of the extract taken from 0.5% of the extract. The resulting solution was mixed thoroughly and kept on the bench for 15 minutes. Sodium carbonate solution (2.5 ml of 7.5% w/v) was subsequently added and incubated at room temperature for 30 minutes. The absorbance of the mixture was read at 760 nm. Total phenol content was denoted as gallic acid equivalent (GAE) (mg/g of dry mass) (Singleton et al., 1999).

2.3.2. Total flavonoid estimation

Total flavonoid concentration was carried out according to the procedure stated by Formagio *et al*. (2014) with modifications. A solution containing 1 ml of sample solution (100 µg/ml), 0.2 ml of 1 M potassium acetate, 3 ml of methanol, 0.2 ml of 10% Aluminum chloride, and 5.6 ml of distilled water was prepared. The resulting solution was kept at room temperature for 30 minutes. The absorbance of the reaction mixture was read at 415 nm. Varying concentrations of quercetin in methanol was prepared and was used to plot a calibration curve from which the total flavonoid concentration was evaluated. The result was expressed in mg quercetin equivalent per gram dry weight extract.

2.4. DPPH radical scavenging activity assay

DPPH radical scavenging activity of the extract was carried out according to Clarke *et al*. (2013), with some slight modification. Varying concentrations (25, 50, 75, 100 µg/ ml) was prepared in 95 % ethanol. An aliquot of 0.5 ml of the prepared concentrations was mixed with 2.0 ml reagent solution made up of 0.004 g of DPPH in 100 ml methanol. DPPH solution was used as the control while methanol was utilized as the blank. The mixture was vigorously shaken and left to incubate at 37 ^{0}C for 30 minutes. The decrease in absorbance of test mixture caused by the reduction of DPPH free radicals was read at 517 nm. The DPPH radical inhibitory effect was evaluated using the expression: % inhibition = [A0-A1] x 100/A_0

Where A_0 is the absorption of the blank sample and A_1 is the absorption of the extract

2.5. Lipid Peroxidation Assay

This was carried out utilizing the protocol described by Murdiffin *et al*. (2017) with slight modifications. A 1 ml volume reaction mixture was prepared by mixing Tris−HCl buffer (20 mM pH 7.0, 0.1 ml), $FeCl_2$ (2 mM, 0.1ml), ascorbic acid (10 mM, 0.1 ml), and 0.5 ml plant extract (25−100 µg/ml). This was subsequently accompanied by incubation at room temperature for 1 hour. The solution was mixed with TBA-TCA (2 mL) reagent and placed in a hot water bath for 15 minutes. Immediately after removal, the solution was cooled and centrifuged at 10,000 g for 5 minutes to remove the flocculent precipitate. Lipid peroxidation in the supernatant fraction was measured as malondialdehyde (MDA) spectrophotometrically at 535 nm. Ascorbic acid was used as a standard.

% inhibition = 100 [($A_{Control}$ - A_{sample}) / $A_{control}$]

Asample : sample absorbance

Acontrol: control absorbance

2.6. ABTS Radical Scavenging Assay

ABTS Radical Scavenging Assay was carried out according to the method described by Arnao *et al*. (2001) with slight modification.

ABTS (7 mM) and potassium persulfate 2.45 nM were reacted to produce the ABTS cation radical which was immediately stored in a dark chamber at 37 ^{0}C for 12 hours before use. An absorbance of 0.700 at 734 nm was obtained by diluting the ABTS with methanol. Diluted ABTS solution (4 mL) was added to 5 ɰl of plant extract, mixed and the absorbance was read at 30 nm against a blank. The experiments were repeated thrice. Percentage inhibition of absorbance at 734 nm was calculated using the formula

$$\text{ABTS scavenging effect \%} = \frac{(AB-AA)}{AB} \times 100$$

Where AB is the absorbance of ABTS radical + ethanol

Where AA is the absorbance of ABTS radical + sample extract

2.7. Inhibitory Activity of A-Amylase on *P. Angulata*

The activity of the extract against α-Amylase was performed utilizing the chromogenic method described by Ali *et al* (2006). 20 mg/mL concentration of the plant extract was prepared and 120 µL of the solution was pipetted in DMSO. It was mixed with 480 µL of water and 0.5 % w/v (1.2 mL) soluble potato starch. The whole mixture was suspended in a phosphate buffer (20 mM) pH 6.9 containing 6.7 mM NaCl in a test tube.

An enzyme solution (600 µL) was added to start the reaction at 0 minutes. Immediately after 3 minutes, 600 µL of the solution was pipetted into different test tubes containing DNSA reagent (300 µL) and transferred to a boiling water bath (85 ^{0}C) and left for 15 minutes. After the incubation period, the mixture in the tubes was mixed with distilled water (2.7 mL) and the absorbance was recorded at 540 nm (Shimadzu UV-160 spectrophotometer, Japan).

Afterward, the reaction mixture in each tube was diluted with 2.7 mL distilled water, and the absorbance measured at 540 nm (Shimadzu UV-160 spectrophotometer, Kyoto, Japan).

The test was repeated for 40, 60, 80, and 1000 mg/mL of the extract to evaluate the inhibitory effect of different concentrations. For each test concentration, 600 µL in distilled water was used to replace the enzyme solution and served as blank incubations at the start of the reaction.

For the control incubations, 120 µL DMSO was used to replace the plant extract similarly. The experiments were run in triplicate. Net absorbance (A) was calculated as:

A540 nm *P. angulata* = A540 nm Test – 540 nm Blank from the value obtained the percentage (w/v) of maltose generated was calculated from the equation obtained from the maltose standard calibration curve (0-0.1% w/v maltose).

Inhibition (%) was calculated as: % inhibition = 100% reaction (at t=3 min) Where, % reaction = Mean maltose in sample × 100/ Mean maltose in control.

2.8. Alpha-Glucosidase Inhibition Assay

The effect of ethanolic extract of *P. angulata* on rat intestinal α-glucosidase activity was assayed according to the method of Matsui *et al.* (2001) with slight modifications.

Different concentrations of the extract was incubated with 0.5 mg of α-glucosidase enzyme just before the reaction was initiated with Maltose (6 mM) and sucrose (45 mM) substrates, to make up a final reaction mixture of phosphate buffer (1 mL of 0.1 M) at pH 7.2.

The solution was subsequently incubated for 20 minutes and 25 minutes at room temperature for both substrates respectively. Tris base (1 mL) was added to the final solution to stop the reaction. Glucose release from maltose and sucrose was monitored to determine the α-glucosidase activity using the glucose oxidase method.

Enzyme inhibition data were expressed as IC_{50} values (The concentration of *P. angulata* required to inhibit 50% of α-glucosidase activity).

2.9. Statistical Analysis

The experimental data obtained were expressed as Mean ± S.E.M.The difference between the extract and standard was compared using one-way Analysis of Variance (ANOVA) followed by Duncan multiple range test using the SPSS Software Version 20. $P<0.05$ was considered statistically significant. The IC_{50} values were calculated using Microsoft Excel version 2016.

3.0 RESULTS

3.1. Phytochemical Constituents Of ethanol *P.angulata Leaves* Extract

The phytochemical analysis of the extract of Ethanolic *P.angulata* leaves for steroid, glycosides, flavonoid, alkaloid, phenolic, tannin, terpenoid, and phlobatannin. The result of the phytochemical screening for active substances is shown in Table 1 below. The major phytochemicals present in *P. angulata* leaf extract include glycosides, tannins, flavonoids, and alkaloids terpenoids, phenols, steroids, and but phlobatannin was absent.

Table 1: Qualitative Phytochemical Screening on alcoholic leaves Extract of *P.angulata*.

S/N	Phytochemical	Extract
1	Tannins	+
2	Phlobatanins	-
3	Saponin	+
4	Flavonoids	+
5	Steroids	+
6	Terpenoids	+
7	Glycosides	+
8	Alkaloids	+
9	Phenols	+

+ = Present, - = Absent

Table 2: Phenol and Flavonoid contents of ethanolic *P.angulata* Leaves Extract

Equivalents per g dry weight of extract (mg/g)	
Total Phenol content (Gallic acid)	Total Flavonoid content (Quercetin)
28.93 ± 0.115	25.98 ± 0.09
P <0.05	P < 0.05

Table 3: DPPH radical scavenging activities of ethanolic *P.angulata* leaves extract

Concentration (µg/ml)	**Percentage Inhibition**	
	Ethanol Extract	Ascorbic acid
25	35.31 ± 0.7465	45.13 ± 0.2875
50	47.18 ± 0.5667	56.66 ± 0.5644
75	55.08 ± 0.4879	70.51 ± 0.2829
100	70.34 ± 0.4908	89.83 ± 0.2051
IC_{50}	58.12	36.18

Values are expressed as percentage mean ± SEM. N=3, extract was compared with ascorbic acid standard at $P \leq 0.05$

The extract and the standard showed a dose-dependent inhibitory effect on DPPH radicals. The percentage inhibition increased significantly with an increase in the dose. *P. angulata* extract exhibited a remarkable DPPH inhibitory upshot with an IC_{50} of 58.12 µg/ml in contrast with the standard with an IC_{50} of 36.18 µg/ml. Not much significant difference exist between the IC_{50} of both the extract and the standard, which indicates that the extract has a significant DPPH radical scavenging ability at $P \leq 0.05$.

Table 4: Lipid peroxidation inhibitory activities of alcoholic *P. angulata* leaves extract

Concentration(µg/ml)	**Percentage Inhibition**	
	Ethanol extract	Ascorbic acid
25	30.77 ± 0.1934	45.36 ± 0.2256
50	39.47 ± 0.2322	56.95 ± 0.1481
75	76.52 ± 1.5812	75.86 ± 0.2467
100	78.30 ± 0.0970	85.20 ± 0.1650
IC_{50} (µg/ml)	58.78	33.89

Values are expressed as mean± SEM of the three replicates, the plant extract was compared with control at P≤0.05.

A dose-dependent increase in the lipid peroxidation inhibitory effect of the extract and standard was observed in this experiment. At 75 µg/ml, both extract (76.52 ± 1.5812 and standard (75.86 ± 0.2467) demonstrated remarkable (P≤0.05) inhibitory activity against lipid peroxidation. From the calculated IC_{50} values, the extract demonstrated significantly high lipid peroxidation inhibitory activity at P≤0.05.

Table 5: ABTS radical scavenging activity of ethanolic *Physalis angulata* leaves extract

Concentration (µg/ml)	PERCENTAGE INHIBITION	
	Ethanol extract	Ascorbic acid
25	37.74 ± 0.3175	64.02 ± 0.2109
50	57.33 ± 0.2079	66.09 ± 0.1178
75	57.45 ± 0.1833	73.12 ± 0.2109
100	81.29 ± 0.2433	85.23 ± 0.1877
IC_{50} (µg/ml)	46.34	15.78

Values are expressed as mean± SEM. N=3, Plant extract was compared with control at P≤0.05

From the results obtained in this experiment, a dose-dependent increase in the inhibitory activity against ABTS radical was also obtained. The high concentration of the extract and standard produces high inhibitory activities against ABTS radical. At 100 µg/ml, the extract (81.29 ± 0.2433) and Ascorbic acid standard (85.23 ± 0.1877) demonstrated significantly (P≤0.05) high ABTS radical scavenging abilities. From the calculated IC_{50} values, the extract has a significant (P≤0.05) ABTS radical scavenging ability (IC_{50}: 46.34 µg/ml) when contrasted with the ascorbic acid standard (IC_{50}: 15.78 µg/ml).

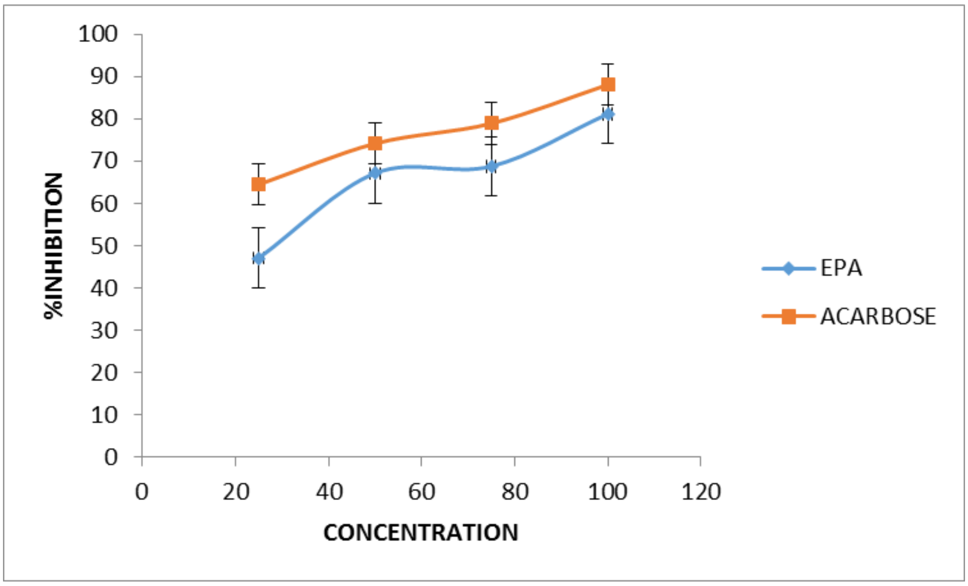

Figure 1: Percentage inhibitory activity of ethanol extract of *P. angulata* Leaves and Acarbose (Standard) of α-amylase on Alcoholic leaves extract. Values are expressed as mean± SEM. N=3, Plant extract was compared with control at P≤0.05

In Figure 1 above, a dose-dependent inhibitory activity of the extract and standard was observed against α-amylase. At 100 µg/ml, the extract and standard drug exhibited potent α-amylase inhibitory activities of 81.15 ± 0.1556 and 88.19 ± 0.1556 respectively. From the calculated IC_{50} values, it was observed that the extract displayed a significant

($P \leq 0.05$) α-amylase activity with an IC_{50} of 23.88 µg/ml when contrasted with acarbose (IC_{50}: 24.75 µg/ml). The close IC50 values suggest that the extract exhibit a potent α-amylase inhibitory effect of the extract.

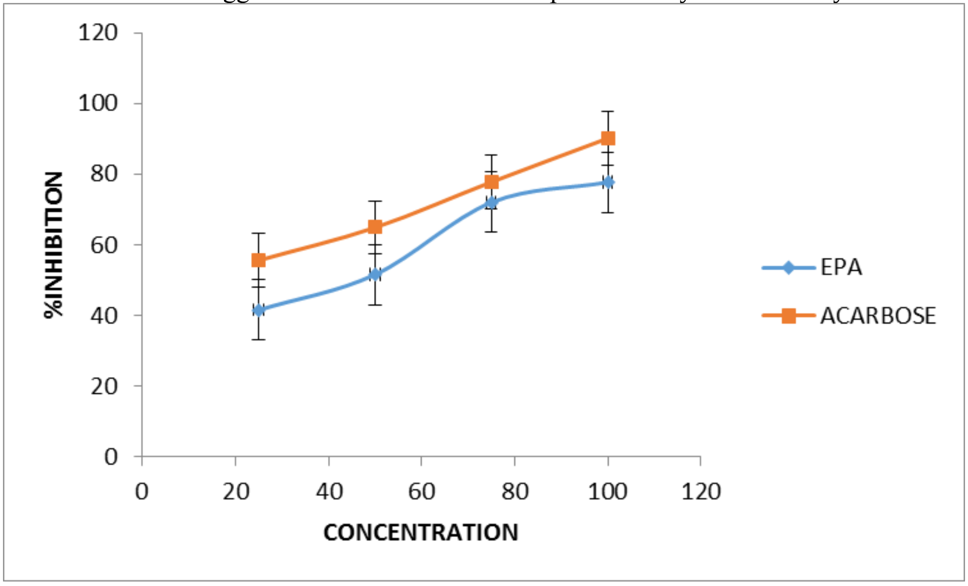

Figure 2: Percentage inhibitory activity of ethanol extract of *P.angulata* Leaves and Acarbose (Standard). Values are expressed as mean± SEM. N=3, Plant extract was compared with control at $P \leq 0.05$.

The extract and acarbose inhibited α-glucosidase in a dose-dependent manner. At 75 µg/ml, the extract and acarbose displayed significant ($P \leq 0.05$) α-glucosidase inhibitory activities of 72.01 ± 0.0953 and 77.71 ± 0.6692 respectively. The calculated IC_{50} values uncovered that the extract (IC_{50}: 41.74 µg/ml) presented promising inhibitory action when contrasted with the IC_{50} of the standard acarbose (IC_{50}: 15.10 µg/ml).

4.0. DISCUSSION

The rapid surge in blood glucose level indicates hyperglycaemia which is majorly a consequence of uninterrupted starch breakdown by pancreatic α-amylase and subsequent absorption of glucose released by α-glucosidase in the intestine. The retardation of glucose digestion by the repression of α-amylase and α-glucosidase holds a promising restorative target in managing blood glucose surge (Deshpande *et al*., 2009).

The total phenolic content (TPC) of the extract was 28.93 ± 0.115 **mg/g** GAE (Table 2). The finding of this study is in agreement with the findings of Ferreira, *et al*. (2019). TPC result was higher than that reported in the study carried out by Cobaleda-Velasco *et al.* (2017). This might be due to differences in the geographical location. The antioxidative action of the extract may be ascribed to the existence of phenols which are established as free radical foragers and powerful chain-breaking antioxidants (Flora, 2009). Research had earlier elucidated that phenolic compounds mitigate persistent diseases such as diabetes, cancer, cardiovascular diseases (CVD) (Zhang *et al*., 2015; Działo *et al*., 2016).

The TFC of the extract was 25.98 ± 0.09 g/mg QE (Table 2). The result of this experiment is consistent with the observations of Ferrreira, *et al.* (2019). Flavonoids alleviate the threat of degenerative diseases linked with the free radical injury. The existence of OH groups in the composition of flavonoids bestows on it the radical scavenging ability which makes them very important secondary metabolites (Ghasemzadeh and Ghasemzadeh, 2011).

The extract displayed a dose-dependent inhibition in the assay systems used in this study (Table 3). DPPH free radical has been largely utilized to determine the antioxidant capacities of plant extracts (Hanato *et al.*, 1988, Amarowicz *et al*., 2004) because it is lucidity in radical form, ease, and reproducibility. From the result, it was observed that *Physalis angulata* extract showed significant activity with an IC_{50} value of (58.12µg/ml) when compared to the standard (IC_{50} 36.18µg/ml), which shows that the extract has a very promising radical scavenging ability. This finding of this study is consistent with the observation of Kusumaningtyas *et al*., (2015).

The extract also demonstrated dose-dependent inhibition of lipid peroxidation. Reactive oxygen species can initiate peroxidation of lipids by abstracting a proton from lipids to form a conjugated radical, which combines with oxygen to become a lipid radical until the reaction is discontinued. Oxidation of biomolecules may be prompted by lipid peroxidation, which eventually results in cell injury (Huong *et al*., 1998).

The extract has slightly higher inhibitory activity at 75µg/ml with 76.52±1.5812 than that of the standard drug which is 75.86±0.2467 (Table 4). This implies higher concentrations can effectively inhibit the progression of chain reactions of lipid peroxidation.

The blue-green colour of the ABTS radical was suppressed by the antioxidants present in the extract. From the result (Table 5), it was observed that inhibition was concentration-dependent and the standard drug, when contrasted with the extract, demonstrated the highest ABTS inhibitory activity (IC_{50} 15.78 µg/ml and 46.34µg/ml).

At different concentrations, there was a notable α-amylase inhibition ($p \leq 0.05$) between the extracts and standard drugs. However, the extract and standard inhibited the enzyme in a dose-dependent mode. The IC_{50} value determined portrayed that extract had an IC_{50} value closer to that of the standard drug (Figure 1). This resulting signal that the plant chemicals accountable for the inhibitory activity against α-amylase by the extracts may be soluble in ethanol. This is in agreement with a recent work reported by Poojari *et al*. (2014) where the fruit extract of *Physalis angulata* inhibited α-amylase activity *in vitro***.**

The acarbose standard has a significantly low IC_{50} value when contrasted with that of the extract (Figure 2). This suggests that the extract inhibited amylase more than glucosidase. The inhibition of α-glucosidase by the standard was found to be strong as shown by the low IC_{50} value. The result of these findings is in concord with the report of Poojari *et al*. (2014). However, this is not in accord with previous results which demonstrated that phytochemicals are slight inhibitors of α-amylase and potent inhibitors of α-glucosidase (Kwon *et al*., 2007).

These outcomes suggest that the inhibitory action of the extract and acarbose on the activities of α-amylase and α-glucosidase may be detached to the presence of phytochemicals. Flavonoids are a distinctive category of pure compounds, possessing a hydroxyl functional group present in it which confers scavenging ability and also plays a pivotal role in arresting **lipid peroxidation** (Mayur *et al*., 2010).

5.0 CONCLUSION

The role of medicinal plants in the care and alleviation of many oxidative stress-allied maladies such as diabetes and its associated complications cannot be overemphasized. The outcome of this study from α-amylase, α-glucosidase, DPPH, ABTS, lipid peroxidation, total phenol, and flavonoid assays revealed the potentiality of *Physalis angulata* as a source of inhibitors of these key enzymes, as well as natural antioxidants. Their cultivation and utilization should be encouraged, which might help prevent or steady the advancement of diverse oxidative stress-linked disorders. However, in vivo studies should be conducted, to ascertain the efficacy of this extract. Also, active principles should be further elucidated.

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OPTIMIZATION OF GLUCOAMYLASE PRODUCTION FROM FUNGAL STRAINS ISOLATED FROM DECOMPOSING CASSAVA

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Abstract

Microbial glucoamylase is needed for the production of sugars from starchy substrates. Commercially available microbial glucoamylase is quite expensive which makes the process uneconomical. The present work was designed to optimize the fermentation conditions of identified glucoamylase producing fungi for maximum production of the enzyme through solid state fermentation. The amylolytic fungi was isolated from fermented cassava and screening of amylase producing fungi was carried out on Sabouraud Dextrose Agar (SDA) supplemented with 1% soluble starch, the index of amylolytic activity were monitored using iodine solution. Highly thermostable amyloglucosidase was yielded from the isolated and identified organisms as; Aspergillus tamarii, A. niger, and A flavus. Maximum enzyme production was recorded at pH 6.0 and wheat bran as a carbon source for all isolates except Aspergillus niger which gave the highest enzyme yield at pH 4.0. The enhancement of the nitrogen supplements appear differently among the different isolates, for Aspergillus tamari highest production was obtained in medium supplemented with soya bean meal, whereas A. niger with sodium nitrate, and A. flavus accomplished this with ammonium sulphate. The study revealed that the isolate isolates were good producers of extracellular thermostable glucoamylase which could be suitable for application in starch processing and food industries.

Keywords: Aspergillus isolates, glucoamylase, thermostable enzymes, optimized conditions,

INTRODUCTION

Starch is a plant storage polysaccharide made up of amylose and amylopectin. The amylose component is a polymer of glucose linked by α-1, 4-glucosidic bonds. The amylopectin is a polymer of glucose linked by α-1, 4-glucosidic bonds in the straight chain and α-1, 6 at the branch point (Okwuenu, Ezugwu & Chilakat 2017). Glucoamylase also known as amyloglucosidase, glucoamylase or I-amylase , the technical name is known as α -(1, 4) glucan glycohydrolase where glucan is the name for a series of glucose units attached and glycohydrolase describes the action of breaking of the bond between two glucose units (Baydaa. Hassan Mohammed & Jebor Zahra 2015). Glucoamylase is an exo enzyme of great importance for hydrolysis of starch and other related oligosaccharides and polysaccharides (Uma & Nasrin, 2013). It can convert starch completely to glucose. Now a days, glucoamylase is one of the most important enzymes in food industries, as it is used for the production of glucose and fructose syrup from liquefied starch (). It is also employed in baking, juice, beverage pharmaceuticals, and many fermented foodstuffs industries for commercial production , in some cases textile, leather and detergents industries. Traditionally, glucoamylase has been produced by Submerge fermentation and used in a one-way process in solution. However, in recent time, the solid state fermentation (SSF) processes have been used increasingly for the production of this enzyme. SSF holds tremendous potential for the production of enzymes. It can be of special interest in those processes where the crude fermented product may be used directly as enzyme source (Chandana Lakshmi & Jyothi 2014). Use of suitable low cost fermentation medium for production of amylase using agricultural by-products has been reported. Amylase enzymes are not yet commercially produced in Nigeria, making them too expensive for amylase utilizing industries. Enzymes of microbial origin are currently becoming increasingly important due to their economic advantages (Damisa et al., 2013). The potential of using microorganisms as sources of industrially relevant enzymes has gear up interest in the investigation of extracellular enzymatic activities in several microorganisms (Ominyi 2013). Major advantages of using fungi for the production of amylases is the economical bulk production capacity and ease of manipulation. Aspergillus spiece are set of funis found in decaying organic matter and in soil i.e. compost heaps and has contributory role in nitrogen and carbon recycling in the environment (Klich and Pitt, 1988). Production of various enzymes from A. fumigatus has been reported previously which includes β-Glucosidase

(Tayyab, Ali, Muneer, Firyal, Awan, Wasim , Masood & Saeed 2019).Gluco-amylases produced by fungi and yeasts are highly thermolabile and it remains active at wide range of acidic pH (Jain &·Katyal 2018). This study was designed to optimize the Culture condition for the production of glucoamylase enzyme by different isolates of *Aspergillus spp*

MATERIALS AND METHODS

Chemicals:

All the chemicals utilized in the current study were purchased from Sigma Aldrich, Germany and were of purified grade.

METHODS

Sample collection and Preparation

The cassava flour was moistened with water and kept at room temperature 37°C±2°C until it changed in colour, texture, odour and appearance of moulds was noticed, which was an indication of fermentation. Portions of the samples showing signs of spoilage were taken and used as sources for the isolation of amylase producing moulds.

3.2.1.1 Isolation of Fungi

The mouldy cassava flour sample (1g) was homogenized in 9 ml of sterile distilled water. Thereafter, 1ml of the homogenate was serially diluted to 10^{-5}and0.1ml of the selected dilutions was plated out on Sabouraud Dextrose Agar (SDA) using the sterile disposable syringe. The plates were incubated at 37°C±2°C for 120h. Discrete colonies on the plates were purified by repeated subculturing on SDA. All the mould cultures were identified and confirmed by studying the gross morphology of the colonies followed by a microscopic examination which was compared with the standard Atlas. All the mould isolates were stored on SDA slants at 4°C until required.

Primary Screening of Amylase Producing-fungi

The fungal isolates were screened for their starch hydrolyzing ability. The fungal isolates were inoculated on 1 % starch-containing SDA Plate. After 2 days of fungal growth, the plates were flooded with iodine solution. Starch reacted with iodine to form a dark blue starch-iodine complex that covered the entire agar. When starch was broken down into sugars, clear zones were surrounding streaked lines which indicated starch hydrolysis. The zones of hydrolysis formed by each isolate were measured in millimetre of diameter and the fungal isolates which showed maximum zone of starch hydrolysis were selected for enzyme production.

Enzymes production:

Sterilized fermentation medium supplemented with 2% wheat bran and nutrients [ZnSO4, (NH4)2SO4, KH2PO4, MgSO4, FeSO4 7H2O, C12H22O11 and MnSO4] (Arun et al., 2008) was inoculated followed Tayyab et al., 2019 by incubation at 37oC in an orbital shaker at 130 rpm. The harvesting was done after 4 days and the biomass thus produced was centrifuge at 6500 rpm for 15 minutes (Gupta et al., 2003). The supernatant was evaluated for enzyme activity.

Optimization of Conditions for the production of Glucoamylase:

Production of glucoamylase was analyzed by examining the fungal growth in wheat bran medium at various pH ranging from 3 to 9 using 50 mM of each of sodium acetate buffer (3-5), sodium phosphate buffer (5-7) and Tris-HCl buffer (7-9) separately (Tayyab et al., 2011). In order to examine the maximal glucoamylase production, the wheat bran medium was supplemented with additional carbon (corn, potato & cassava starch) and nitrogen (saya bean meal, ammonium nitrate & ammonium sulphate) sources . Fungal growth and glucoamylase production was recorded in the above said medium after sterilization.

Effect of incubation time for the maximal glucoamylase production was recorded by examining the fungal growth up to 9 days. glucoamylase production was also analyzed in the presence of Tween-80 a non-ionic detergent at a final concentration of 0.1 to 1% detergent.

Enzyme Assay: Enzyme activity was determined using starch as substrate at pH 5 in 50 mM sodium acetate buffer. Regarding the enzyme activity, 0.1 mL of enzyme was mixed with 1.9 mL substrate prepared in 50 mM sodium acetate buffer, followed by incubation at 40oC for 40 mins. The production of glucose was measured by DNS method by recording the absorbance at 540 nm. The units for enzyme activity were calculated using standard curve for glucose. One unit of enzyme activity was the amount of enzyme required for the production of one micromole of reducing sugar in one minute at 40oC (Miller, 1959).

Results

Table 1: Results of the clear zone around the colonies indicating starch hydrolysis

Isolates	The diameter of the Clear Zone in (mm)
Aspergillus fumigatus	**15**
Aspergillus flavus	**29**
Aspergillus tamari	**28**
Aspergillus niger	**30**
Penicillum spp	**20**

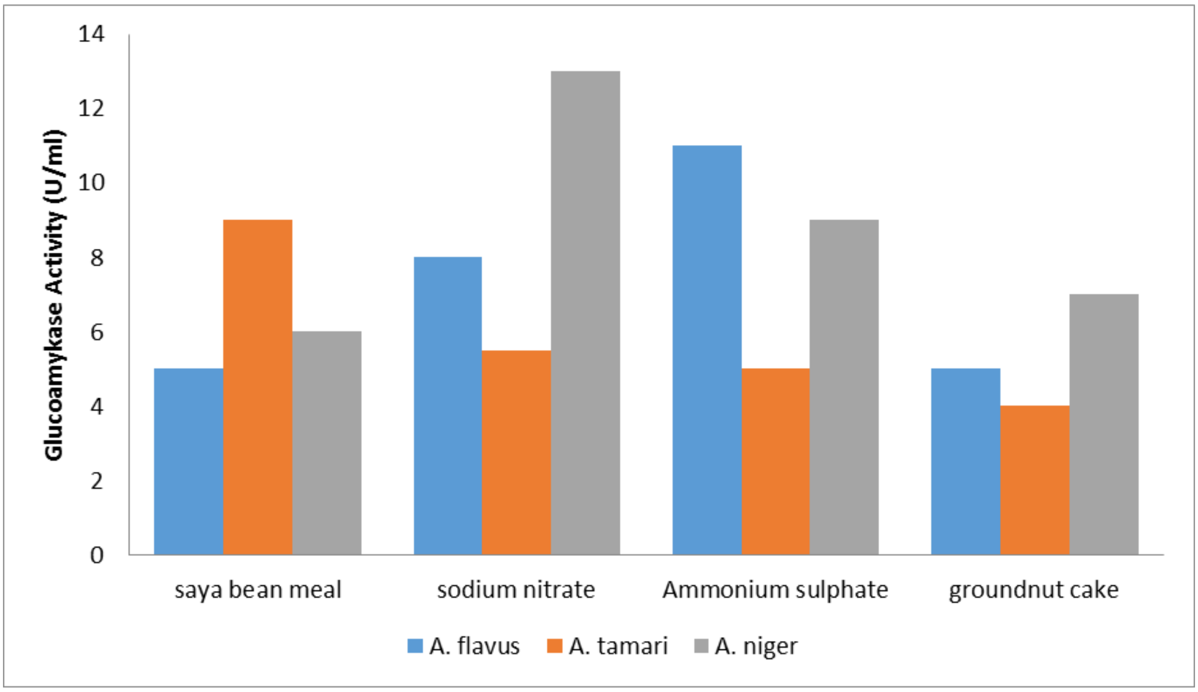

Fig 1 Effect of nitrogen source on the medium for the production of Glucoamylase by various *Aspergillus spp.*

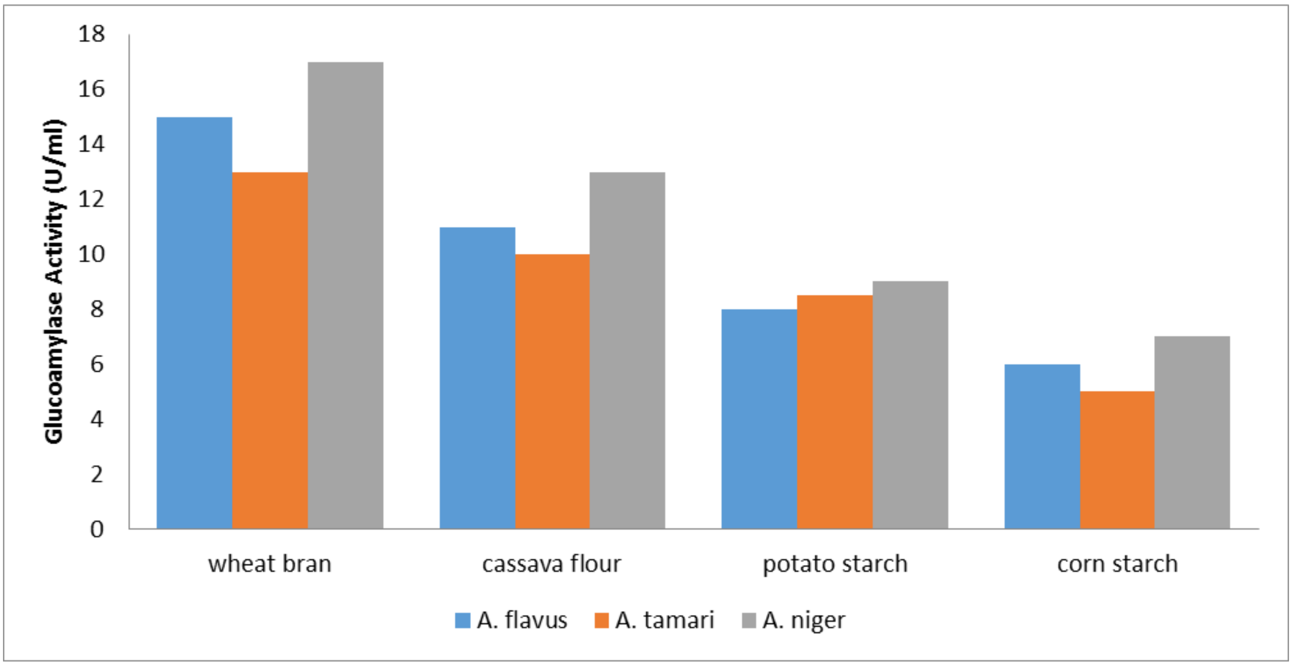

Fig 2: Effect of carbon source on the medium for the production of Glucoamylase by various Aspergillus spp.

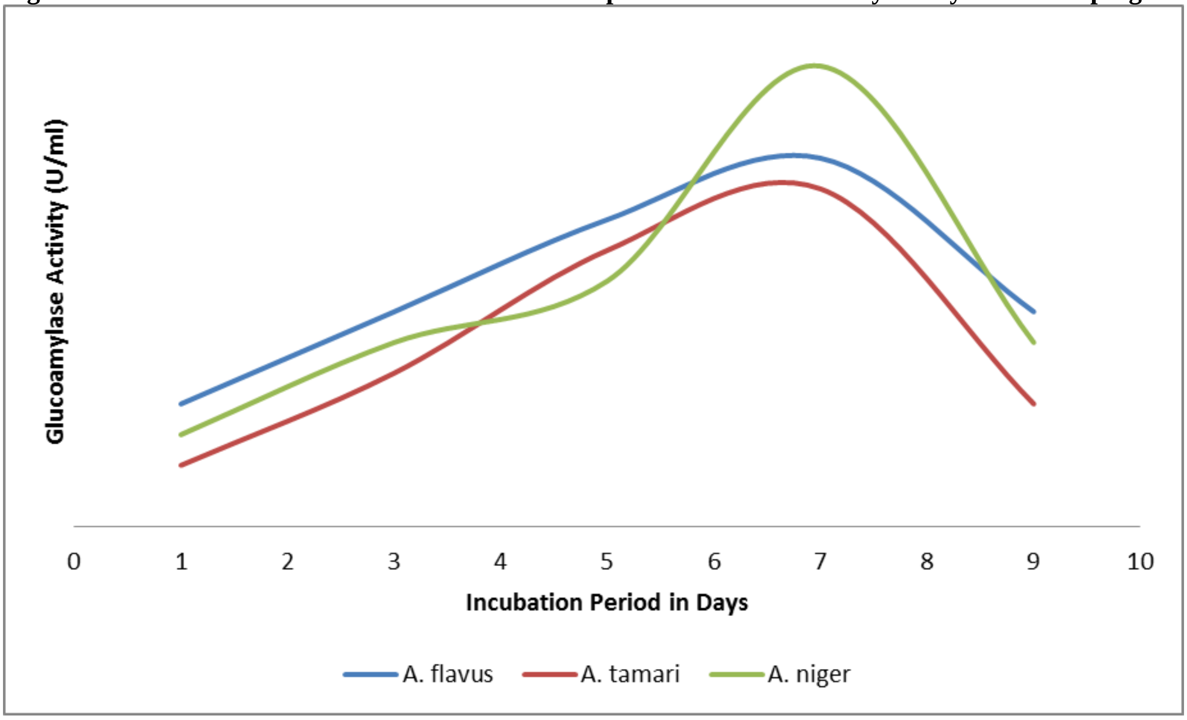

Fig 3:Effect of pH on the medium for the production of Glucoamylase by various Aspergillus spp.

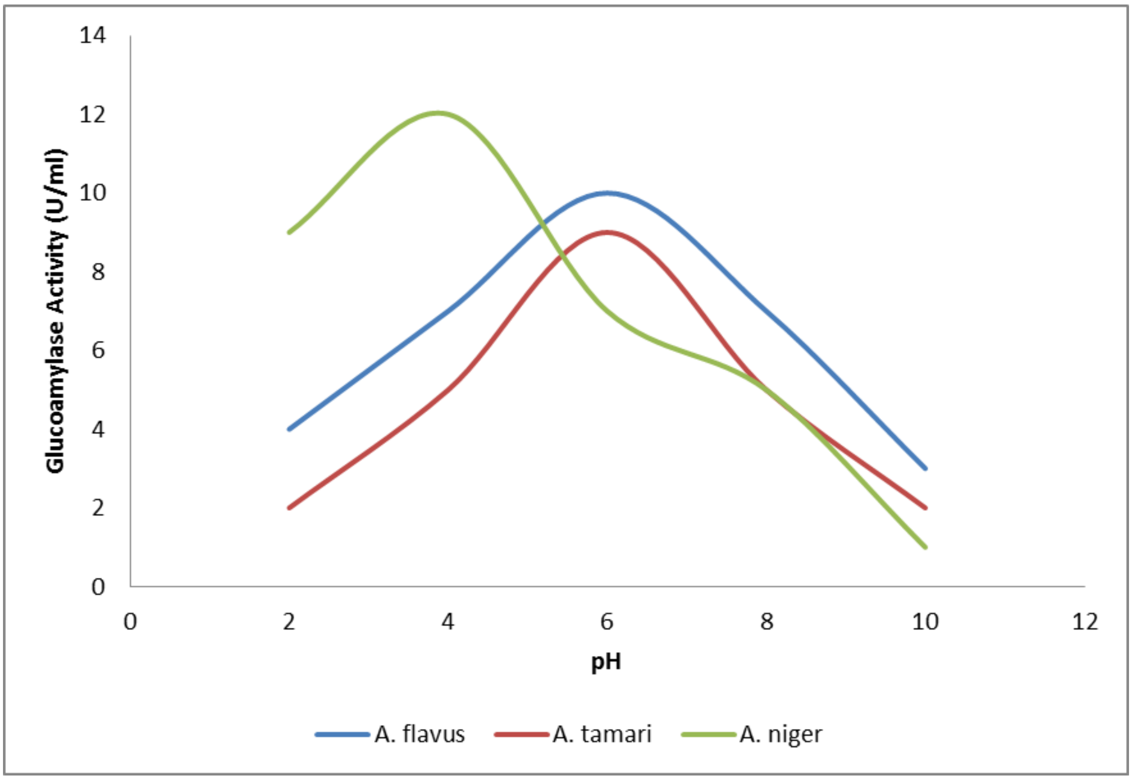

Fig 4:Effect of incubation period on the medium for the production of Glucoamylase by various Aspergillus spp.

Discussion

Fungal species *Aspegillus fumigatus, Aspergillus flavus, Aspergillus tamari and Aspergillus niger and penicillin species* were isolated from waste bread sample. Three of these isolates were found to have higher clear zone of hydrolysis (table 1); *Aspergillus flavus, Aspergillus tamari and Aspergillus niger*, this is the similar to the work reported by Okwuemu et al.,2017 and Chandana Lakshmi and Jyothi, 2014 that Aspergillus species has higher amylolytic hydrolysis than any other strains of fungi. The production of extracellular glucoamylase by *A. species* was studied in solid-state fermentation (SSF). Solid-state fermentation has numerous advantages over submerged fermentation (SmF), including high productivity, simple mechanism, low capital investment, low energy requirement and less wastewater output, better product recovery and lack of foam build-up (Damisa et al., 2013). In SSF, the selection of a suitable solid substrate is an important condition and thus includes the screening of a number of agroindustrial material and some starchy crop for microbial growth and product formation (Hassan, Jebor & Ali., 2015). In the present study, a substrate (wheat bran) was used been supplemented with certain starchy crop powdered viz. corn starch, cassava starch and potato starch were used for growth and GA production by the isolates. Culture media containing 10 g substrate being supplemented by the addition of several starch were subjected to fermentation for varying incubation period at varying pH , temperature (37±1) °C, moisture 50 % (by mass per volume) and inoculum level 10 % (by mass per volume). All the substrates supported growth and enzyme formation by the culture, but wheat bran proved superior to other substrates (Fig. 2). Wheat bran medium gave high glucoamylase activity (15, 13, 17) U/g) after 120 h, followed by Cassava starch ((11, 10, 13) U/g). Potato starch gave the minimum enzyme yield (8, 8,5 & 9) U/g), Corn starch gave the minimum enzyme yield (6,5 & 8) U/g) from *A, flavus*, *A tamari* and *A niger* respectively . Wheat bran had previously been reported to be the best substrate for glucoamylase production (Hassan et al., 2015). The effect of the nitrogen content of the substrate was also determined using soya bean meal, nitrogen sulphate, sodium nitrate and ground nut cake. Aspergillus tamari gave the highest actoivity using soya bean meal as source of nitrogen while flavus and A. niger gave the highest activity using inorganic compound as nitrogen source, which is similar to the work reported by Singh et al., 2019 that the highest activity of amylase is gotten from inorganic nitrogen. The biosynthesis of GA decreased after 96 h. Ramadas et al, 2013 reported that 96 h is the optimum period for amyloglucosidase synthesis by Aspergillus niger in SSF. Time courses of the glucoamylase enzymes production were studied for the three fungal isolates at different periods in hours (24, 48, 72, 96, 120, 144, and 168). The productivity of the enzymes was peaked at 168 hours. Further Increase in incubation period beyond the optimum incubation time resulted in decrease in amylase activities (figures 3). This is different from the one reported by Singh, Singh, Kumar, Masih & Singh.,2019 on Aspergillus flavus with the optimal incubation period of 240hrs. this corresponds with Kaur, Aror, Bhatia & Alam., 2015 which reported maximum glucoamylase production by Aspergillus niger after an incubation period of 5 days. Similarly Nyamful, Moses, Ankudey & Woode 2014 reported that glucoamylase production was highest on 5th day of incubation period. The decline in the productivity may be due to depletion of one or more essential nutrients in the medium or due to accumulation of toxic by-products. The activities of the enzymes decreased with further increase in pH values. This implies that the successful production of amylase enzymes depends on the maintenance of initial pH of the production medium. All experiments were run in parallel triplicates. This observation agrees with the earlier report that amylases differ in their temperature optimum, pH optimum and several other physiochemical properties depending on their origin. Hence, different enzymes have found specific application in different industries (Arti , Neelam, Dinesh., 2010)). The initial pH of the production medium has been reported to play a significant role in the growth and metabolite production by various organisms (Olutiola, 1976). Amylase production in this study was also found to be affected by the initial pH of the enzyme production medium. However, the highest amylase titre was recorded at pH 4.0 for *A. niger* and 6.0 for A tamari and *A flavus* in this study (fig. 4). Maximum amylase production at pH 6.0 by various species of Aspergillus has been earlier reported (Ezugwu et al., 2017;). However, the pH results of this study is a shift from the earlier reports of Olama and Sabry, (1989) who reported maximum amylase production by *Aspergillus flavus* at pH 7.0. In addition to the regulatory effect on gene expression, cultivation pH can also affect fungal morphology greatly (Ominyi 2013). This was similar to the earlier report that amylases are produced by fungal organisms maximally in acidic medium (Arti et al, 2010). This shift may be due to environmental influences on the growth and enzyme production by the organisms. Variation in amylase production as pH of the medium varies could be as a result of the various morphological changes induced in microbes due to the changing pH

Conclusion

Conclusions

It was concluded that the nature of the substrate, incubation time, pH and moisture content all affect the production of GA in solid-state fermentation. The results provided valuable information for the production of GA by F. solani using relatively inexpensive substrate wheat bran, and other starchy crop.

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DESIGN AND IMPLEMENTATION OF ONLINE BANK VERIFICATION NUMBER (BVN) SYSTEM

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Abstract

Bank Verification Number commonly called BVN is a biometric identification system implemented by the central Bank of Nigeria to curb or reduce illegal banking transactions in Nigeria. It is a modern security measure in line with the Central Bank of Nigeria Act 1958 to reduce fraud in the banking system. The system works by recording fingerprints and a facial photograph of the client. The Bank Verification Number (BVN) became imperative following the increasing incidence of compromise on conventional security system such as password and Personal Identification Number (PIN) of customers. The BVN involves identifying an individual based on physiological or behavioral attributes, such as fingerprint, signatures and others. The customers unique BVN is accepted as a means of identification across all banks system. On the basis of introducing the concepts of Bank Verification Number system, this paper work illustrates the role that BVN plays in Nigeria banks. The developed system was designed by creating the following modules: Home page, Login page, and BVN page of the bank verification system using BVN. The evaluation of the performance of the developed system was carried out by administering questionnaires on 80 users of the system based on accessibility, reliability, availability and speed of processing. The results of evaluation of the developed system showed that 75 out of 80 users agreed that the system is easy to use while 5 users disagreed. Also 73 out of 80 users agreed that the system is fast while 7 users disagreed. It is therefore concluded that a bank verification system using BVN that is capable of providing a user friendly and accessible means of bank verification system using BVN has been developed. This new system is help in the reduction of redundancies, inconsistencies and ensures user defined rule for data integrity. The programming language used to implement this paper is visual basic 6.0 because it is object oriented language and it is user's friendly.

Keywords: Online, Bank Verification Number (BVN), transaction, biometric e.t.c

INTRODUCTION

Bank verification Number (BVN) is a new initiative introduced by the Central Bank of Nigeria(CBN) to check the prevailing money laundering and incidence of fraud in the financial institutions in Nigeria(Adamu, 1997; Adenmosun, 2014). Intially, personal identification Number (PIN) and passwords technology were introduced in Nigeria to check financial fraud in the banking sector, but due to incessant compromise of the traditional methods in the recent times, some researchers warned that there is a need for higher level of security in the banking sector(Aderiyike, Paul & Owoicho, 2015; Akinnuwesi, Uzoka, Okwundu & Fashoto, 2016; Offiong, Udoka & Ibor, 2016; Levitin, 2012; Anya, 2003). In another study, it was stated that the BVN became imperative following the increasing incidence of compromise on conventional security systems(Anya, 2003). This called for the introduction of the BVN by the central bank of Nigeria. Previous research has reported that the current BVN is generated inside the banking hall making the whole process to be stressful and cumbersome(Awenhimobor,1991; Benedict, 2003; Blass & Yosha, 2003). This study introduces the online generation of the BVN using a linear congruential algorithm which is better than the former method. The BVN was introduced by the CBN in 2014 to curtail the crime in the banking and Such as fingerprint, signatures and others. The customers unique BVN is accepted as a mean of identification across all banks systems. The BVN is a compulsory exercise provides account holders with a unique number that enables the account holder to have a single identity in the banking system. It aimed at protecting bank customers from identity theft and other financial/economic crimes emanating in the banking sector of Nigeria.

Previous studies have shown that BVN uses biometric technology to register customers in the banking sectors(CBN, 2014; CBN, 2017;Esoimeme, 2015). The already existing BVN software doesn't generate the 10 digit BVN immediately it goes through a number of sources for allocation of BVN to customer(Eteyen, 2015). Also, researchers have reported that because of crime rate in the banking sector there are much people that can access this application or update information on this platform so there is a long procedure in updating information on this platform and creating this BVN(Fatokun, 2015).

Statement of the Problem

Over the years, the banking sector of Nigeria has played the role of the intermediate body in regards to ensuring the smooth running of the economy and coordination other sectors involved in the circular flow of income in the Nigerian economy. However, growth in this sector has been reduced due to high cases of economic and financial crimes. Adam, (2007). Fraud and money laundering have had adverse impacts on our national development and particularly on the financial system. They have caused damage to the reputation of the image of the country, loss of FDI, poor infrastructural development, dwindling confidence and distortions in our political as well as financial systems, among other things.

In view of these crises crimes perpetuated by cyber thieves, the mandatory bank verification number exercise embarked by various banks nationwide has also caused congestions in banking halls. Although the exercise commenced since February, 2014, the fire brigade approach of most Nigerians has warranted most bank halls to be filled to its maximum capacity. Queues in some banks even extended outside the banking hall. This development has caused confusion in some banking halls as other transactions are placed on hold due to inadequate staff to attend to clients or delayed indefinitely.

The aim of this research is to design and implement an online Bank Verification Number System for Nigerians in the Diaspora and at home to use.

The specific objectives of work include:

i. To review existing system of an online Bank Verification Number System.

ii. To design and develop a new system based on the finding above.

iii. To implement the design system in (i) above.

iv. To implement the new system based on an online Bank Verification Number System.

LITERATURE REVIEW

A vibrant banking industry in any country is pivotal to achieving economic growth development through efficient financial services as they provide a mechanical system to group savings and convert them into investment. Thus, a bank serves as an intermediary between savers or depositors and borrowers (Olanipekun, et al 2013). This is why the government establishes bank regulating bodies like Central Bank of Nigeria (CBN). These regulating bodies from time to time reform the sector to meet the current economic standard.

Financial reforms and attendant policy prescriptions are age-long phenomena. They represent the various transformation and policy adjustments and overhaul that are directed at the art, practice, and activities of financial institutions and markets overtime in response to the nominal need for operation improvement and growth of both the institutions and the general economy. (Iganiga, B. O. 2010).

According to Obadeyi (2014) financial reforms is a possible change made to a household, system, firm, government, economies etc. in order to perform and operates in a more effective and efficient way within the context of stipulated regulatory policies. The reform of financial markets and banks remain a persistent force in the growth and development of financial sector in developed economies, developing economies and emerging markets (Nigeria inclusive). The reform of the financial sector could easily be traced to banks' competitive actions, assisted with continuous rise in government regulations over the soundness of banks' strong financial positions.

These reforms in banking sector have creating room for advancement in technology which gives birth to e-banking sector.

The banking industry no doubt has witnessed advancement in technology just like any other sector; the adoption of e-banking is one of these as it affects banking operations entirely. With the adoption of Self Service Technology by the banks, e-banking system has continued to service the populace, e-banking is one of them (Adewoye, J. 2013).

E-banking was adopted by banks so as to improve their service delivery, decongest queues in the banking hall, enable customers withdraw cash 24/7, aid international payment and remittance, track personal banking transaction, request for online statement, even transfer deposit to a third party account (Ogunlowore & Oladele, 2014).

According to Okoro (2014) quoted Omotayo (2017) which define electronic banking as a system in which funds are moved between accounts using computerized online or real time system without the use of written cheques. Okoro (2014) define e-banking to include the provision of retail and small value banking products and services through electronic channels as well as large value electronic payments and other whole sale banking services delivered electronically.

To prove this e-banking payment system the need for biometric tool was created to verification bodies and password of individuals. Adewale et al (2014) biometrics as categorized can be from physical body regions, medico-chemical body features or behvioural traits, defining high (for individuals) to low (for group) levels of distinction. Examples of biometrics from body regions include the occurs hand (fingerprint, palmprint, finger knuckle print, hand geometry, hand veins) and facial (face, ear shape, teeth); medico-chemical body features include body odor, DNA and heart sound; while behavioural trait include voice, gait, signature.

A biometric recognition system is a pattern recognition system recognition system that acquires biometric data from an individual, extracts a feature set from the acquired data, and compares this feature set with the template set in the database to decide whether to accept (genuine) or reject (impostor) the individual.

However, the e-banking and biometric has created a room for more problems. It is one of the reasons why many people now have many account numbers which they use to carry out different financial fraud that has affect the economy growth of Nigeria. To handle this issues the Central Bank of Nigeria created a policy called bank verification number (BVN).

Related Works

The greatest innovation that has taken place in the twentieth century is in the realm of information Technology. This is currently made possible by the introduction of the digital computers which has been observed in the field of communication to be increasingly inseparable from communications. These linkages often referred to as convergence is driven by technology and amplified by business trends. Faster growth in network systems that use communication links to connect subsidiary system (nodes) which may send and receives, direct and redirect information (Ezeja, 2017).

Talking of the internet a couple of years ago would have sound like a fairytale but today the internet is pervasive in almost every field of human Endeavour changing the fundamentals of how we conduct national as well as international businesses. Few years of its existence, the internet has shown that it can deliver the long sought after goal of electronic commerce(*Adewale et al, 2014).*

It is worth that companies in the developed countries world-wide have recognized the business potential of the internet and are getting connected to the network of networks in their millions (*Adewoye, 2013).*

The financial institution (Bank) is one of such organizations. Banking constitutes one of the most prominent life wire for Socio-Economic grow and development in any given nation, it supports and assists in the supply of long and short term loan, accepts both current sowing and fixed deposits, both foreign transactions, advice and facilitates transactions between client, workers, agents, firm, buyers and seller by providing payment services, not excluding the issue of undertaking risk on behalf of their clients, only to mention but a few(*Iganiga, 2010).*

MATERIALS AND METHODS

The aim of this research study is to examine the effect of BVN in Delivery of Banking Service in Enugu metropolis. This chapter consists of the research methodology which throws more light into method use in analyzing and conducting the work. Also in order to fully assess the effect of BVN in delivery of bank services, a model with dependent and explanatory variables to be estimated is specified, a prior expectations of these variables, techniques of estimation and method of data analysis are all treated in this chapter. A Descriptive Statistical Analysis method making use of Central Bank of Nigeria(CBN) data on currency in circulation, saving statistics and commercial banks loans to small scale enterprise for the pre and post period of Bank Verification Number(BVN).

Sources of Data

Secondary Research is a common research method; it involves using information that others have gathered.

This study makes use of secondary data covering a period of 10 years i.e. 2005 – 2015 gotten from federal ministry of finance, central bank of Nigeria, journals and bank websites/publications. The sources of secondary data are:

Official Statistics: Official statistics are statistics collected by governments and their various agencies, bureaus, and departments. These statistics can be useful to researchers because they are an easily obtainable and comprehensive source of information that usually covers long periods of time. However, because official statistics are often characterized by unreliability, data gaps, over-aggregation, inaccuracies, mutual inconsistencies, and lack of timely reporting, it is important to critically analyze official statistics for accuracy and validity.

Scholarly Journals: Scholarly journals generally contain reports of original research or experimentation written by experts in specific fields. Articles in scholarly journals usually undergo a peer review where other experts in the same field review the content of the article for accuracy, originality, and relevance.

Literature Review Articles: Literature review articles assemble and review original research dealing with a specific topic. Reviews are usually written by experts in the field and may be the first written overview of a topic area. Review articles discuss and list all the relevant publications from which the information is derived.

System Implementation

The study discovers a better approach to generating the BVN and thereby will assist the financial institutions in reducing queues at banking halls and identify theft. Many authors have spoken on the relevance of BVN but failed to outline the processes of generating it. The results of this study will help the banking sector in Nigeria to know the importance of having the BVN generated online. The following are the program interfaces:

Registration Page: The registration Page contains fields of information necessary for the use to fill in. These include: First and last names, Account no, Nationality, State of origin, Marital Status, Address etc. After the enrolment form has been filled we then submit for verification.

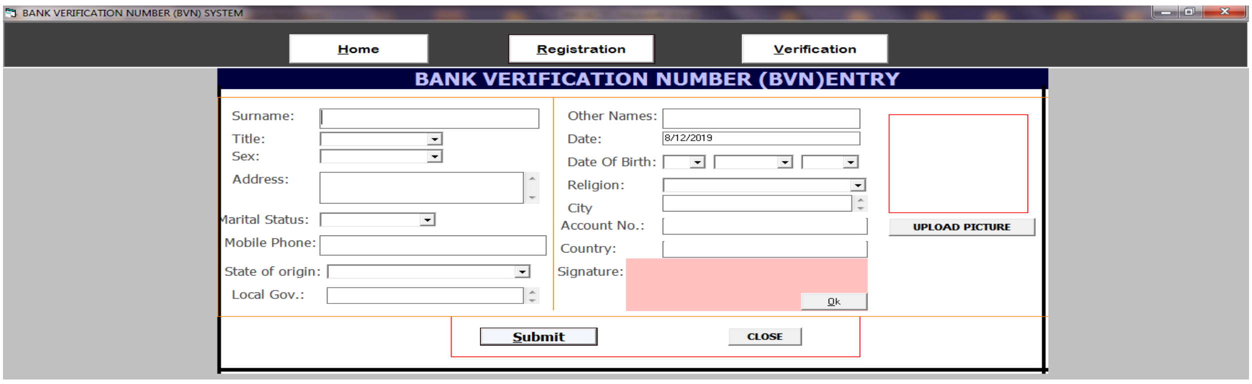

Figure 4.1: Registration Page of online Bank Verification Number System

Verification Page: Figure 4.2 shows the verification of a registered bank account holder having filled the enrolment form and gone through the image capturing process has been verified to be assigned a unique BVN.

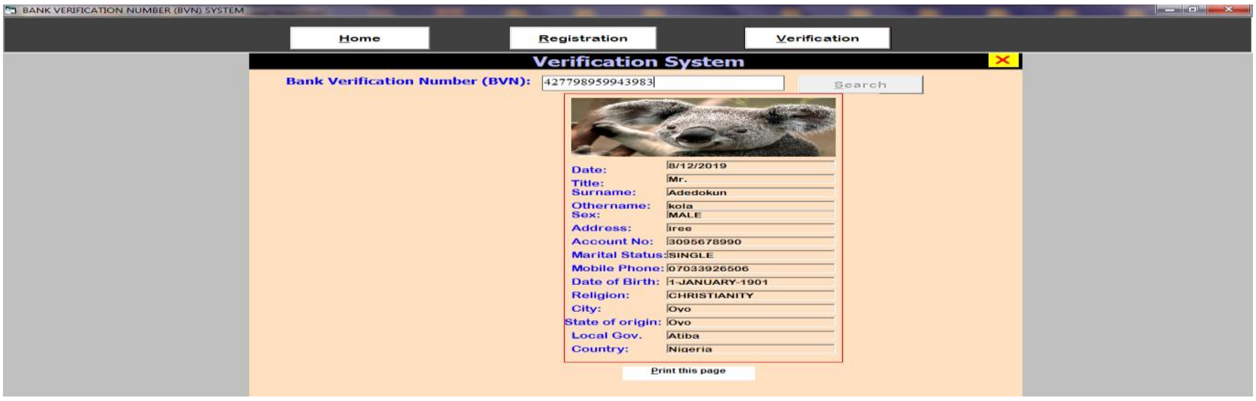

Figure 4.2: Verification Page of online Bank Verification Number System

System Investigation

The researcher carefully and closely studied the system and discovered inherent problem. The problems were closely looked into with a dual aim of understanding the system and searching out ways to improve upon it. In the course of this paper, researcher conducted a comprehensive interview as well as site observation. The result of the system investigation provided a broader understanding system the problems and the way out.

Method of Analysis

The data collected through the questionnaire administered were subjected to analysis using Statistical Package for Social Science (SPSS) such as percentages, tables and so on. The group respondents with the highest percentage (frequency) was assumed to be opinion of the generally of the online bank verification number (BVN) system.

Evaluation of the Developed System

Evaluation Criteria

Evaluation of the developed system was carried out based on the following criteria:

i. Accessibility

ii. Reliability

Methodology of Evaluation

The developed system was evaluated by administering questionnaire on 80 users whose response were collected and used for the analysis of the results.

Moreover, statistical analysis in terms of graphical representations and hypothesis were simulated.

RESULTS AND DISCUSSIONS

The system was evaluated by 80 users who in turn rated based on its accessibility and reliability. Below are the evaluate tests for comparison of the newly developed system rated as follow:

The result of the evaluation of the developed system is as presented in tables 4.1 and 4.2; figures 4.1 and 4.2 below:

Table 4.1: Response of the users on the accessibility of the developed system

The developed system is easy to access	**Frequency**	**Percentage**
Strongly Agree	55	68.75%
Agree	20	25%
Disagree	5	6.25%
Strongly Disagree	-	-
Total	**80**	**100%**

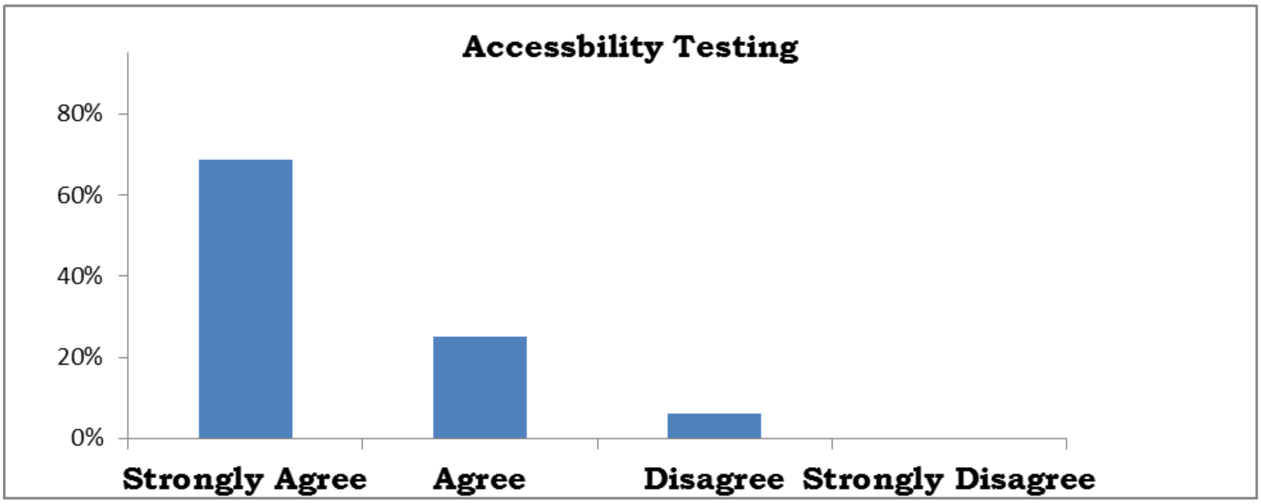

Figure 4.1: A Graphical Representation of the newly developed system.

Table 4.2: Response of the users on the Reliability of the developed system

The developed system is easy to access	**Frequency**	**Percentage**
Strongly Agree	52	65%
Agree	21	26.25%
Disagree	7	8.75%
Strongly Disagree	-	-
Total	**80**	**100%**

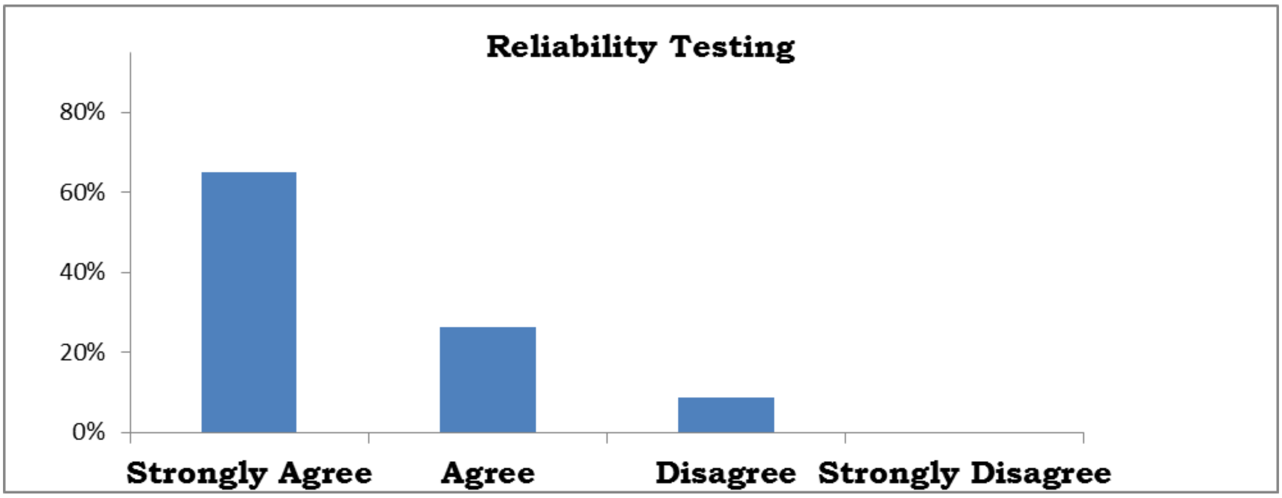

Figure 4.2: A Graphical Representation of the newly developed system.

Discussion of Findings

The table 4.1 and fig 4.1 shows that 75 agreed and 5 users disagreed that the system is easily accessible. The table 4.2 and fig 4.2 shows that 73 agreed and 7 users disagreed that the system is reliable. From the result shown in the table it is concluded that majority of the users agreed that the system is easy to access, reliable, available at any convenient time and fast in operation.

CONCLUSION

Bank Verification Number (BVN) is a biometric identification of customers in the financial industry launched by the CBN in February 2014, which is aimed at revolutionizing the payment System in the country. An Online Bank Verification Number banks was produced in this application. Through the new system, customers will be assigned a single identity within the financial system. It will help people who cannot be replicated, to tackle incidence of identity theft and enable banks to really identify their customers in the overall context of Know Your Customer (KYC) initiative. The existing method of queuing at the bank to collect and submit BVN enrolment form has been so stressful, time consuming and always at high cost. The new system would be very easy to use because of its accuracy and reliability. Information about BVN and the enrolment requirement can be promptly assessed easily.

Corrupt Nations of the world will effectively check corruption in Nigeria and also help Nigeria achieve her developmental goals and assume her place of pride in the League of Nations. We need not fear, as machines have no emotions.

The study discovered that the Nigerian financial regulators have not done enough in sensitizing the Nigerian populace about the relevance of the impact of electronic banking functionalities and it is evident from the result of the study that the level of illiteracy and ignorance of information technology constitute a great set back to the adoption and usage of electronic banking by over 60% of the Nigerian populace.

RECOMMENDATION

The study thereby recommend amongst other things that financial regulators should stem up sensitization activities on installation, adoption and usage of electronic banking which can only be possible through improved awareness creation among the public on information technology. Moreover, the study also recommended an increase level of technical education and improved training on information and communication technology amongst banking operators to enhance the application of the usage of electronic banking.

This study shows that the introduction of BVN and other reform in the banking sector (ie cashless economy) in Nigeria can be seen as a step in the right direction.

It is expected that its impact will be felt in modernization of Nigeria payment system, reduction in the cost of banking services as well as reduction in high security and safety risks. This should also include curbing banking related corruptions and fostering transparency. It is also assumed that the introduction of cashless policy in Nigeria will help to reduce the amount of bills and notes circulating in the economy. This should, therefore, reduce handling operation cost incurred on conventional money, as well as reduction in cash related crimes. It should also help to provide easy access to banking services for Nigerians.

Lastly, provisions should be made to ensure that all the members of staff are given equal opportunity for training in the use of computer for greater efficiency and implementation of the BVN policy. The following are future recommendations.

i. It would be interesting if there could be a very secure system whereby, anyone can log on from their phone, tablet or computer and access the registration site and enroll themselves.

ii. There is need to do a further research on the customer account liking process in the case where one person as more than three names and at least two will be required to link the account.

iii. It would be good if the database was larger such as it has a full scale of the background of each customer from place of birth to time of death and it automatically deletes the BVN at the time of death.

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ENTREPRENEURSHIP EDUCATION PROGRAMME: AN EVALUATION OF STUDENT PERFORMANCE IN POLYTECHNICS.

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Abstract

Entrepreneurship education was introduced to tertiary institutions in Nigeria to give students skill acquisition. The purpose is to equip them for establishing and managing small scale enterprises before graduation and be able to sustain such enterprises thereafter. The enterprises serve as means of being gainfully employed if paid employments are not forthcoming after graduation. This tends to curb the rising level of unemployment among youths and the attendant social vices. The aim of this study is to evaluate the performance of students in entrepreneurship education after exposure to all the courses taken during their academic training. Survey research design was used for the study. Three research questions and three research hypothesis were raised to guide the study. Through stratified sampling procedure, HND 2 students of Yaba College of Technology from School of Science and School of Management and Business Studies were selected for the study. Students from Department of Computer Technology and Department of Biochemistry were selected from School of Science while students from Department of Accountancy and Department of Office Technology Management were selected from School of Management and Business Studies to participate in the study. Data used for the study were the grades obtained by those students from the final entrepreneurship education course taken by them and were analysed using frequency count, percentage, and t-test. All hypotheses were tested at 0.05 significant level. Results from the study revealed that there were significant differences in student performances in entrepreneurship education across the Schools and Departments. It is recommended that more efforts should be geared towards qualitative delivery of the programme and incubation centres should be established in all Polytechnics to enable students benefit immensely from the programme.

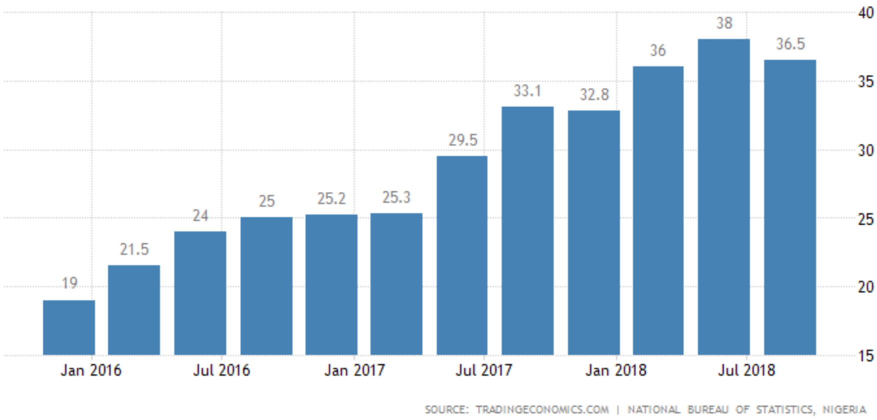
Key words: Entrepreneurship, Entrepreneurship Education, Tertiary Institutions, Students, Entrepreneur, Performance

1.0 Introduction

The Federal Government of Nigeria in the year 2003 reviewed (modified) the curriculum of tertiary institution's by including a compulsory entrepreneurship education for all undergraduates in all fields of study, as an alternative measure geared towards the utilisation of the teeming human resource turnout as well as reducing graduate unemployment problem in the country. Entrepreneurship education globally is geared towards preparing youths particularly students in school to be responsible enterprising individuals who will become entrepreneurs and contribute to the economic growth of the community in which they are located and the society at large. Entrepreneurial activity is important in a nation for sustainable national development because it encourages ingenuity, creativity, innovation and promoting a business oriented culture among youths. Entrepreneurship education programme in tertiary institution is tailored towards equipping students, irrespective of their field of specialisation, with knowledge and skills that will enable them set up income yielding businesses (enterprises/ventures) if they are unable to secure jobs after graduation from school. Furthermore, it was meant to instill entrepreneurial mindset in students which will enable them to be useful to themselves and to the larger society. The directive made it mandatory for all Nigerian universities to offer entrepreneurship education (EE) to undergraduates commencing from 2007/2008 academic year (Yakubu; 2007 and Nwite, 2007).

1.1 Statement of the Problem

The Federal Government introduced entrepreneurship education into the curriculum of tertiary institutions in Nigeria in the year 2003. The aim of the government was to make students acquire additional education to what is given from their main field of study. Entrepreneurship education is to make students acquire entrepreneurial knowledge and skills which will help make them to be creative, innovative and self-reliant, so as to make them more employable after graduation from school. However, from recent studies conducted, it was discovered that the rate of youth and graduate unemployment in Nigeria is still high. Jacob and Ariya (2015), in a study reported that every year thousands of graduates are turned out for whom there are no jobs. There are many youth hawkers on Nigerian streets, who ordinarily would have found gainful employment in some enterprises. Trading Economics (2019) reported that youth unemployment rate in Nigeria from 2016-2018 on the averaged was 23.63%, and during the second quarter of year 2018 it escalated to 38%. This study was conducted to evaluate the performance of Science based and Management based students after exposure to entrepreneurship education during their academic programme to ascertain if they have acquired enough knowledge and skills to be self-employed or establish businesses after graduation which is the core objective of exposure to the programme.



1.2 Objectives of Study

The study set out to evaluate the performances of Science based and Management based students in the entrepreneurship education programme undertaken during the academic training. Specifically, it:

1. examine the performance HND 2 Science based and Management based students.
2. examined the performance of HND 2 students in Departments of Biochemistry and Department of Computer Technology.
3. examined the performance of HND 2 students in Departments of Accountancy and Department of Office Technology Management.
4. determined if there is any difference in the performance HND 2 Science based and Management based students.
5. determine if there is any difference in performances of HND 2 students in Department of Biochemistry and Department of Computer Technology.
6. determine if there is any difference in performances of HND 2 students in Department of Accountancy and Department of Office Technology Management department.

1.3 Research Questions

The following research questions were raised to guide the study:

1. What is the level of performance of HND 2 Management based (Accountancy and Office Technology Management) students in entrepreneurship education?

2. What is the level of performance of HND 2 Science based (Biochemistry and Computer Technology) students in entrepreneurship education?

3. What is the level of performance of HND 2 Science based and Management based students in entrepreneurship education?

1.4 Research Hypotheses

The following research hypotheses were formulated and tested in the study:

1. Performance of HND 2 students in Department of Accountancy in entrepreneurship education will not significantly differ from performance of HND 2 students in Department of Office Technology Management.

2. Performance of HND 2 students in Departmant of Biochemistry in entrepreneurship education will not significantly differ from performance of HND 2 students in Department of Computer Technology.

3. Performance of HND 2 Science based students in the entrepreneurship education will not significantly differ from the performance of HND 2 Management based students

2.0 Literature Review

2.1 Concept of Entrepreneurship Education

Entrepreneurship Education is the acquisition of knowledge, skills, abilities and competencies which enable individuals/students to be independent, leading to the creation of new jobs and business on their own which is necessary for societal development. Jacob and Ariya (2015) defined entrepreneurship education as the type of education which will assist students to think creatively in order to acquire knowledge, develop desirable attitude and skills for self-reliance. This in turn will help them to contribute meaningfully to the political and socio-economic development of their society**.**

In addition, Nigeria University Commission (NUC) reiterated that entrepreneurial studies are out to making beneficiaries to think creatively to job creation during their undergraduate days and after graduation from the university. The NUC embarked on the promotion of the programme in tertiary institutions in Nigeria with the following objectives; empowerment of the people (students), creation of employment, diversification in business and individual confidence. All the objectives are tailored towards reducing unemployment and boosting the economy of the nation.

2.2 Objectives of Entrepreneurship Education

Entrepreneurship education is a functional education centered on making graduates to be job producers rather than job seekers. Paul (2005) and Oborah (2006), highlighted the objectives of entrepreneurship education. The following are some of them which are centred around students and youths:

1. To provide meaningful education to the youth which will make them become self-reliant and subsequently encourage them to derive profit and become self-dependent.

2. Provide graduates with the training and support necessary to help them establish a career in small and medium size business.

3. Offer institution graduates with enough training that will make them to be creative.

4. Provide the graduates with training in skills that will make them meet the manpower needs of the society.

5. Provide graduates with enough training in risk management to make uncertainty bearing possible and easy.

2.3 Importance of Entrepreneurship Education

The importance of Entrepreneurship Education (EE) cannot be over emphasized. Entrepreneurial knowledge, abilities and skills contributes positively to the growth of economic activities which is capable of creating jobs and self-employment for youths and young graduates. This will in turn lead to employment of economic resources. Entrepreneurship Education helps in establishing a strong economy through increased employment, reduction in the level of poverty and synergy among entrepreneurs for the benefit of the masses. Moreover, the acquisition of entrepreneurial skills will enable entrepreneurs to recognize opportunities and also to take advantage of the by generating business idea which if satisfactorily implement increases the number of enterprises established within the economy.

However, research findings (Olokodun, 2017; Aladejebi, 2018) have shown that entrepreneurship education in all higher institutions of learning in Nigeria will assist to expose the business potentials of graduates despite their various disciplines. Thus, it is believed that the present youth/graduate restiveness in the country today resulting from the frustration of unemployment can be addressed by strengthening the capabilities of the youth in enterprise development. It is therefore, imperative to expose all students in tertiary institutions irrespective of their various disciplines to entrepreneurship education.

2.4 Empirical Studies

Many researchers have been conducting studies on entrepreneurship education in recent times. This study, therefore attempted to review some of the studies that have been carried out by scholars on this subject that has being attracting attention globally.

Examining a study conducted by Oyebola, Irefin and Olaposi (2015) on evaluation of entrepreneurship education in Nigerian universities. The result of the analysis revealed that the respondents had impressive opinion about the entrepreneurship education delivered in Nigerian universities. For instance, a high percentage (77%) of the student respondents and 62% of the graduate respondents rated the content of entrepreneurship lectures as excellent, very good or good. Summarily, the study revealed that majority of science and engineering students and graduates of the selected universities were of the opinion that the contents of the entrepreneurship courses were adequate and relevant for venture creation. In addition, the study found that students have sufficient theoretical knowledge of the skills taught. Results of correlation analysis showed that factors such as entrepreneurship training, relevance of entrepreneurship lectures, full knowledge of the entrepreneurship courses, adequacy of course duration and feasibility of the principles learned have significant and positive relationship with number of business opportunities identified by the graduates

Similarly, in a study conducted by Alabi and Akande (2016), on empirical study of effect of entrepreneurship education on entrepreneurial intention among universities' students in Nigeria, it was discovered that the teaching of entrepreneurship courses can provide entrepreneurial intention among students and also create a platform for future establishment and growth of small scale enterprises. The study also found that entrepreneurship education has significant effect on entrepreneurial intention and that proper entrepreneurship education exposure will enable students to have positive attitudes towards choosing entrepreneurship as a mean of livelihood.
Another study on evaluating the entrepreneurship education programme in Nigerian universities for sustainable development conducted by **Aja,** Onoh and Igwe (2018), it was reported that there are inadequate trained lecturers/instructors, instructional facilities/materials for teaching entrepreneurship education and the entrepreneurship curricular contents are relevant for sustainable development in Nigeria but does not fully equip students with adequate knowledge, resources and skills to establish on their own.

3.0 Methodology

The research design for the study is descriptive survey. The population for the study comprises all the final year Higher National Diploma (HND) students of Yaba College Technology, Lagos. Stratified sampling procedure was used throughout the stages of selection. Two schools were selected out of the six schools running programmes of study for students. The two schools are School of Management and Business Studies (SMBS) and School of Science

(SS). From the SMBS, all students in Department of Accountancy and Department of Office Technology Management in their final year were selected and from SS, all students in Department of Computer Technology and Biochemistry in their final year were selected. Students running both Full Time and Part Time programme were selected for the study. The total number of students that participated in the study was 1063. The data used for the study were the grades obtained by the students from the final entrepreneurship course taken by the sampled students. Data was analysed with SPSS statistical package version 20. The data is analysed using frequency count, percentage and t-test. All hypotheses are tested at 0.05 significant level.

4.0: Data Presentation and Analysis

4.1: Socio-Demographic Analysis of Students

Table 1: Classification of Students by School, Department and Mode of Study

School of Management		**School of Science**	
Department and No. of Students	**Department and No. of Students**	**Department and No. of Students**	**Department and No. of Students**
Accountancy: Full Time Part Time 356 144 **Total**=500	**(OTM):** Full Time Part Time 138 33 **Total**=171	**Computer Technology:** Full Time Part Time 214 96 **Total**=310	**Biochemistry:** Full Time Part Time 74 8 **Total**=82

4.1: Analysis of Results

Research Question 1: What is the level of performance of HND 2 Management based (Accountancy and Office Technology Management) students in entrepreneurship education?

Table 2: Performance of HND 2 Management Based students in Entrepreneurship Education

(Management) Department:	**Frequency**	**Percentage**	**Department:**	**Frequency**	**Percentage**
Accountancy			**OTM**		
Poor	32	6.4	Poor	Nil	Nil
Average	212	42.2	Average	51	29.8
Good	230	46	Good	88	51.5
Outstanding	26	5.2	Outstanding	32	18.7
Total	500	100	Total	171	100

Result from the study revealed that OTM students' performance was better than that of the Accountancy students. A total of 32 (18.7%) OTM students had outstanding performance in entrepreneurship education while 26 (5.2%) of the students in Accountancy had outstanding performance. Similarly, there was no poor performance among OTM students while 32 (6.4%) students from Accountancy had poor performance.

Research Question 2: What is the level of performance of HND 2 Science Based (Biochemistry and Computer Technology) students in entrepreneurship education?

Table 3: Performance of HND 2 Science Based students in Entrepreneurship Education

SCHOOL (Science)	**Frequency**	**Percentage**		**Frequency**	**Percentage**
Computer Technology			**Biochemistry**		
Poor	1	0.3	Poor	Nil	Nil
Average	43	13.9	Average	Nil	Nil
Good	182	58.7	Good	21	25.6
Outstanding	84	27.1	Outstanding	61	74.4
Total	310	100	**Total**	82	100

Result from the study revealed that Biochemistry students' performance was better than that of the Computer Technology students. A total of 61 (74.4%) of the Biochemistry students had outstanding performance in entrepreneurship education while 84 (27.1%) of the students in Computer Technology had outstanding performance. Similarly, among the Biochemistry students there was no poor (0%) performance while among Computer Technology students there was only one (0.3%) poor performance.

Research Question 3: What is the level of performance of HND 2 Science based and Management based students in entrepreneurship education?

Table 4: Performance of HND2 Science Based and Management Based students in Entrepreneurship Education.

SCHOOL (Science)	**Frequency**	**Percentage**	**(BMS)**	**Frequency**	**Percentage**
Poor	1	0.3	Poor	32	4.8
Average	43	11	Average	263	39.2
Good	203	51.7	Good	318	47.4
Outstanding	145	37	Outstanding	58	8.6
Total	392	100	**Total**	671	100

The result of the study revealed that Science based students' performance in entrepreneurship education was better than Management based students. A total of 145 (37%) students in the School of Science had outstanding performance in entrepreneurship education while 58 (8.6%) students in School of Business and Management Studies had outstanding performance. Similarly, 1(0.3%) student had poor performance among the Science based students while 32 (4.8%) students had poor performance among the Management based students. The total number of students that scored above average in the examination conducted from the two schools of study sampled were 724 (68.9%).

4.3: Test of Hypotheses

Hypothesis 1: Performances of HND 2 students in Department of Accountancy in entrepreneurship education will not significantly differ from that of HND 2 students in Department of Office Technology Management department (OTM).

Table 5: T-test analysis on difference in performance of Accountancy students and OTM HND 2 students in entrepreneurship education.

	Department	N	Mean Score	Df	t-value	Sig.
Students' scores	Accountancy	500	58.9	669	5.69	.000
	OTM	171	63.0	393.65	6.56	.000

Table 5 shows the t-value of 5.69 and 6.56 with degree of freedom (df) of 669 and 393.65 with significant Alpha value of .000 which is below .005 level of significance set for Alpha. The null hypothesis is therefore rejected, performance of HND 2 students in Department of Accountancy in entrepreneurship education is significantly different from that of HND 2 students in Department of Office Technology Management department (OTM).

Hypothesis 2: Performance of HND 2 students in Department of Biochemistry in the entrepreneurship education will not significantly differ from performance of HND 2 students in Department of Computer Technology.

Table 6: T-test analysis on difference in performance of Biochemistry students and Computer Technology students in entrepreneurship education.

	Department	N	Mean Score	Df	t-value	Sig.
Students' scores	Computer Technology	310	65.7	390	7.62	.000
	Biochemistry	82	70.9	227.402	10.36	.000

Table 6 shows the t-value of 7.62 and 10.36 with degree of freedom (df) of 390 and 227.40 with significant Alpha value of .000 which is below .005 level of significance set for Alpha. The null hypothesis is therefore rejected, performance of HND 2 student in Department of Biochemistry in the entrepreneurship education is significantly different from performance of HND 2 student in Department of Computer Technology.

Hypothesis 3: Performance of HND 2 Science based students in the entrepreneurship education will not significantly differ from the performance of HND 2 Management based students.

Table 7: T-test analysis on difference in performance Management Based and Science Based students in entrepreneurship education.

	Classification	N	Mean Score	Df	t-value	Sig.
Students' scores	Management	671	59.9	1061	13.94	.000
	Sciences	392	66.7	1026.493	15.25	.000

Table 7 shows the t-value of 13.94 and 15.25 with degree of freedom (df) of 1061 and1026.50 with significant Alpha value of .000 which is below .005 level of significance set for Alpha. The null hypothesis is therefore rejected, performance of HND 2 Science based students in the entrepreneurship education is significantly different from the performance of HND 2 Management based students.

5.0 Discussion of Result

The research questions raised for the study basically addressed the performance of HND 2 students in entrepreneurship education received during their academic training. The performances revealed that a large percentage of the students had good and outstanding performances in the course. From the School of Science, a total of 348 (88%) students had good and outstanding grades, similarly from the School of Management and Business Studies, a total of 376 (56%) of the students had good and outstanding grades. In addition, the study also revealed that more students in the School of Science performed much better than students in the School of Management and Business Studies. The implication of this is that, the knowledge and skills students were exposed to are capable of providing adequate preparation for start-up, management and sustenance of enterprises when it is established. Furthermore, entrepreneurship as a field of study is more tilted towards the field of management, but the result of the study has shown that irrespective of the field of study of students, they can benefit equally and maximally from the programme. This is reflected by the Field of Sciences having a greater number of students with good and outstanding performances than the students in the Field of Management.

The hypotheses tested from the study addressed if there were significant differences in the performance of students across the Departments, the Schools and the Mode of Study.

The study revealed that there were significant differences in performances of students in entrepreneurship education across the departments. Performances of students in the School of Management and Business Studies differed significantly, looking at the mean score, OTM students had a higher mean score (63%) than the mean score (58.9%) of Accountancy students. Similarly, the study also revealed that there were significant differences in the performances of the students in the School of Sciences, particularly the students in the Department of Biochemistry had a higher mean score (70.9%) than the mean score (65.7%) of students in Department of Computer Technology. Performance between the two sampled Schools (Management and Business Studies and Science) also revealed differences. The students in the School of Science had a higher mean score (66.7%) while students in the School of Management and Business Studies had a mean score of 59.9%.

Looking at some other studies conducted on entrepreneurship education, for example Aladejebi (2018), conducted a study on the effect of entrepreneurship education on entrepreneurial intention among tertiary institutions in Nigeria. It was discovered from the study that students enjoyed entrepreneurial education lessons, due to entrepreneurial education, they can successfully develop a business plan and also they want to be self-employed after completing school. The findings from Aladejebi (2018), seem to be in agreement with this study because given the good and outstanding performances of the students. This is reflected in the above average mean score obtained by a large percentage of the students involved in this study, it can be inferred that the students benefitted immensely from the programme and the likelihood of starting their businesses after graduation from school is very high. In the same vein, a study was carried out on perceptions of students on entrepreneurship education and entrepreneurial intentions in selected Nigerian universities by Olokundun (2017), it was reported that entrepreneurship curriculum contents had significant impact on students critical thinking and generation of business ideas, entrepreneurship pedagogy significantly affect students shared vision and identification of business opportunities, teaching methods in entrepreneurship significantly stimulate students' interest and business start ups and university support systems significantly enhance knowledge sharing and innovations among students. Given the outstanding performance of the students sampled in this study, it can be deduced that the knowledge and skill acquired during their academic training is capable of helping them to demonstrate creativity and critical thinking skills which is the basic foundation of venturing into entrepreneurial activities.

5.1 Conclusion

The research result revealed that students' performance in entrepreneurship education programme while at school was very high. Specifically, students had good and outstanding performance as reflected by the above average scores obtained in the examinations conducted to determine the impact of entrepreneurship pedagogy. Furthermore, significant differences were reported in the performances of students across the Department and Schools of Study but no significant difference was found in students' performance when the Mode of Study was considered.

5.2 Recommendations

1. Government actions to promote entrepreneurship in tertiary institutions should be further intensified in order to achieve required aim of reducing unemployment for the increasing Nigerian graduate population.

2. Functional Incubation Centres should be established in all tertiary institutions, in order for students to practise what is taught and to give them the opportunity to incubate their businesses and nurture to maturity under the watch of capable mentors.

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STRENGTH IMPLICATIONS OF CRUSHED CONCRETE AS AGGREGATE FOR FRESH CONCRETE PRODUCTION

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Abstract

Concrete is the most widely used construction material across the world and in all types of civil engineering works and aggregate represents about 70-80 % of its components. This paper examines the strength implications of using crushed concrete as coarse aggregate for the production of fresh concrete. Fresh concrete was produce with four different mixes viz.; 1:1½:3, 1:2:4, 1:3:6 and 1:4:8. A total number of 96 cubes were casted for the test with 0.55 water cement ratio, 48 each for cubes produced with fresh aggregate and crushed concrete respectively. The concrete cubes were subjected to compressive strength test at curing ages 7, 14, 21 and 28 days respectively. The compressive strength of recycled concrete at the age of 28 days curing for mixes 1:1½:3, 1:2:4, 1:3:6 and 1:4:8 gave values of 22.3N/mm2, 20.7N/mm2, 19.8N/mm2 and 20.1N/mm2 respectively which shows an average performance strength of 84%, 86%, 90% and 100% respectively, as compared to the strength performances of the fresh concrete. The results gave a better hope on the use of recycled materials for the production of fresh concrete, although, it will be more preferable where low weight is required. The use of recycled concrete as aggregate would lead to reduction or elimination of cost expended on waste disposal from site and reduction in overall cost of the project.

Key Word: *Crushed Concrete; Fresh Concrete; Aggregate; Construction; Compressive Strength.*

Introduction

Socio-economic status of both developed and developing countries are on daily basis increasing. Government and the rich ones are more interested in building massive structures at the heart of the cities in the world to replace the old ones. The old structures in existence, some of which are no longer meeting with the environmental protection requirements are now been sold out , which in most times been demolished in order to pave ways for modern structures. Most of these construction and demolished (C & D) materials except for reinforcement steels which the less privilege in the society sees as hot cake, are dumped in the landfill and regarded as waste, while some community also take the advantage of packing it as fill materials for their poor roads.

Limbachiya, Meddah and Ouchagour (2012) reported that the cost of tipping and transporting a ton of C & D waste to landfill as $100.40 per kilometer. Continuous disposal of large tonnage of this C&D waste to landfill proved uneconomical, hence, consideration for its reuse as construction material in recycled concrete aggregate (Tiwari, 2015). Concrete is the premier construction material across the world and the most widely used in all types of civil engineering works, including infrastructure, low and high-rise buildings, defense installations, environmental protection facilities (Neville and Brooks, 1987). The use of recycled aggregates in concrete production opens a whole new range of possibilities for reuse materials in building industry as its utilization also provides solution to the problem of an excess waste material in landfill.

Different Authors had examined the effects of recycled aggregates as partial replacement of natural aggregates in construction industry, few of which are here reviewed. Krishan, Srishti, Nayan and Purnachandra (2019) examined the effect of recycled aggregate on mechanical and durability properties of concrete. In the research, effects of two different wastes (ceramic waste and C&D waste), silica fume and fly ash were monitored separately as partial replacement of natural aggregate on concrete in different proportion. It was observed that the mechanical properties of concrete with recycled aggregate are slightly lower to the normal concrete.

The rate of water absorption of concrete with recycled aggregate at varying proportions (0%, 15%, 30%, 60% and 80%) increases with an increase in recycled aggregate (Saurabh, Suman and Bhuveshwar, 2019). The reuse of C&D waste in construction industry as affirmed by Vladimir, Denis and Myhammet (2019) reduces the load on municipal landfills and the costs of new urban building. Surya *et al* (2013) examined the effect of fly ash as admixture on recycled concrete aggregate concrete for transportation infrastructure. Mechanical properties of concrete with 0%, 50%, 75% and 100% replacement of natural aggregate with recycled aggregate was established. Though, the compressive strength of concrete made with natural aggregate without fly ash appreciated in values at day 3, 7 and 28 more than the one with fly ash, the result dropped with increase in curing age beyond 28 days. The compressive strength of concrete with recycled aggregate were inconsistent with increase in the quantity of recycled aggregate. With the fluctuation observed in the strength, it is noteworthy that the strength of 100% recycled aggregate concrete performed higher than the natural aggregate from curing ages more than 14 days.

The ability of any structures to withstand loads imposed on it majorly hinge on the strength properties of the materials used in construction. In some regions, the cost of acquiring recycled concrete aggregate may range between 65% and 70% of the cost of acquiring natural aggregates, due to the high rate of demolition. This article therefore, examined the use of recycled coarse aggregate as fresh aggregate in construction industry and its effect on the concrete strength.

Materials and Methods

The materials used for this research are cement, coarse aggregate, fine aggregate and water. They were obtained within Ado - Ekiti, Ekiti State metropolis. Ordinary Portland cement produced by Elephant Portland Cement Company procured from a retail's shop in Ado – Ekiti was used for the research, while the fine aggregate used was naturally occurring sand free from silt and organic materials. Coarse aggregate used are fresh granite from quarry and recycled granite from crushed concrete. The fresh granite obtained a Quarry in Ado-Ekiti, Ekiti state mixed with other concrete constituent materials was used to produce the control samples while the recycled granite which was gotten from the waste site of the concrete laboratory, Federal Polytechnic, Ado Ekiti, Ekiti state was used to reproduce a fresh concrete. The granite used had an average graded size of 20mm diameter and was free from organic material or soil.

Experimental program of work

Crushed concrete cubes were packed from the refuse site of concrete laboratory, the Federal Polytechnic, Ado-Ekiti (7˚35'26.25"N, 5˚17'47.58"E) and further crushed to smaller bits. Coarse aggregate extracted from the crushed cubes in accordance with American Society for Testing and Materials (ASTM D8038) and washed with 2.36mm sieve for easy removal of cemented fine particles in the coarse aggregates. The washed aggregates were later used as coarse materials for the production of recycled concrete. Forty-eight (48) concrete cubes were casted each for fresh (control specimen) and recycled concretes with four different mix ratios namely; 1:1½:3, 1:2:4, 1:3:6 and 1:4:8with water cement ratio of 0.55.

The concrete (batch by weight) was mixed manually on a platform with the aid of spade and 12 specimens were casted for each mix. Concrete was poured into the lightly lubricated moulds in three layers such that each layer was about one third height of the mould. Each layer was compacted with a tamping rod of cross – sectional area of 25mm^2 exerting 35 blows in each layer (British Standards, 1996), the last layer was placed in excess, which was later scrapped off to enhance a full mould. The surface was smoothened to give a better surface finish. The cubes were left for 24hours in the moulds after which they were demoulded, cured in a water bath and subjected to compressive strength at curing ages; 7, 14, 21 and 28 days respectively (Figure 1).

Fig. 1. Pictorial representation of laboratory stages involved in achieving the compressive strength test.

Data presentation and discussion

- Gradation test

Coarse aggregate extracted from the crushed concrete was subjected to gradation test in accordance with British Standards Institution (1992 and 1997). The aggregate sizes from the graph as shown in Figure 2 indicates gravelly material of medium size, this therefore necessitate the use of 25mm granite that was used as fresh aggregate for the control samples.

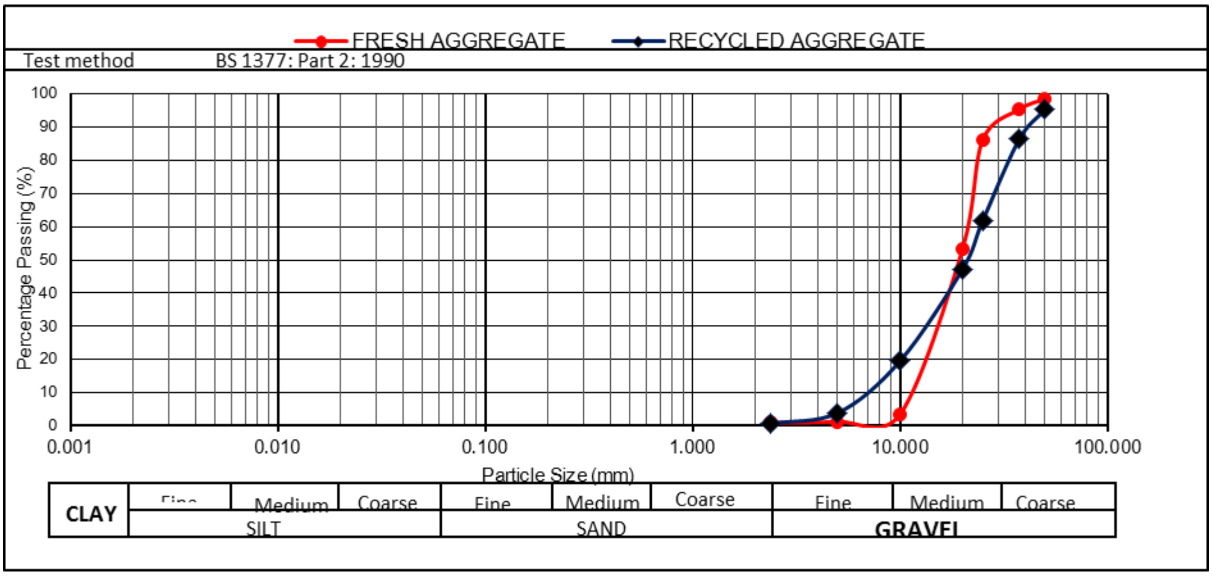

Fig. 2. Percentage passing against sieves sizes.

- Compressive Strength test

This test was carried out using the electric compression machine. The load obtained at failure points of three different cubes were recorded from the attached scale of the compression machine in kN (Kilo newton). The loads (exerted force) were divided with the cross sectional area of the cube and the average strength of the cubes were determined.

$$\text{Compressive strength} = \frac{\text{Force exerted on concrete at failure}}{\text{Cross sectional area of cube}} \quad (1)$$

Table 1 shows summary of the compressive strength of both the fresh and recycled concrete at the prescribed mix ratios and curing ages. From the results, it was observed that the recycled concrete generally showed a considerable increase in strength as the curing age increases. A critical analysis of the result shows that recycled concrete attained an average percentages of 84, 86, 90 and 100 strength compared to the fresh concrete at concrete mix 1:1½:3, 1:2:4, 1:3:6 and 1:4:8 respectively. Figures 3, 4, 5 and 6 shows the compressive strength attained by the recycled concrete and control concrete at predetermined curing ages for concrete mix 1:1½:3, 1:2:4, 1:3:6 and 1:4:8 respectively. A glance look at the compressive strength results of the different mix as shown in Figure 7 revealed that concrete mix 1:4:8 with recycled aggregate improves better than control specimens of the same mix from curing age 14 and above.

Table 1. Results of compressive strength test on fresh and recycled concrete.

Mix Detail	**1:1½:3**				**1:2:4**				**1:3:6**				**1:4:8**			
Curing Age	days	4 days	1 days	8 days	days	4 days	1 days	8 days	days	4 days	1 days	8 days	days	4 days	1 days	8 days
Fresh (N/mm^2)	16.5	19.6	23.5	30.4	15.6	17.2	22.0	25.1	14.1	15.9	19.3	23.4	12.3	13.3	16.4	19.7
Recycled (N/mm^2)	15.2	16.7	19.6	22.3	14.5	15.2	17.6	20.7	12.6	15.0	17.8	19.8	11.6	13.7	16.5	20.1

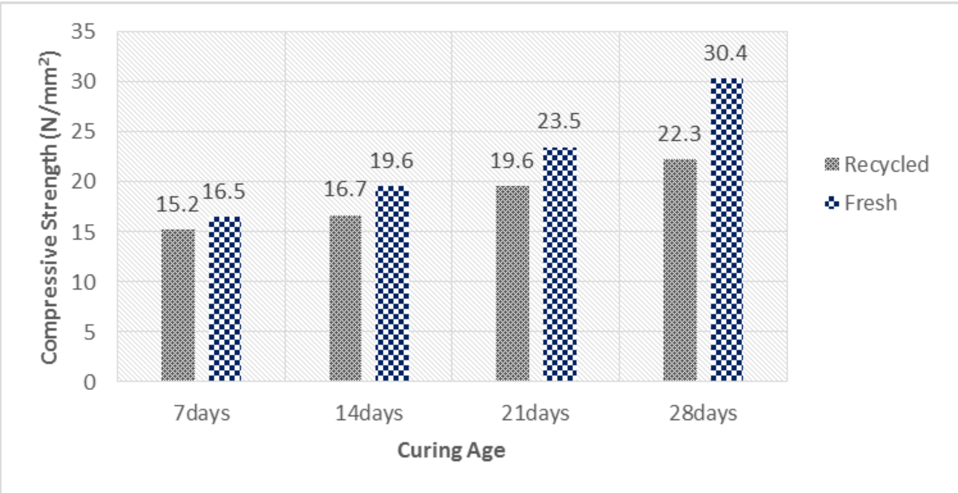

Fig. 3. Compressive strength against curing age of 1:1½:3 concrete.

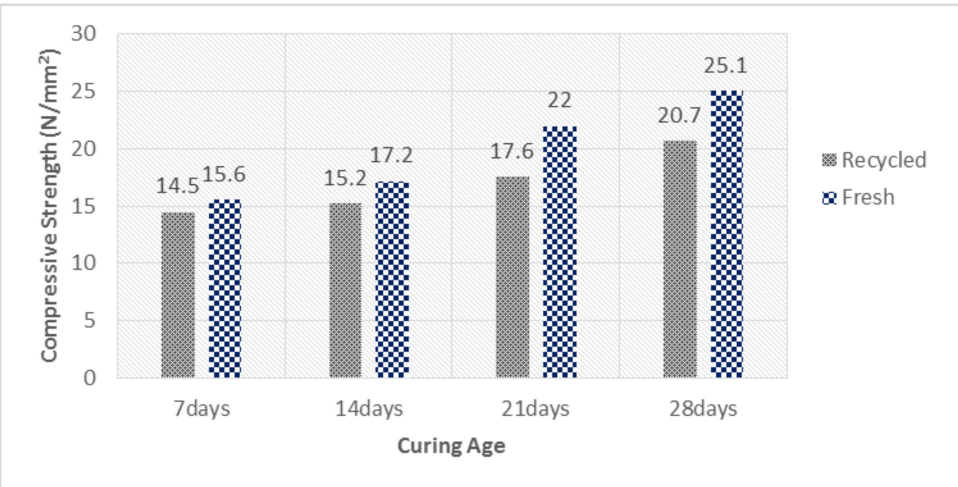

Fig. 4. Compressive strength against curing age of 1:2:4 concrete.

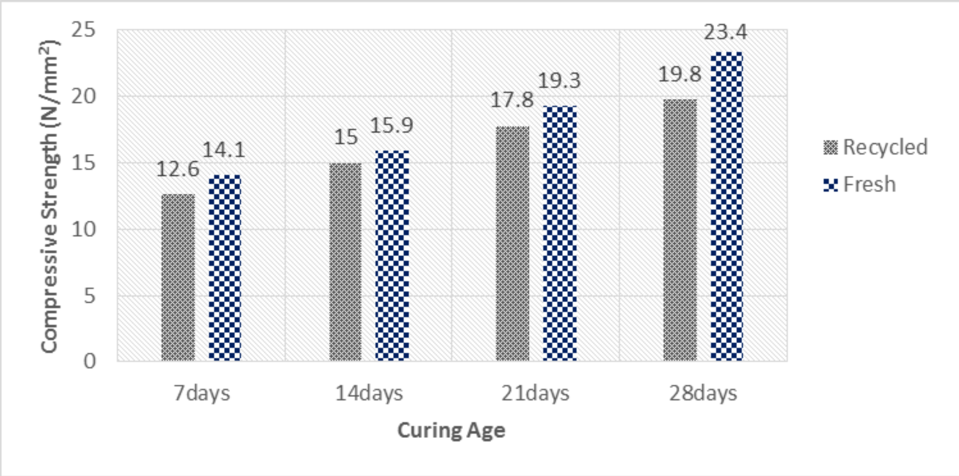

Fig. 5. Compressive strength against curing age of 1:3:6 concrete.

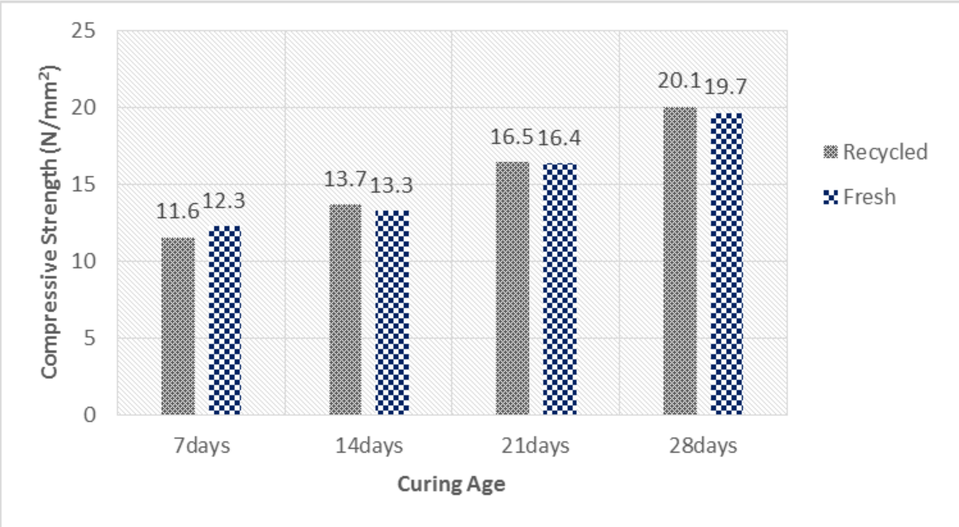

Fig. 6. Compressive strength against curing age of 1:4:8 concrete.

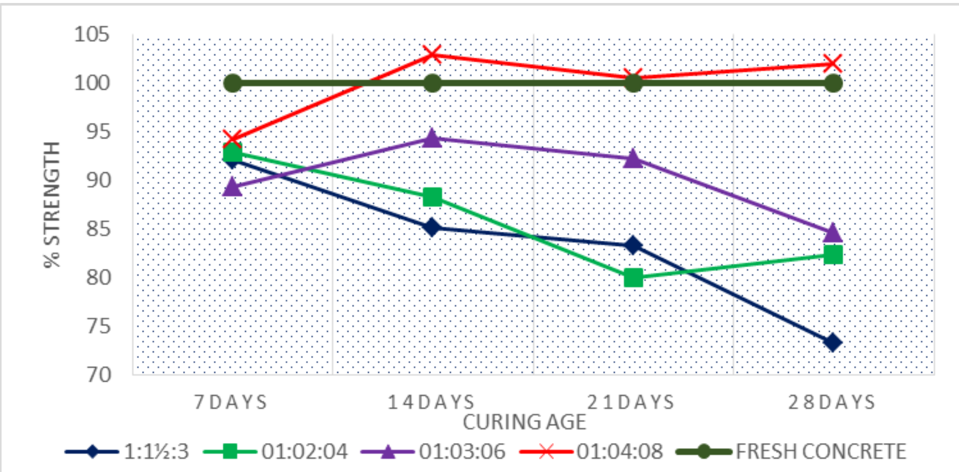

Fig. 7. Percentage compressive strength performances of recycled aggregate concrete vs fresh concrete

Conclusion

From the analysis of the results of tests conducted on the concrete produced from crushed concrete, it was observed that the strength of fresh concrete is higher than that of the recycled concrete, except for the one with the lowest grade (1:4:8) which was having the recycled concrete's strength in par with the ones produced from fresh materials of the same mix. The strength of concrete produced from the fresh and the recycled materials irrespective of the mix, improved with increase in their curing age.

Recommendations

Having keenly examined the performances of recycled aggregate concrete to that of fresh aggregate concrete, the following recommendations were made:

1. Effects of partial replacement of fresh aggregate concrete with recycled aggregate concrete should be examine.
2. Recycled aggregate concrete should be cheered for light or plain construction works that requires less strength.
3. Proper reinforcement will be of support, should it be proposed for heavy duty works.

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AN ASSESSMENT OF THE IMPACTS OF COVID-19 ON CONSTRUCTION INDUSTRY: SAKI TOWNSHIP ROAD CONSTRUCTION AS A CASE STUDY

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Abstract

The outbreak of coronavirus or COVID-19 unexpectedly has hit hard the whole world and the systems and its impacts continue to threaten lives. It appeared increasingly likely that proactive, protective measures along with their restrictive effects on economy and construction activities continue. In order to stop the spread of the pandemic, the Federal Government of Nigeria was forced to implement travel restrictions, lockdowns curfews and stay at home orders. As a result of those orders, construction companies have been forced to delay some projects while fewer essential projects were allowed to continue. This delay/slow in construction works has in turn has notable significant effects on the clients, users, construction workers and construction industry. This study uses the road construction project of Saki Township as the case study. Interview method was used to collect data/information from some of the stakeholders. The study then identifies that the delayed road to be constructed has become a death trap to the users, turns the workers to be jobless and causing liquidity problems to the industry. The study recommends that there should be contract review and identifying the contract clauses in order to understand the claims. Also, the risk involved should be evaluated.

Key words: Construction Industry, COVID-19, pandemic, impacts, liquidity.

INTRODUCTION

In 2019, the sudden appearance of COVID-19 was firstly reported in Wuhan city, China (Hui, Azhar& Peterson, (2020).This disease is infectious and considered by the World Health Organization (WHO) as a pandemic as it spreads all over the world drastically (WHO 2020).Gamil and Alhagar (2020) stressed that, the pandemic (COVID - 19) has a very severe consequences on the people and the economic due to the spread of the disease all over the countries. This has led to many countries facing recession and economic meltdown.

One would recall that, during the outbreak of the said virus, the government of the countries declared lockdowns, social distance, stay-at-home orders in order to curtail the spread of the virus. This has led to shutting down of all businesses/activities in which construction industry is not excluded. Construction works include public works, public facilities, commercial, residential, and mixed use projects as well as remodel and renovation work. The orders by which the countries are forced into, have turned out the lights on businesses, sends employees home and caused some construction works not to see the light of the day.

Chivilo, Fonte&Koger(2020) asserts that nature of impacts and extent of the ramifications depends on the location of both the respective businesses and underlying projects.

Parada (2020) opined that, the construction industries with high levels of debt and low cash reserves may face a liquidity crisis while those with smaller firms and sub-contractors may fail rapidly.

The impacts of the outbreak to the stakeholders has led to the need for the industry to addressboth short term and longtime business challenges as well as formulating projects by projects solutions in the face of a new global and national environment. It is against this backdrop that this study is set to assess the impacts of COVID-19 on construction project using a case study of Saki township road construction with a view to prevent future crisis on construction projects.

Review of Literature

The outbreak of coronavirus (COVID-19) disease, known to the world as a global pandemic has been the trending topic of the year which is drastically impacting the economy and disrupting the lives of people, businesses and other aspects including industries (Critelli,Ibara and Sahota, (2020) and Franzese (2020) added that, at the continuous spread of the said Corona Virus, the impacts on the construction industry are becoming more severe which has led to “forceful stopwork” orders in businesses and markets along with narrower definitions of ‘essential construction and fewer projects’ continuity.

Several studies have been attempted to investigate the effects / impacts of coronavirus on construction industries but the reviews are yet to be adequate due to uncertainty of the current

Situation.Harari (2020) expresses COVID-19 pandemic as the biggest crisis of the generation and that it may take years to recover. He further states that, action must be taken decisively to plan new strategies to avoid travail of humankind. As opined by Helm (2020), the total lockdown has severely curtailed the economic activities construction industries inclusive and paralysed businesses situation (Gamil and Alhagar, 2020). According to Odukoya, Akinboboye, Oladotun and Oghumu (2020), it is possible that investment contracts may be halted, given the large initial outlay required and which can result into liquidity problem after the pandemic. Also, the projects that are expected to commence may not as they may linger even after thepandemic. Moreover, lenders who have leveraged exposure are more likely to be affected by the pandemic, with defaults in repayment obligations by the investee companies (Odukoya et al, 2020).

The study by Critelliet. al(2020) reveals that the outbreak of the pandemic has led to the contract review which may eventually lead to termination to the contractor,increase in cost of materials and labour which eventually result into variation of the contract sum. Also, the productivity of the industry is limited due to limited supply of labour.

Statement of the Problem

Since 2019, when the World Health Organisation (WHO) has announced the outbreak of coronavirus (COVID-19) as global pandemic, researches have been put up in order to assess its impact on construction industry and infrastructure. The work of Critellietal (2020) on impact of COVID-19 on construction projects suggests the recovery road map to mitigate the aftermath of COVID-19, but it does not state the exact impact on the projects. Odukoyaetal (2020) on the impact of COVID-19 on infrastructure/projects and assets states the possible impactsof COVID-19 on projects but does not express the impacts as the real impact on construction projects. In addition to this, the Gamil and Alhagar (2020) on the impact of pandemic crisis on the survival of construction industry: a case of COVID-19 was carried out in Malaysia but not in Nigeria implying that the stated impacts might not really affect the construction works in Nigeria. This research is to really establish the impacts of COVID-19 on construction works in Nigeria especially in Oke-Ogun area, using the Saki township road construction work as the case study. This work will enlighten the people living in the environment andprofer solution to the problem (s).

Aim and Objectives

The aim of this study is to assess the impacts of COVID-19 on construction projects. A case study of Saki township road construction in order to prevent future crisis on the project with the following objectives.

i. To identify the impacts of coronavirus (COVID-19) outbreak on construction projects.
ii. To suggest the ways out of the problems impacted by COVID-19 to the stakeholders on each projects.

Research Method

This study adopted two types of method to collect data. The first method was exploratory interview which was conducted for the selected workerschosen at random in the project inorder to express their views and opinions on the state of the project mid the COVID-19. Also they were asked to explain the impacts of the pandemic on them as workers and on the industry. The second method was the use of structured questionnaire for the road users. The questionnaire was prepared using a 5 likert type scale.5 Extremely impacted, 4, very impacted 3, moderately impacted, 2 slightly impacted 1 Not impacted at all. The selection of sample size for the questionnaire survey was random sampling technique.

According to Sandelowski, (2000) and Gamil and Alhagar (2020), the random sampling technique is widely used in construction research where the sample is randomly selected from the population-based on non-zero probability. This technique is considered adequate because it produces a sampling representative of the population by avoiding any voluntary response bias. In addition to this Sharma (2017) opined that each member of the population has an equal chance of being selected as subject and the generalization of the results of the sample can be made back to the population. Since the road leads to the town, the population is large (assuming minimum of about 2,000 people per day), 10% of the population. Therefore, 200 questionnaires were administered but 170 were duly filled and returned.

Findings

The interview conducted with the workers revealed that the lockdown orders from the Federal Government of Nigeria with restrictions of movement caused the workers to go hungered. Since the work is based on daily pay. Even those who on the monthly pay were not promptly paid, those in the security units who were allowed to continue their work were also in the same shoe, in which finally resulted into deployment. They were unable to cater for all their dependents. The situation was unbearable for them because it was an incident that was not prepared for. The fear of losing the job is still a major disturbance to the workers after envisaging that the loss the industry has experience can lead to reduction in numbers of the workers. According to the information gathered, the sudden outbreak had thrown the industry out of balance because of the sudden stoppage of work. Some of the preliminaries that have been done had been destroyed by rain, (erosion), passage of vehicles, animals and man which has resulted into extra cost due to repetition of what had been accomplished before the pandemic. This could then be traced to wastage of capital (the money spent on both materials, workers' salaries and plants). It has also becomes a dangerous working environment to the workers that are left on site. Not only that, thereis increase in cost of labour and materials. It was during the pandemic that the Federal Government of Nigerian announced the sudden increase in cost of fuel. This has a great impact on the project because it eventually increases the labour cost. It was further discovered that the debt incurred by the company herself has a great impact on the running of the company and if there is no review of contract, the company might eventually lose it.

Findings from the road users

Respondents' profile

Table 1: Respondents' demography

Demography of the respondents	Status	Frequency	Percentage
Sex	Male	90	52.94
	Female	80	47.06
Age	Above 60years	75	44.12%
	50-60 years	40	23.53%
	40-50 years		19.41%
	30-40 years	33	
	Below 30 years		5.88%
		10	7.06%
		12	
Occupation	Civil Servant	45	26.47%
	Transporter (Driver)	54	31.76%
	Okada Rider		34.12%
	Student	58	0.59%
	Others		7.06%
		1	
		12	

The study embraces both male and female; i e. 52.94% male and 47.06% female showing that the study was not gender bias. The opinion of both sexes was regarded during the study. Also, the highest numbers of the respondents are adults of above 60 years of age. This establishes the authenticity of the study. The majority of the road users are motor drivers and okada riders. They were able to express their opinion on the road. People living adjacent to the road were also included in the interview. Some of them are civil servants, drivers and okada riders, student as well as other occupations. The study was carried out involving all the stakeholders; meaning that, those who can say one or two things about the road.

Findings from the road users

Table 2. Impacts of the pandemic to the road users

S/No	Impacts	5 Extremely Impacted Frequency/%	4 Very Impacted Frequency/%	3Moderately Impacted Frequency/%	2 Slightly Impacted Frequency/%	1 Not Impacted at all Frequency/%	Total
1.	Environmental pollution	120 70.59%	30 17.64%	20 11.76		-	170
2.	Destruction of property	100 58.82	50 29.4	-	10	10	170
3.	Loss of Lives	150 88.24	20 11.76	-	-	-	170
4.	Erosion	170 100%	-	-	-	-	170
5.	Reduction in Economic activities	60 35.29%	30 17.64	30 17.64	30 17.64	20 11.76	170
6.	Health Hazard	170 100%	-	-	-	-	170

The respondents' responses reveal that the pandemics impact on the construction of the road has not been bearable to them.

Environmental pollution: Extremely impacted is 70.59%, very impacted 17.64%, moderately impacted 11.76%. The pollution caused by the road has been in form of dust. The adjourned buildings /objects have been dusty and increase in the risk of being infected with respiratory disease (s).This is expected because by the time the pandemic started, surface leveling and compaction of the entire stretch of the road had just begun.

Destruction of properties: Extremely impacted 58.82%, very impacted 29.4%, All the properties along the site have been panted with dust which has turned the properties unattractive and rendered the commercial properties valueless. Not only that the adjourned building properties are no more safe to live in. The most of the solar light pannels' surfaces are covered with dust preventing sunlight penetration.

Loss of lives: Extremely impacted 88.24% and slightly impacted 11.76%. The respondents reported that the abandonment of the road has led to inability of some weak vehicles to accelerate higher to plight the highland. This is one of the major factors that contributed to the death of a lady hit by a DAF lorry when the vehicles failed to climb high. Not only that, many accidents have occurred claiming lives of both the cyclists and the passengers while some were carried away by erosion.

Erosion: the response was 100% on extremely impacted. Erosion is one of the obvious impacts of the pandemic on the road. The earthworks done which have not been compacted become aids to erosion. The said erosion has made the road worse than when the work has not started. Erosion has created gully and artificial highland on the major road. It has claimed life properties and the road itself.

Health hazard carries 100% extremely impacted. The risk of been infected with respiratory related disease (s) is high due to air pollution by dust.Since the signs and sympthons of COVID-19 is sneezing, coughing e.t.c.,the tendency of being tested be positive is high for the users.

Respondents' opinions on the way out

It was envisaged that, the possibility of reducing the numbers of workers is high; which can be a way out for the company to cope with the financial indebtness. This action if carried out will turn many workers jobless. Therefore, the company will deem it fit to pay the workers off since it will not be easy for them to get another job immediately.

Conclusion

This research has been carried out in order to assess the impact of the sudden outbreak of coronavrus disease on construction industry. It was gathered that one of the impacting factors to the workers is that they have not been paid while some have been dismissed without payment.In the nearest future, many workers will still be laid off for the company to cope with the financial obligations of the work. Not only that, the contractors may face legal issues due to nonconformity to contractual terms which was caused by the sudden stoppage of work. The company is also faced with some challenges like shortage of labour and increase in price of materials. Also, the road users are not comfortable with the situation of the road because of increase in accident, bad road,e.t.c

Summarily, the most impacting factors are delay payment of salary, loss of lives, erosion, environmental pollution, e.t.c. (as a result of sudden stoppage of work)

Recommendations

Having carried out this work, it is not recommended the following.

- There should be project review for the companies so that the contractual terms will be met,
- The company should pay the workers off; at least 3months and give them at least three months before they are finally deployed.
- The company should try as much as possible to reduce the risk of accident on the road and minimize erosion.

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MEDICINAL ASSESSMENT OF BITTER CHEW STICK (MASSULARIA ACUMINATA)AS A POTENT CHEW STICK USING GC-MS ANALYSIS

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Abstract

Maintenance of mouth hygiene through constant removal of dental plaque and food deposit plays a vital role in the prevention of dental caries and diseases. This study focused on elucidation of the presence of antimicrobial and other active components extractable from bitter chew stick (*Massularia acuminata*) commonly used as chew stick in southwestern part of Nigeria using a GC-MS procedure. The result obtained showed the presence of five major components (Octanoic acid, ethyl ester, Cyclopropane, nonyl, Decanoic acid, 1- Nonadecene, n-Heptadecanol-1) which possess antibacterial, antifungal, and anti-inflammatory properties. It can therefore be inferred that an adequate use of *Massularia acuminata* as chew stick will improve oral hygiene as it can be very potent as a toothbrush.

INTRODUCTION

It is generally accepted that oral hygiene maintenance through regular removal of dental plaque and food deposits is an essential factor in the prevention of dental caries and periodontal disease. Methods for oral hygiene vary from country to country and from culture to culture (Wu et al., 2001). Despite the widespread use of toothbrushes and toothpastes, natural methods of tooth cleaning using chewing sticks selected and prepared from the twigs, stems or roots from a variety of plant species have been practised for thousands of years in Asia, Africa, the Middle East and the Americas because of their availability, low cost and simplicity (Niazi et al., 2016). The plants used are very carefully selected for properties such as foaminess, hardness or bitterness and certain species are more popular than others. A great number of these plant species have related medicinal properties that may be antibacterial (Hooda et al., 2009)

Massularia acuminata, also known as bitter chewing stick is a medium sized shrub that grows up to 5 m high. The plant is native to tropical regions of Western Africa and known for its varied uses in trado-medical practice, especially its acclaimed potency as an aphrodisiac, antidiabetic, anti-carcinogenic, and antimicrobial agent. The stems of *Massularia acuminata* are traditionally used as chewing sticks to improve oral health. (Akande and Ajao, 2011)

Selected studies by Ndukwe et al, Bankole et al, Aderinokun et al, have shown that *Massularia acuminata* chewing sticks, when properly used, can be antibiotic and as efficient as a toothbrush in removing dental plaque. The aim of this study is therefore to establish the presence of antimicrobial and other active components extractable from *Massularia acuminata* chew stick using a GC-MS procedures.

MATERIALS AND METHODS

Sample collection

Sticks of *Massularia acuminata* (Pako Ijebu) were purchased from Ijebu-Igbo and authenticated by a botanist in the department of Science Laboratory Technology. The sticks were air dried and ground into powder. The powder sample was transferred into soxhlet extractor where the extraction with ethanol was carried out for a period of 7 hours. The extract was transferred to a storage bottle and kept in a refrigerator prior the analysis.

Gas Chromatography Mass Spectrometer (GC-MS) Analysis

The GCMS analysis of the Ethanol extract of the *Massularia acuminata* chew sticks was carried out in the laboratory by using GC Model 7890A and MS Model was 5975 ms D. The column used is HP-5 capillary column (30m, 0.32mm, 0.25N. The injection volume is (1.0N/L). Helium was used as the carrier gas with a flow rate of 1.8mL/min in a split less mode.

An aliquot of 2µL of ethanol solution of the sample was injected into the column with the injector temperature at 250^{o}C. GC oven temperature started at 90^{o}C initially then 3^{o}C per min at it was raised to 180^{o}C for 10^{o}C/min without holding. The injector and detector temperatures were set as 280^{o}C and 300^{o}C respectively. The mass spectrum of the compounds was obtained by simple ionization monitoring (SIM) for a total running time of 40 minutes.

RESULT AND DISCUSSION

Result obtained for the Gas chromatography-mass spectroscopy analysis of the ethanolic extract of *Massularia acuminata* is as shown in figure 1 below. In the analysis, some bioactive phytochemical compounds were identified. The identification of GC-MS analysis is based on the peak area (%), Retention Time (min), Molecular weight (g/mol), Molecular formula.

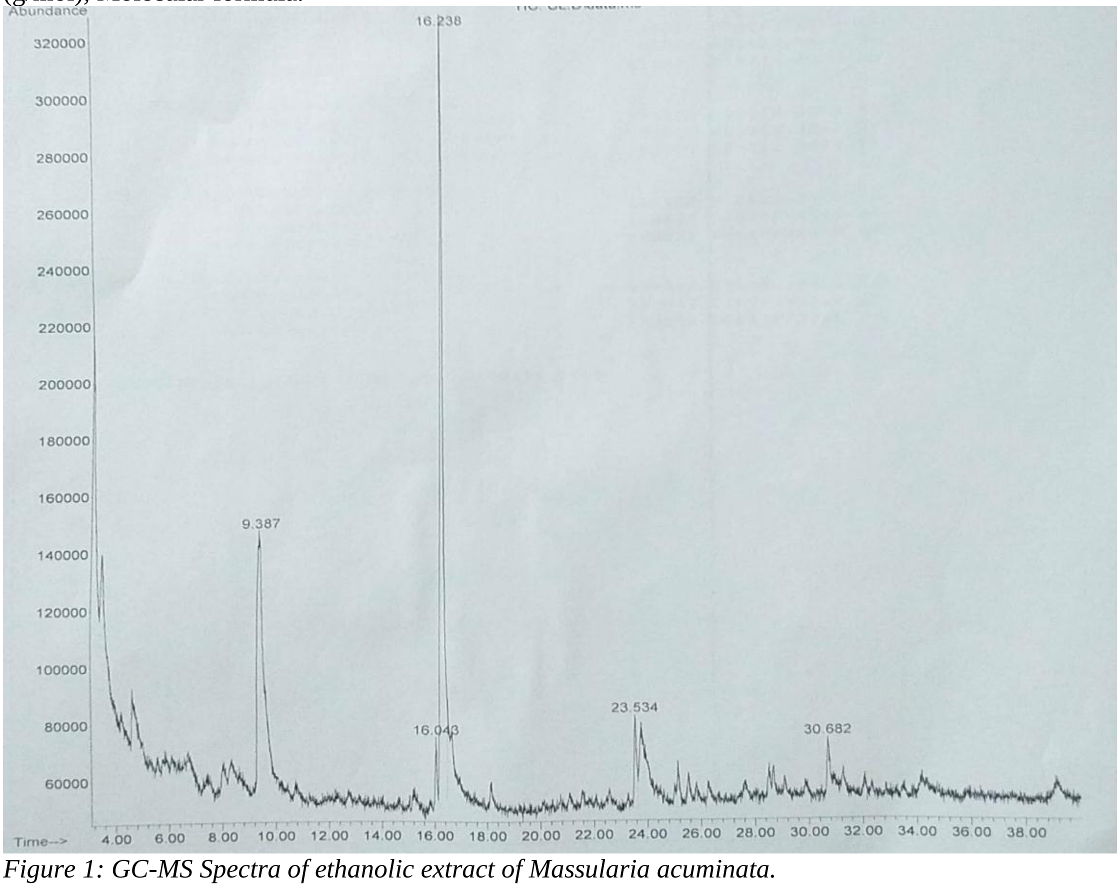

Figure 1: GC-MS Spectra of ethanolic extract of Massularia acuminata.

Table 1: **Bioactive Components Identified In The Ethanolic Extract Of *Massularia Accuminata***

S/N	Retention time (min)	Name of compound	Molecular formula	Molecular weight(g/mol)	Peak area %
1	9.387	Octanoic acid, ethyl ester	$C_{10}H_{20}O_2$	172	15.74
2	16.043	Cyclopropane, nonyl	$C_{12}H_{24}$	168	3.73
3	16.238	Decanoic acid, ethyl ester	$C_{12}H_{24}O_2$	200	69.88
4	23.534	1-Nonadecene	$C_{19}H_{38}$	266	6.29
5	30.682	n-Heptadecanol-1	$C_{12}H_{24}O_2$		4.37

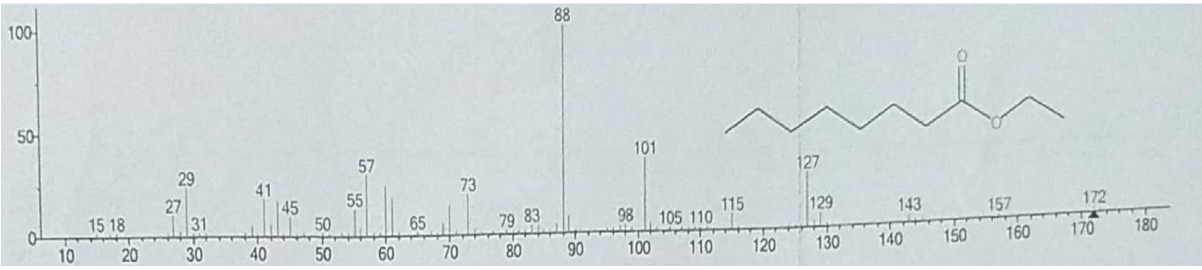

Figure 2: Mass spectra of Octanoic acid, ethyl ester

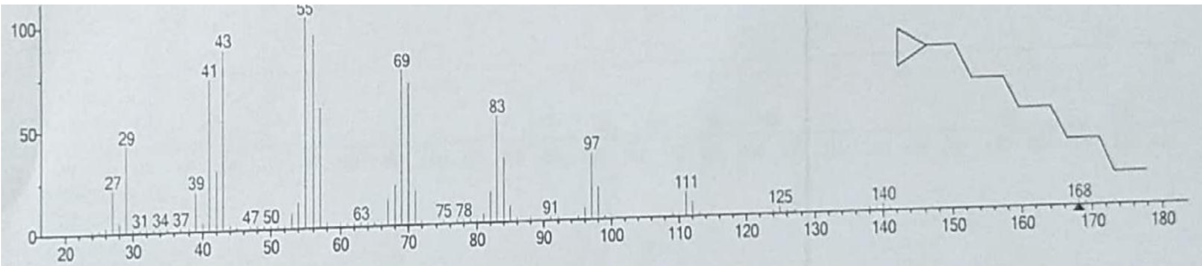

Figure 3: Mass spectra of Cyclopropane, nonyl

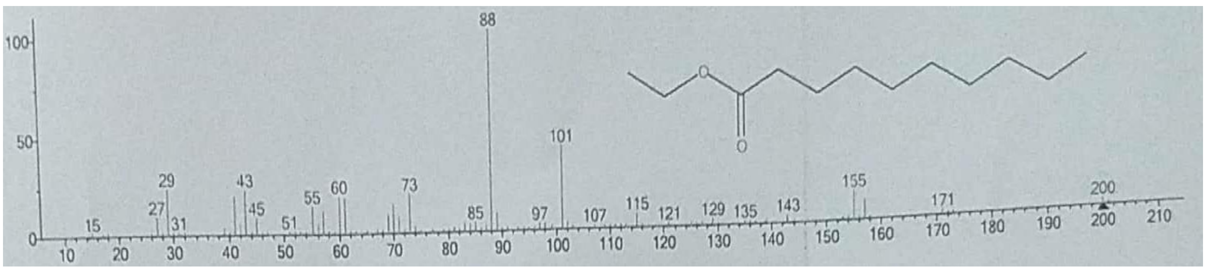

Figure 4: Mass spectra of Decanoic acid, ethyl ester

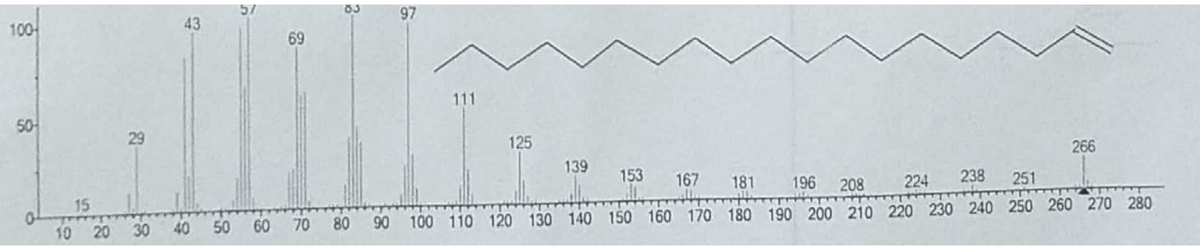

Figure 5: Mass spectra of 1-Nonadecene

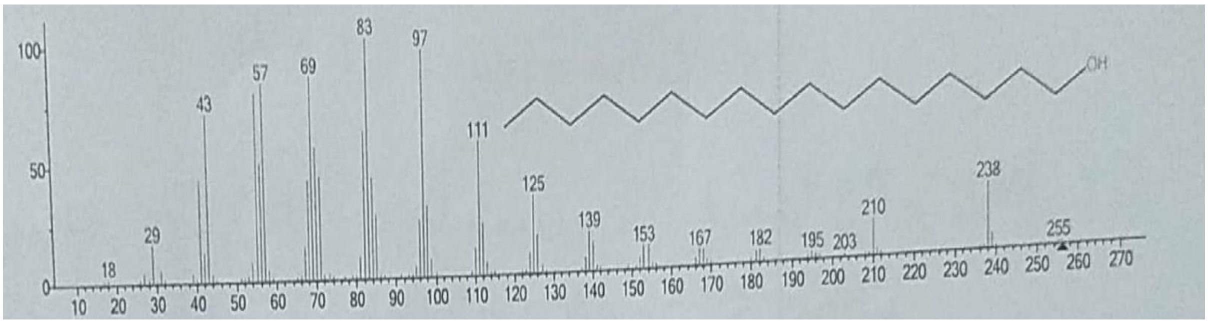

Figure 7: Mass spectra of n-Heptadecanol-1

DISCUSSION

The Gas Chromatography-Mass Spectrometry (GC-MS) analysis of ethanolic extract of *Massularia accuminata* revealed the presence of five major compounds which are Octanoic acid, ethyl ester with peak area of 15.74%, Cyclopropane, nonyl (3.73%), Decanoic acid (69.88%), 1- Nonadecene (6.29%) and n-Heptadecanol-1 (4.37%). The identified compounds possess many medicinal properties. According to *Fahlbusch, et al, (2003),* Octanoic acid, ethyl ester detected at retention time 9.387 minutes is used in food industries as a flavoring and in the perfume industry as a scent additive. It is present in many fruits and alcoholic beverages, and has a strong odor of fruit and flowers. It is used in the creation of synthetic fruity scents. Decanoic acid, ethyl ester discovered at retention time 16.238mins also have similar application. In addition, Cyclopropane, nonyl discovered at retention time 16.043mins is a gaseous hydrocarbon which is used in medicine as a general anesthetic. (Budavari, 1996)

1-nonadecene identified at retention time 23.534mins is an alkene used in artificial ripening of fruits. It is applied in metabolism of aromatic compounds in animals. It also possesses antimicrobial properties. (Lakshmi and Nair, 2017)

Finally, n-Heptadecanol-1 detected at retention time 30.682mins acts as anti-arthritis and it is also used in the treatment of skin disease. *(Arora et al. 2017)*

Conclusively, dental diseases such as gingivitis, mouth odour and tooth loss may be minimal if our generations which do not value the use of chewing stick except from the elderly will replace toothbrush with *M. Accuminata* chew stick on daily basis due to its medicinal benefits.

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BUSINESS SURVIVAL STRATEGIES IN A POST PANDEMIC ECONOMIY (A STUDY OF SMES IN OGUN STATE)

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Abstract

Corona virus outbreak is the latest world pandemic that has affected all sectors of the world economy. The lockdown, movement restriction and social distancing are amongst the governments' effort to safeguard the public health. While recognizing the importance of the national order in preventing the immense spread of the virus, this research work argue that there are certain undiscovered effects of the control order policy on SMEs in Ogun state Nigeria. The objectives of this research are to examine the impact of corona virus on SMEs in Ogun state and to identify survival strategies that SMEs owners should adopt to cope with the effect of corona virus so as to survive this tough situation. The study applies qualitative and quantitative approach, conducted through monkey survey with three hundred (300) selected SMEs' owners out of which only one hundred and ninety-four (194) SMEs owners responded. In summary, it was gathered that corona virus has negatively impacted the operations and finances of SMEs in Ogun state. The paper recommends that Every SMEs should concentrate on investment into technology apps, online marketing and new delivery system since social distancing is a prime issue today. Technology can help the SMEs to alleviate the effect of corona virus.

Keywords: *Covid-19, movement restriction, social distancing, survival strategies, small and medium enterprises*

INTRODUCTION

The history of outbreaks of pandemics and contagious diseases is as old as the existence of mankind. The novel Corona Virus otherwise referred to as COVID-19 was first discovered in 2019 in the Chinese city of Wuhan following which the pandemic has spread like wildfire across continents, constituting global health crises with attendant effects on business and economies globally. The catastrophic effects of the pandemic in terms of the daily geometric increase in the number of confirmed infections and deaths prompted the World Health Organization (WHO) and political leaders across the world to initiate strict measures. The interventions to contain the spread of the COVID-19 pandemic included the travel restrictions, massive testing, aggressive contact tracing, establishment of isolation centers and quarantine procedures, huge investments in medical supplies, ventilators, and training of medical practitioners, social distancing, locking down societies, among others. Other efforts at mitigating the spread of the virus globally have been in the areas of collating data daily, developing effective vaccines and preventive measures to contain the spread or surge in infected cases. The strict endures introduced to protect lives and curb the spread of the novel Corona virus portend a major shift in peoples lifestyles globally in terms of social relations, economy, politics and education to mention but a few. In most African states, the threats of the pandemic were not taken serious early enough and so, the response was weak. While other continents were seriously battling the pandemic, most African states were still going about their normal daily socio-political and economic routines.

The first case of the pandemic was recorded in Egypt on February 14, 2020 and the first confirmed case in sub-Saharan Africa was in Nigeria (BBCNews,2020)Maclean(2020),laments that most of the index cases of Covid-19 in Africa were imported from Europe and America rather than China, where the virus originated. The possibility of Africa becoming the epicenter of the pandemic has become a major concern to professionals and experts across the globe due to the fragile health systems characterized by inadequate funding ,ineffective data management system, inadequate training of healthcare workers and unavailability of modern medical equipment. Almost all the West African states have recorded confirmed cases and deaths with some recoveries. In line with the practices in containing the pandemic, countries in the sub-region have instituted measures such as travel bans or restrictions, closure of land and sea ports, grounding of all non-essential flights or movements, contact tracing, massive sensitization of citizens on the nature of the virus, isolation or social distancing, disinfecting public places, shutting down of schools, religious and other public places. Because of the „lockdowns and restriction of peoples movement in most West African states, most businesses have gone cashless with a 70% rise in Point On Sales(POS) transactions in Nigeria in March, 2020 according to a report by the Nigerian Inter-Bank Settlement Scheme(NIBSS)(Adesanya, 2020).

Also, the educational system has evolved from conventional classroom instruction to eLearning channels such as Google or virtual classroom, radio and television teaching sessions. However, there has been little effort in the areas of massive or early testing and provision of Personal Protective Equipment (PPE) for frontline health workers in West Africa. This led to increase in the toll of Covid-19 cases across Africa which prompted strict restrictions that have affected businesses and economy in many countries within the continent. As expected, several small scale businesses facilities were shutdown to promote social distancing and reduce person-to-person contacts that feeds the virus. Such measures have come at a great cost to the survival of the businesses and local and national economy.

Therefore, the continent of Africa and West African sub-region in particular should brace up for large scale unemployment, socio-economic meltdown and massive changes in the peoples lifestyles in the post pandemic era. Unlike the countries in Europe, Asia and America, most West African states (either the Francophone or Anglophone counties) share strong colonial and sub-regional experiences through the Economic Community of West African States (ECOWAS) charter agreement or protocol among them which allows free movement of individuals across the sub-region without a visa for an initial period of 90 days. Therefore, there is high traffic of people and trades across the West African states thereby making the spread of the virus and socio-economic impact of the pandemic to cause a chain reaction on the economy of the sub-region. In essence, West African states need not only to brace up to contain the pandemic, conquer it and flatten the curve but also to develop recovery strategies to survive the post-COVID-19 global dynamics with attendant changes in business operation and possible socio-economic meltdown. The impacts of this pandemic are being felt across all sectors of the global economy, and Africa continent would not be spared given the nuances of globalization and economic interdependence. The most hit sectors are that aviation industry, entertainment industry, sports, education, small scale businesses etc. with the overall impact on the global economy and peoples lifestyles. In addition, the pandemic has affected global price of crude oil which dropped to as low as $30 and could dropped further without the intervention of the Organization of Petroleum Exporting Countries (OPEC)(United Nations Office on Drugs and Crime, 2020). The drop in the price of crude oil portends huge deficits in the expected incomes of nations that rely on oil export and Nigeria which is a „big brother toothier countries in West Africa are already reconsidering its budgetary commitments for 2020. Similarly, the International Monetary Fund report International Monetary Fund (2020)has warned that the three major economies in Africa namely Nigeria, South Africa and Angola are at the brink of total collapse. Nigeria accounts for more than 60% of the economy of the sub-region and remains the major market for virtually all the 15 Economic Community of West African (ECOWAS) member States (Karaki and Verhaeghe, 2017).

With Nigeria being the power house in the West African bloc, the implication is the spill-over of the economic recession across the sub-region because "whenever Nigeria sneezes, West Africa catches a cold". More so, the outbreak of the pandemic coincided with the period most of the countries are trying to adjust to the economic realities of the abrupt closure of Nigeria's borders against its immediate neighbours of Benin, Chad, Niger and Cameroun since August 2019 in a bid to protect its wobbling economy and salvage the increasing insecurity in the country. Given the ravaging effect of the global health crisis (COVID-19 pandemic) on socio-political landscape, national economy, education and peoples businesses vis-à-vis the fragile nature of the healthcare systems, economies, democracies and education in most West African states, massive business collapse are imminent. Therefore, this paper attempts to project into the post COVID-19 pandemic era in Nigeria while other specific objectives are as follows:

- To examine the impact of corona virus on scale business in Nigeria
- To identify strategies that businesses in Nigeria should adopt to cope with the effect of corona virus so as to survive this tough situation

LITERATURE REVIEW

Concept of SMEs

When statistical definitions are used based on selected quantitative criteria to define the SMEs, such definitions is inadequate to unfold the various qualitative features of these enterprises because all such quantitative indicators suffer from various shortcomings and fall short of being adequately satisfactory measures of enterprise size. As such, they are incapable of describing the important economic, social, psychological, behavioral and organizational characteristics of the SMEs which play important roles in explaining why and how small businesses emerge, develop and continue to sustain (Ahmed, 2016).

For instance, USAID in its definition of SMEs classified thus: micro enterprise as informal businesses employing five or fewer workers including unpaid family labour; small enterprises as those operating in the formal sector with five to twenty employees; and medium enterprises as those employing 21 to 50 employees (Kayanula&Quartey,1999).

The 1975 companies Act in the United Kingdom stated that an enterprise with a turnover of less than £ 1.4 million was small, those with turnover between £1.4 and £5.7million were medium, while those enterprises having turnover above £5.7 million were large. It also went further to classify the enterprises based on number of employees – those with fewer than 50 workers being small, between 50 and 250 workers being medium and those employing above 250 workers were described as being large. Similarly, the European Union (EU) in 1995, defined SME as any enterprise employing less than 250 employees, and went further to break down the SME into micro (less than 10 employees, small (from 10 to 49 employees) and medium (between 50 to 249 employees) (Etuk, Etuk&Baghebo, 2014). In Nigeria, the Central Bank of Nigeria (CBN) in its monetary policy circular No 22 of 1988 defined small-scale enterprises as having an annual turnover not exceeding five hundred thousand naira (Ali 2003). While the Federal Ministry of Industries (1973) defined small scale enterprises as businesses that have total capital (land, building machinery equipment and working capital) of up to N60, 000 and employ up to 50 persons. Also, The Central bank of Nigeria in its 1990 credit Guidelines for financial institutions characterized small-scale enterprises as those whose yearly turnover does not exceed N200, 000,000 or capital use does not exceed N200, 000,000. Nonetheless, the CBN act 2001 placed the level of employment by small scale enterprises of less than 50 and medium scale enterprises of less than 100 labour forces. In term of the asset based; small scale has capital of less than N 1 million while medium scale has less than N150 million (IFC 2002 referred to in Ogboru 2007). The SMIEIS characterized MSME as any business undertaking with a most extreme capital base of N200 million barring land and working capital and with the amount of workers at the very least 10 or more than 300.
Small business was defined by the third National development plan (1975-1980) as a firm that is capable of providing employment to not more than ten employees (Taiwo, Ayodeji and Yusuf, 2012). However, MSMEs also refer to SMEs as a business with a fixed asset and working capital of an amount not exceeding N60, 000 and capable of employing 50 workers. Companies and allied matters act 1990, Federal ministry of Industry Nigeria cited in Taiwo, Ayodeji and Yusuf, 2012). Defined SMEs as a firm with an annual turnover worth N2 million and a net asset of an amount not exceeding N1 million.

However, with the introduction of National Policy on MSMEs has addressed the issue of definition in respect to what constitutes micro, small and medium enterprises was addressed. The definition receives a grouping focused around double criteria, assets and employment (with the exception of land and buildings. Thus: Micro enterprises are those businesses capable of providing employment less than ten (10) employees and have an asset of less than N5 Million with the exception of land and building. Small enterprises are those businesses capable of employing 10 to 49 employees and have an asset of an amount equal to N5 million to N49.9 million with the exception of land and building. Medium enterprises are those businesses capable of employing 50 to 199 employees and have an asset of an amount equal to N50 million to N499.9 million with the exception of land and building (Yahaya, Geidam& Usman, 2016). The National Council on Industry (NCI) at their 13th meeting held in Makurdi in July, 2001 modified the definition of small-scale business to refer to an enterprise with total capital which excludes cost of land not more than N1.5 million with labour size of not more than ten (10) employees. This includes cottage and micro industries which are mostly single family operated businesses with no employees other than them the owners.
Alabar, (2002) explains that any establishment employing less than ten people and whose investment in machinery and equipment does not exceed N600,000.00 is referred to as small-scale business. He further stated that such business must have fixed assets above N1 million but not exceeding N10 million excluding land (Esiebugie, Hembadoon&Loveday, 2016).

It is also worthy of note that the disparities associated with the definition of this concept could be ascribed to the differences in the background of the researchers, changes in economic conditions, institutional changes and advances in technology (Esiebugie, Hembadoon&Loveday, 2016).

ECONOMIC IMPORTANCE OF SMEs

Small-scale enterprise development reduces poverty through employment generation, income earning, consequent accumulated savings, and increased investment expenditure. The performance of new and existing SMEs has contributed to increased economic activity, job opportunities and poverty reduction **(**Sirajo&Zayyanu 2014). According to Lingesiya 2012 SMEs plays an important role in economic development through creation of employment opportunities, the mobilization of domestic savings, poverty alleviation, income distribution regional development training of workers and entrepreneurs' creation of economic environment in which large firms flourish and contribute to export earnings. Lockdown policy, movement restriction and social distancing measure put in place by government to curtail the spread of corona virus has impacted negatively the economic importance of SMEs because most of their income had fallen which had resulted into downsizing of employees

DIFFERENT SECTORS OF THE ECONOMY AFFECTED BY CORONAVIRUS

Covid-19 has set foot in Nigeria and is heading the nation to major downturn. Corona virus disease has become a world-changing event and is not only a humanitarian crisis but also economic and social crisis. Its impact on the business environment is worldwide and manifold. Due to the rapid spread of corona virus, several entities are bound to limit their business operations leading to disruption in the economic activities of several industries that drives growth. The setback that is being encountered by the different sectors of the economy is highlighted below.

Agricultural industry: In agricultural sector, due to travel restrictions for lockdown there has been a dearth of agricultural workers which has resulted in drop in production. As the operations of the businesses like hotels, restaurants, are suspended, the market of raw materials which are used for this purpose has gone down leading to grievances of farmers.

Secondary sector: The secondary sector provides employment to around 31.39% of the population in Nigeria and contributes about 20% of the Nigeria GDP. It embraces industries that produces and distributes finished goods or in indulged in construction activities, thus providing support to both the primary and service sector.

Manufacturing industries: Manufacturing industries are bearing the brunt of corona virus as they had terminated their production at a short notice. The value of the inventories that are held up in the production centers or warehouse of these industries has gone down and the machineries are too lying idle for a long time. Major hindrance encountered by the industries are cash flow constraints and supply chain disruption.

Automobile industry: With almost all plants shut and imports being sealed up, there is a steep decline in production and sales of the automobile companies impelling them to declare pay cuts. The situation will be awful even during post lockdown period due to fall in income levels.
Pharmaceutical and Chemical industries: These industries highly count on import of bulk drugs and several raw materials from China. Due to import restrictions these industries are also affected.

Electronic industry: The finish products plus the components used in this industry is mainly supplied by China. The spread of corona virus have pushed down the assembling and sale of electronic goods and the supply chain is also interrupted.

Construction and engineering industries: For construction and engineering industries, the physical presence of massive labour force is essential which is restrained during lockdown and the construction activities have also halted. Thus the industries are now suffering in the hands of ruthless corona virus.

Tourism and hospitality industries: Tourism and hospitality are the foremost industries to be severely affected amid corona virus crisis and the exact time for resumption of activities is unknown. Lockdown has averted the inflow of fun lovers dealing a crippling blow to the tourism and hospitality industries.

Transportation segment: The pandemic has put down this segment under massive financial strain. Airlines cruise and road cargo operators have been struck hard because of border closure and travel restrictions. Some of the aviation companies are not even in the position to refund their customers those who had booked flights that were cancelled due to lockdown.

Healthcare segment: healthcare segment is at the epicenter of these worldwide pandemic ordeals. Certain public hospitals have witnessed increase in demand in the crisis period. The private hospitals have risen to the occasion by providing the government with all the succour it requires.
Media and entertainment industry: Corona virus has compelled to postpone release of several movies, shootings have come to rest and the theatres cannot show movies bringing about heavy loss to this industry.

Retail segment: shutting down of shops and malls that do not sell necessity goods have brought further problem in revenue and considerable job loss. Retail stores selling essential commodities have witnessed demand of the products exceeding supply thereby causing shortage and non-availability of some commodities.

BUSINESS SURVIVAL STRATEGIES
Getting the better of this pandemic crisis and its aftermath is imperative at this time. The business world need to bite the bullet of corona virus catastrophe and should come to grips with it by means of proper business strategies. To survive in this pandemic period, the organizations should adopt certain strategies to transform panic into constructive and proactive action.

Every organization need to understand the present external environment, for which they need to conduct **PEST** (Political, Economic, Social, Technological) analysis .Analyzing political environment will provide information about the administrative decisions and measures taken by both the central and state governments. This will help the business to avail the benefits provided by the government which may soothe their business operations from this turbulent situation. For instance, government has extended the due dates for filling return and relieves businesses of tax, also provided 3 months moratorium on loan repayment and so on. Appraising economic environment will throw light on the present economic situation of the country, purchasing power of the consumer, change in their taste and preferences, volatility in demand and supply, etc. Social aspects will give information about the demand of the society. At present, social distancing, safety measure, disinfection has become very relevant. Technology related changes need to be properly assessed to ride on the technological wave by upgrading and innovating products otherwise the business can lose market. At present, this has become a very important issue which every business need to consider first.

Then the enterprises should conduct **internal analysis** to appraise their current position. They should properly know their core competent area, availability of resources and manpower and their capabilities. However, during this turbulent period, the senior offcials of the company should assume utmost responsibility of managing and directing the organization. More powers should be bestowed upon the chief executives by the Board so that they do not confront impediment while taking urgent decisions in the period of crisis

On basis on internal and external analysis, the entities should use **SWOT** analysis to correctly identify its strength, weaknesses, opportunities and threats. Strength recounts what an enterprise excels at and in what it is unique compared to its competitors. Whether it has skilled workforce, better knowhow or technology, loyal customer base, adequate capital, strong brand image, better equipment, ideal location and so on. Weaknesses will help an organization to identify its internal weakness or what it lacks such as inadequate capital, high debt pressure, shortage of skilled workers, weak brand, resource limitations, inadequate supply chain, etc.These affect entity from operating at its optimum level so organization must develop these areas to remain competitive. Opportunities indicates the auspicious external factors which might give rise to certain competitive advantages for an enterprise. Thus, opportunities need to be properly determined as it will help an organization to expand business. Based on the current scenario, the demand for new products can be identified. For example, demand can rise for safety-enhancing products like sanitizer, masks, disinfectants, hand washes, gloves, etc. Threats refer to all those external factors that poses a risk to the entity or its likelihood of growth and prosperity. Therefore, the threats that has arisen due to the pandemic outbreak should be discerned. The change in customer behavior, new competitors, supply chain disruption, change in regulatory environment, etc. should be assessed. Companies need to minimize its threats by using its strengths and should try to eliminate its weaknesses by utilizing the opportunities identified.

The ability to absorb a shock and deal with it i.e. resiliency is the key to survive in the crisis and vital for long-term prosperity. Resilience capabilities of the entities must be reinforced to respond to the aftermath of unforeseen events. They need to have the capability to plan for and adjust to any change through forecasting, safeguarding, responsive capability and reviving and recovering strategy. Entities need to delineate its crucial functions and emphasize those which are critical to be carried out during crisis. Firms should recognize what their vulnerabilities are and how can they prepare themselves to remain in business.

Firms need to rethink their business model, concentrate on their core business area, revive their strategies, rework their plans and policies, try to explore new markets, embrace new sales channel and find more opportunities to grow. Companies should focus on zero base budgeting by starting from zero and including only those expenditures which are essential to withstand the current situation.

Business should ensure agility in their operations, strategies, etc. so that they can respond swiftly and efficiently to any threats or opportunities whether it be from external or internal environment.

Technology is one of the vital aspect which the companies need to focus on. At present, every business should concentrate on digitalization since social distancing is a prime issue today. Digital technology can help the companies to alleviate the effect of corona virus. From on-premises systems, the entities need to switch over to hybrid cloud services. Customer experience should be enhanced by using technology, financial and operational based software need to be upgraded, a more pliable and dynamic work environment need to be created. Artificial intelligence should be adopted by the business to ease the effect of this catastrophe.

Digitalization gives rise to several cybercrimes so additional consideration should be given to cyber security.
Lastly, to keep the business buoyant in course of challenging period, a robust business continuity and disaster management plan is required. Every business should have such plan to cope with the difficulties and uncertainties that may arise anytime during the course of business. Such framework outlines the strategies and planning

Methodology
The study was carried out in Ogun state Nigeria, with a survey of 300 small scale and medium scale enterprises selected from the population of 1794 registered SMEs in ogun state. The necessary primary data was collected through a four-point likert scale questionnaire which was administered through a monkey survey-forwarded to the business emails gotten through the assistance of the cooperate affair commission (CAC) in Ogun state.194 questionnaire out of the 300 sent was returned and used for the analysis. The psychometric properly of the instrument was tested through component factor analysis and cronbach alpha statistics. Both descriptive and inferential analysis were conducted in the study while the hypothesis of the study were tested by means of multiple regression analysis with the aid of SPSS version 20.

The model of the analysis was formulated as;

PPE = f (RS)
PPE = f (TECD, HCD)
RS = Recovery Strategy
PPE = $\beta_0 + \beta_1$TECH + β_2HCD + ……. e_t
PPE = Post Pandemic Economy
TECD = Technology Development
HCD = Human Capital Development
E_t = Error term
β_0 = constant
$\beta_1\beta_2$ = Correlation coefficients of independent variables.

Table 1: Validity Test (KMO and Bartlett's Test)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.950
Bartlett's Test of Sphericity	Approx. Chi-Square	2891.663
	Df	190
	Sig.	.000

Source: Field survey 2020.

The probability value P < 0.05 of the KMO and Bartlett's Test in table implies that the instrument of measurement is adequate for all the necessary estimates in the study.

Table 2: Validity Test (Total Variance Explained)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.063	55.317	55.317	11.063	55.317	55.317
2	1.334	6.669	61.986	1.334	6.669	61.986
3	1.061	5.307	67.293	1.061	5.307	67.293
4	.985	4.927	72.220	.985	4.927	72.220
5	.667	3.334	75.554			
Extraction Method: Principal Component Analysis.						
a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.						

Source: Field Survey 2020.

The cumulative total variance explained value of 72% in table 2 indicates that the instrument of measurement in the study is sufficiently loaded with appropriate items suitable for necessary estimate.

Table 3: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.955	.956	20

Source: Field Survey 2020

The alpha co-efficient value α = .955 indicates a highly reliable instrument which implies that it is capable of consistently taken the necessary estimate at all times in a similar study and situation.

Table 4: Descriptive Statistics

	Mean	Std. Deviation	N
PPE	16.8402	3.35626	194
TECD	21.2010	3.92360	194
HCD	19.5052	4.17276	194

Source: Field Survey 2020.

Table 4 gives a brief feature of the data used for the study. The means scores for Post Pandemic Economics (P.P.E), Technology Development (TECD) and Human Capital Development (HCD) are 16.84, 21.20 and 19.51 with associated standard deviation 3.366, 3.92 and 4.17 respective.

Table 5: Correlation Matrix

		PPE	TECD	HCD
Pearson Correlation	PPE	1.000	.753	.843
	TECD	.753	1.000	.823
	HCD	.843	.823	1.000

Source: Field Survey 2020.

Table 5 reveals that the independent variables are high and positive correlates of the dependents variable. Technology Development (TECD) correlate with post pandemic economy at .753 (r = .75) will human capital development correlates with post pandemic economy at .843 (r = .84)

Table 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.849[a]	.722	.719	1.78020
a. Predictors: (Constant), HCD, TECD				

Source: Field Survey 2020

The K-Square value R^2 = .722 in table 5 implies that about 71 percent of total variation in post pandemic economy is jointly predicted by technology development and human capital development.

Table 7: Analysis of Variance (ANOVA[a])

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1568.744	2	784.372	247.504	.000[b]
	Residual	605.303	191	3.169		
	Total	2174.046	193			
a. Dependent Variable: PPE						
b. Predictors: (Constant), HCD, TECD						

Source: Field Survey 2020

The associated probability value of the t-statistic result [f(2/191) = 247.504; $P < .05$] implies that the null hypothesis that there is no significant relationship between recovery strategy and post pandemic economic is rejected at 5 percent significant level and the alternative is accepted at 95 confidence interval.

Table 8: Correlation Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.655	.706		3.761	.000
	TECD	.157	.057	.183	2.732	.007
	HCD	.557	.054	.692	10.308	.000
a. Dependent Variable: PPE						

Source: Field Survey 2020

Table 8 correlation coefficient showing the relative significant and the direction of relationship among the variables. This table reveals that:

1. There is a significant positive relationship between technology development and post pandemic economy; this is evident by the P-value $P < 0.05$ in the t-statistics ($\beta = .157$, $t = 2.732$, $P < .01$) which implies that the null hypothesis that there is no significant relationship between TECD and PPE is rejected at 5 percent significant level and the alternative accepted. The result also shows that a unit increase in TECD will trigger .157 increase in PPE.

2. There is a significant positive relationship between human capital development (HCD) and post pandemic economy (PPE), this is evident by p-value $P < 0.05$ in the t-statistics ($\beta = .557$, $t = 10.303$, $P < .01$) which implies that the null hypothesis that there is no significant relationship between HCD and PPE is rejected at 5 percent significant level and the alternative accepted. This result also shows that a unit increase in HCD will trigger .557 increase in PPE.

CONCLUSION

The entire world is in the grip of vicious corona virus. The pandemic outbreak has sparked a global health emergency along with social and economic crisis unleashing unprecedented collapse of the economic activities and business operations. It has severe repercussions on the global business world. Therefore, This study has put forward the potential effects of corona virus on the different sectors of Nigeria economy and also put a light to the concept of SMEs. The quantitative analyses made by this research work shows that there are positive significant relationship among technology development, human capital development and business survival in a post pandemic economy. Moreover, the study highlights the survival strategies that are essential for a business to cope with the present situation. However, during this current pandemic scenario, every enterprise should brace up for the uncertainties and challenges that spring up due to corona virus. Businesses need to be proactive and should build up strategies to fight the negative impact of corona virus in order to sustain during this turbulent time. They need to foresee probable impending changes in business environment and should identify the opportunities in order to strive and thrive

RECOMMENDATIONS

- Every SMEs owner should concentrate on investment on technology, apps, online marketing and new delivery system since social distancing is a prime issue today. Technology can help SMEs to alleviate the effect of corona virus.

- Government should put in place emergency funds to cover at least six months overhead and other fixed costs of SMEs owners to help their financial recovery and stability.

- SMEs owner must have certain degree of strategic resources flexible enough to mobilize during crisis period since modern businesses are exposed to various unpredicted global crisis.

- Government should try as much as possible to increase her investment in education as this will help to make readily available human capital that will help SMEs to cope with likely future pandemic challenges.

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PHYTOCHEMICAL AND MEDICINAL EVALUATION OF ETHANOLIC EXTRACT OF CROTON ZAMBESICUS LEAVES

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Abstract

Medicinal plants have contributed immensely to the development of new drugs in pharmaceutical industries and the increasing drug resistance amongst many disease causing microbes has initiated the needs to search for newer antibiotic sources. This study was carried out to examine the medicinal efficacy of the ethanolic extract of the leaves of Croton zambesicus through elucidation of active ingredients in the leave extract using Phytochemical screening and GCMS analysis. The result obtained showed that the leaf extract contain compounds such as Octatriacontyl pentafluoropropionate, Cryophyllene oxide, Trachylobane, Andrographolide, Eth anol- 2-octadecyloxy, Tricosane, Tricyclo[4.2.2.0(2,5)]dec-7-ene,7-(5-hexynyl), Stigmasterol, Bicyclo[3.1.1]hept-2-ene,2,6dimethyl-6-(4-methyl-3-pentenyl)-, gamma.-Sitosterol, Heneicosane, and Beta-Amyrin with many of them reported to be antifungal. As a whole, the leaf extract will be an effective antimicrobial, antihyperglycemic, anti-inflammatory and antitumor agent.

Introduction

From ancient times, herbal plants have been widely used across all regions as means of medical and health care sustenance. The application of herbal medicine in most developing countries for the maintenance of good health is well known (UNESCO, 1996). An increasing dependence on the use of herbal plants in the industrial sector has been connected to the extraction and development of several drugs and chemotherapeutics from these plants (UNESCO, 1998). Medicinal plants have also contributed immensely to the development of new drugs in pharmaceutical industries especially in the production of antibiotics. The rising incidence of multidrug resistance amongst pathogenic microbes has further necessitated the needs to search for newer antibiotic sources.

Croton zambesicus is commonly known as Umgeligla or Koriba in Hausa, Yoruba refer to it as Ajekofole, Mfam in Ekoi languages (Agishi and Shehu, 2004) and Moramora in Kilba language (Reuben, et. al, 2008., 2009). It belongs to the Euphorbiacea family. *Croton zambesicus* Muell.Arg is a shrub or small tree widespread in Tropical Africa. Herbs contain many ingredients that may function with one another to give a positive result and often times, researchers are not sure of the ingredient in particular herb that is effective against a disease or ailment. With various studies which have reported *Croton zambesicus* leaves extract to have broad spectrum antibacterial and antihyperglycemic property (Okokon et al., (2005), Reuben et al., (2009), Hassan et al., (2019); this study is carried out to evaluate the medicinal efficacy of the ethanolic extract of the leaves of *Croton zambesicus* through elucidation of active ingredients in the leave extract using GCMS analysis.

Materials and Method

Sample Preparation

The *Croton zambesicus* leaf was collected from Atikori in Ijebu-Igbo and was identified by a botanist in the department of Science Laboratory Technology of Abraham Adesanya Polytechnic Ijebu-Igbo. The leaves were air dried at room temperature and later pounded in a mortar and pestle into powder form. Finally, the extraction was carried out from the powdered sample in a soxhlet extractor ethanol. The extract was stored in a refrigerator prior the assays.

Phytochemical screening

The phytochemical screening was carried out on the leave extract to test for alkaloids, saponins, terpenoids , anthra-quinone, plobaanins, cardiac glycosides, Pheno and Tannins using standard methods described by Trease and Evans (1989). Flavonoids, and Sofowora (1993).

Gas Chromatography-Mass Spectrometer (GC-MS) Analysis.

The leave powder was extracted with ethanol and analyzed using GC-MS. The data were obtained on an Elite-1(100% Dimethyl poly siloxane) column (300.25mm 1umdf). Helium (99.999%) was used as the carrier gas with flow rate of 1ml/min in split mode (10:1). An aliquot of 2ul of ethanol solution of sample was injected into the column with the injector temperature at 250^o C.GC oven temperature stared at 110^{o}C and holding for 2mins and it was raised to 200^{o}C at the rate of 10oc/min, without holding. Holding was allowed at 280^{o}c for 9mins with program rate of 5oc/min. The injector and detector was temperature was set at 250^{o}c and 280^{o}c respectively. Ion source temperature was maintained at 200^{o}c. The mass spectrum of compounds in sample was obtained by electron ionization at 70Ev and the detector was operate in scan mode from 45- 459 amu (atomic mass units). A scan interval of 0.5seconds and fragment from 45 to 450 Da was maintained. The total running time was 35 minutes.

Statistical analysis

Values are mean ± SD (standard deviation) of three replicates. All experiments were performed at least three times (unless indicated otherwise) and were highly reproducible.

RESULTS

Table 1: Phytochemical Screening of *Croton zambesicus* ethanolic extract

1. Alkaloid	
a. Mayers Test	++
b. Dragendorff Test	+++
2. Anthraquinone Glycoside	-
3. Cardiac glycoside	-
4. Saponins	
a. Frothing Test	+
b. Emulsion Test	+ (oil droplet)
5. Tannins	-
6. Phloba-Tanins	-
7. Flavonoid	
a. H_2O	++
b. EtoAc	-
c. EtoAt	++
8. Phenol	-
9. Steriods	+++
10. Terpenoids	+++

Key: + Trace, ++ Moderate, +++ Abundant, - Absent

Phytochemical screening is usually carried out to screen for and to characterized the constituents available in a given plant sample. The phytochemical screening of *C. zambesicus* leaf revealed the presence of alkaloids, anthracene, saponins, flavonoid, steroids and terpenoids as shown in table1.

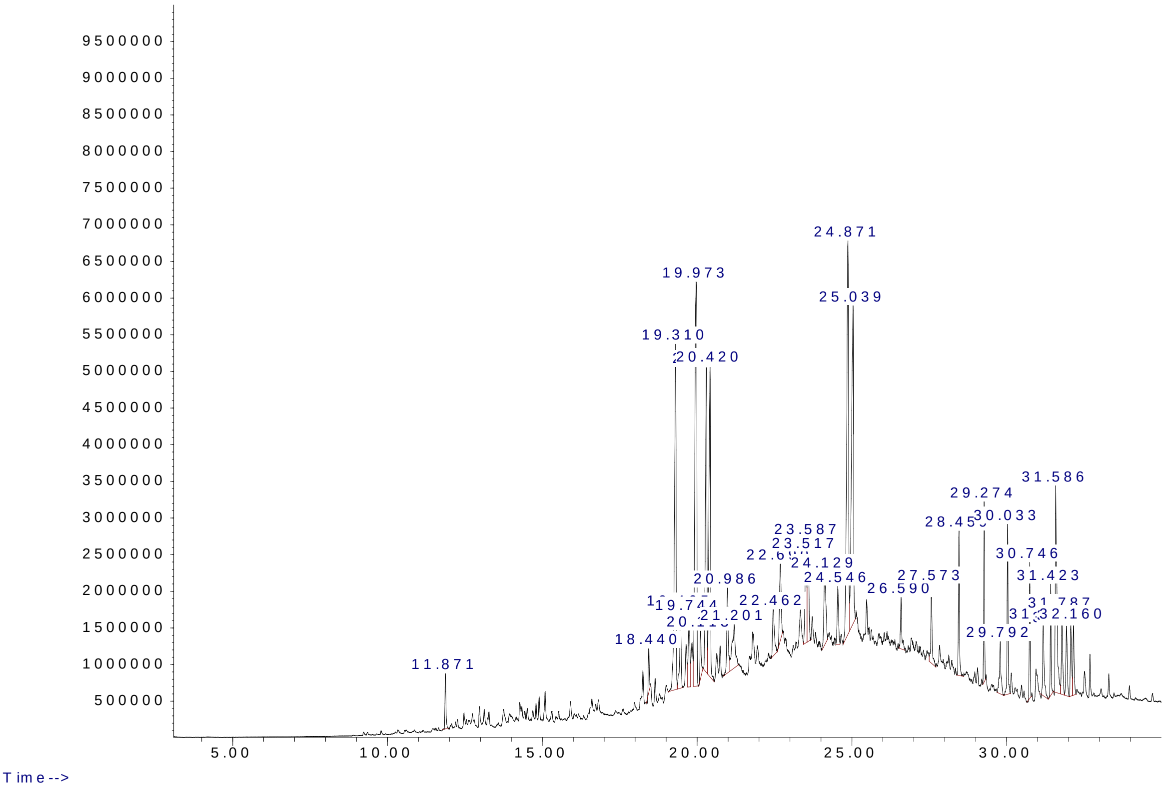

Table 2: Component Identified In The Ethanolic Leaf Extract of *Croton zambesicus* by GC-MS

S/N	RT (Min)	Name of Compound	Molecular Formular	MW (g/mol)
1	11.871	Cryophyllene oxide	$C_{15}H_{24}O$	220.35
2	18.440	9-Octadecyne	$C_{18}H_{34}$	250.46
3	19.310	Trachylobane	$C_{20}H_{32}$	272.46
4	19.744	Bicyclo[5.2.0]nonane, 4-methylene- 2,8,8-trimethyl-2-vinyl-	$C_{15}H_{24}$	204.35
5	19.973	1,3,6-Octatriene, 3,7-dimethyl-, (Z)-	$C_{10}H_{16}$	136.23
6	20.110	Bicyclo[3.1.1]hept-2-ene,2,6dimethyl-6-(4-methyl-3-pentenyl)-	$C_{15}H_{24}$	204.35
7	20.420	Benzamide, N-(1-adamantyl)-2-hydroxy- Cyclohexane, 1,5-diethenyl-3-methy	$C_{19}H_{23}ClN_2O_3$	362.854
8	20.986	1,3,6,10-Cyclotetradecatetraene, 3 ,7,11-trimethyl-14-(1-methylethyl) -, [S-(E,Z,E,E)]-	$C_{20}H_{32}$	272.47
9	21.201	3beta.17beta-dihydroxyestr-4-ene		

10	22.462	5,8,11,14,17-Eicosapentaenoic acid, methyl ester	$C_{21}H_{32}O_2$	316.5
11	22.620	Methyl 10,12-pentacosadiynoate	$C_{26}H_{44}O_2$	388.6
12	23.517	1,4a,7-Trimethyl-7-vinyl-1,2,3,4,4a,4b,5,6,7,9, 10,10a-dodecahydrophenanthren-(1-methyl Ethyl) methanol	$C_{20}H_{32}O$	288.46
13	23.587	Hexatriacontyl pentafluoropropionate	$C_{39}H_{73}F_5O_2$	669.003
14	24.129	17-Pentatriacontene	$C_{35}H_{70}$	490.9
15	24.546	Octatriacontyl pentafluoropropionate	$C_{41}H_{77}F_5O_2$	697.057
16	24.871	2-Pentenoic acid, 5-(decahydro-5,5,8a-trimethyl-2-methylene-1-naphthalenyl)-3-methyl-, [1S-[1.alpha.(E),4a.beta.,8a.alpha.]]	$C_{20}H_{32}O_2$	304.5
17	25.039	Tricyclo[4.2.2.0(2,5)]dec-7-ene, 7-(5-hexynyl)	$C_{16}H_{22}$	214.35
18	26.590	Tricyclo[5.4.3.0(1,8)]tetradecan-3-ol-9-one, 4-ethenyl -6-(2-hydroxyacetoxy)-2,4,7,14 –tetramethyl-		
19	27.573	Andrographolide	$C_{20}H_{30}O_5$	350.4
20	28.453	Heneicosane	$C_{21}H_{44}$	296.6
21	29.274	Ethanol, 2-(octadecyloxy)	$C_{20}H_{42}O_2$	314.5
22	29.792	Tricosane	$C_{23}H_{48}$	324.6
23	30.033	Octatriacontyl pentafluoropropionate	$C_{41}H_{77}F_5O_2$	697.00
24	30.746	Hexadecane	$C_{16}H_{34}$	226.44
25	31.423	Stigmasterol	$C_{29}H_{48}O$	412.7
26	31.586	gamma.-Sitosterol	$C_{29}H_{50}O$	414.7
27	32.160	Beta-Amyrin	$C_{30}H_{50}O$	426.729

Discussion

The result obtained for the GCMS analysis of the ethanolic extract of *Croton zambesicus* leaves is as shown in Table 2 above

Caryophyllene oxide obtained at Retention Time RT (11.871) is a sesquiterpenoid which has a strong potential for being used in medical applications, due to its anticancer and analgesic properties (Klaudyna et al 2016).

Trachylobane obtained at RT (19.310) has been reported as cytotoxic, antitumoral, genotoxic, antiinflammatory, antibacterial, antifungal and moluscidal. (Cavalcanti et al, 2009) *trans*-3,7-dimethyl-1,3,6-octatriene also known as β-Ocimene was discovered at RT (19.973) have been reported as oils with a pleasant odor. They are used in perfumery for their sweet herbal scent, and are believed to act as plant defence.They also possess anti-fungal (Cavaleiro et al, 2015) and anti-inflammatory properties (Valente et al, 2013).

Meanwhile, 17-Pentatriacontene discovered at RT (24.129) has been identified as anti-inflammatory, anticancer, antibacterial and antiarthritic by Dinesh et al. (2018).

Andrographolide, a labdane diterpenoid lactone which had also been discovered as the principal bioactive chemical constituent of *Andrographis paniculata* (Acanthaceae), is established as a prospective pharmaceutical entity as it exhibits a wide range of biological activities including promising antidiabetic potential. (Brahmachari, 2017). However, Biswas et al. (2017) confirms Heneicosane RT (28.453) as disease resistance marker due to its strong inhibition to fungal growth.

Ethanol, 2-(octadecyloxy) obtained at RT (29.274) is also antimicrobial in nature according to Sudhandra et al (2015).

Stigmasterol discovered at RT (31.423) is antifungal as reported by Mbambo et al (2012) Gamma sitosterol RT (31.586) also act as anticancer (Shenbagamoorthy et al 2012).

Beta Amirin is reported to have antihyperglycemic and hypolipidemic effects by Santos et al (2012). Another study (Simao et al,.2011) also demonstrated that β-amyrin exhibits long-lasting antinociceptive and anti-inflammatory properties in 2 models of persistent nociception via activation of the cannabinoid receptors CB1 and CB2 and by inhibiting the production of cytokines and expression of NF-κB, CREB and cyclooxygenase 2.

In conclusion, *Croton Zambensicus* leaf extract contain active ingredients which make it a good alternative source of antibiotic, antihyperglycemic, anti-inflammatory agent and may therefore be used as a potent herbal medicine against diabetics, inflammation and other infectious diseases.

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BUILDING A DIGITAL ECONOMY WITH DATA AS A KEY ENABLER FOR GLOBAL COMPETITIVENESS

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Abstract

The advent of information and communication technology has enabled the global economy to experience rapid growth, this has led to an issue of the digital economy, in which private and public services are rendered universally across the globe. Data is a raw fact about any entity and this has been used traditionally in taking decisions that affect the economy either positively or negatively. Researchers have considered and justified the use of digital data in the development and solving of societal problems in politics, finance, education, transportation, security, traffic, etc. but with limited work on the influence of big data on the digital economy. This paper hereby focuses on creating awareness of the efficacy of big data in influencing the digital economy. In this study, a practical implementation of the use of big data in the transporting system of the economy, specifically the aviation industry was analyzed and visualized using a heatmap. A statistical tool in Python 3.7 framework, was implemented in a google colab research environment The result shows the flow of patronage of air-travel within the twelve months of a duration of 10 years from 1949 to 1960. The conducted experiment proved that with the help of digital data there are so many ways to make a reasonable decision that can help in improving the performance of every sector, which can also lead to economic growth.

Keywords: Analysis and Visualization, Big Data, Data, Decisions, Digital Economy.

1.0 Introduction

The digital economy, is an economy that is based on digital computing technologies, although we increasingly perceive this as conducting business through markets based on the internet and the World Wide Web(https://unctad.org/en/PublicationsLibrary/der2019_overview_en.pdf). Digital economy infrastructure is based on the interconnectedness of people, organizations, and machines that results from the Internet, mobile technology, and the internet of things (IoT). The digital economy is underpinned by the spread of Information and Communication Technologies (ICT) across all business sectors to enhance its productivity.

In a report on Nigeria Economy Diagnostics (Nigeria-Digital-Economy-Diagnostic-Report.pdf, 2019). It was stated that Nigeria is capturing only a fraction of its digital economic potential and will need to make strategic investments to develop a dynamic, transformative digital economy, according to a new World Bank assessment. It was further reported that with improvements in digital connectivity, digital skills, digital financial services, and other core areas of digital development, Nigeria can fully unleash new economic opportunities, create jobs and transform people's lives. According to Isabel Neto, World Bank Senior Digital Development Specialist, "As the biggest economy in Africa with one of the largest populations of young people in the world, Nigeria is well-positioned to develop a strong digital economy, which would have a transformational impact on the country," She added that "Through innovations and investments, the Nigerian economy can harness digital data and new technologies, generate new content, link individuals with markets and government services, and roll out new, sustainable business models."

Nigeria's Economic Recovery and Growth Plan 2017–2020 (ERGP) recognizes the need for a digital-led strategy to make the Nigerian economy more competitive in the 21st-century global economy. This paper hereby focuses on creating the awareness of the efficacy of big data in influencing the digital economy as stated above. In addition, an explanation of the technicality involved in transforming from the traditional data economy to the digital economy was expressed. The key foundational elements of a digital economy are digital infrastructure, digital platforms, digital financial services, digital entrepreneurship, and digital skills.

Data, as a raw fact about any entity, is inevitable in day to day activities, it can be sourced from businesses referred to as business data, which provides data about customers, the data provided as regarded as very valuable as the customer. Data is voluminous and is generated in the scale of gigabyte GB, Terabyte TB, and Petabyte PB. It can be diversified in structured, semi-structured, and unstructured types. The Era of Data has led to a decrease in hardware costs, acceleration of network bandwidth, the emergence of cloud computing, popularization of intelligent terminals, e-commerce, and social networks, comprehensive application of electronic maps, and the internet of things to mention a few.

Data has penetrated into every industry and business domain by discerning services, forecasting trends, and guiding the future. It guides the efforts of humans with a clear future target and makes due efforts to secure future success. The type of data needed for a digital economy is big data(BD). Big data is a field that treats ways to analyze, systematically extract information from, or otherwise deal with datasets, that are too large or complex to be dealt with by traditional data. Data with many cases (rows) offer greater statistical power, while data with higher complexity (more attributes or columns) may lead to a higher false discovery rate(Breur, 2016). Traditional data are characterized by cost for storing massive data, insufficient batch data processing performance, lack of streaming data processing, limited scalability, single data source, and external value-added data sets

Some Applications of Big Data in the Digital Economy

Politics

Cambridge Analytical Ltd uses the behaviour of giving likes by voters on Facebook to analyze the personality traits and political orientation of voters, classifies voters into three types(republican supporters, Democratic supporters, and swing voters, hence focused on attracting swing voters.

The USA president Donald Trump requested Cambridge Analytical Ltd to make personality and requirement analysis on American voters, which acquired 220 million personalities of Americans.

Data streamed from the internet was used against Hilary Clinton, the African Americans could see the video in which the black were called predators by Hillary Clinton, and thereby refused to cast their votes for Hilary. These dark posts were visible for only specified users.

In Finance

in the non-digital economy, customers obtain services at fixed times and places. Passively receive data, only depend on market information received. The financial institutions focused on processes and procedures, contacts the customers through mangers, and interact with each other in fixed channels, which are inflexible ways.

With the digital economy, interactive models are used to attain efficiency by electronically analyzing data and making recommendations to customers on financial deals. For example, sales analysis results generated in a specific region can be used to guide a neighboring region on goods arrangement on the same day.

Education:

In America public education, big data has been applied to enforce educational reform. It has been used to determine academic performance, enrolment rate, dropout rate, rate of admission into higher schools, literacy accuracy, homework correctness, hand-raising times in class, question-answering times, duration and correctness of answering questions, duration, and frequency of interaction with teachers, a sequence of question-answering in exams, average time for answering each question to mention a few. A nation with the above details of its educational system will be able to develop an effective curriculum that will meet the need of the students and the country at large.

Transportation

There are different mediums of moving from one geographical area to another, there exist land, air, and water transportation. With the advent of a digital economy, citizens can choose their means of transportation based on the knowledge of the distance to be covered. For example, an individual may decide to move by train for a journey less than 500 km distance. For a 6 hours driving distance, the railway has the highest performance-price ratio. The performance-price ratio of vehicle less than that of a train. It can also be used to predict the rate of patronage of transport services.

Government and Public Security

Big data analysis can be used to monitor and analyze population flow into cities. It requires setting an Area-Based people to flow threshold. The threshold can be determined based on the policy of the government. Figure 2, illustrates how big data can be used in population:

Traffic Planning

Big data can be used in traffic planning scenarios, a multi-dimensional analysis of the traffic crowd can be used to monitor the rate at which people move from one region to another, in terms of their age group, status, career, and other factors.

Challenges faced by Big Data in the Current Economy

1. Business departments do not have clear requirements on big data

Many enterprises' business department are not familiar with big data as well as its application scenarios and benefits. Therefore, it is difficult for them to provide accurate requirements for big data. Top management in business worries about the low input-output ratio, they even delete valuable historical data because there is no application scenario.

2. **Data Fragments**

In large organizations, different types of data are often scattered in different departments, so that the same data within an enterprise cannot be shared and the value of big data cannot be fully used.

3. **Low data availablity and poor quality**

Many large and medium enterprises generate a large amount of data each day. However, some pay no attention to big data processing, this results in the non-standard data processing. Big data processing involves data to be extracted and converted into data that is easy to be processed, cleaned, and denoised to obtain valid data.

4. **Data Security**

The advent of the internet enables criminals to obtain personal information easily, which has led to more crime methods that are difficult to be tracked and prevented. Hence, ensuring personal information security becomes an important subject in the big data world. Therefore, the disaster recovery mechanism of data becomes inevitable.

5. **Insufficient Big data talents**

Steps involved in big data construction involves high technical know-how, it is necessary to develop and build a professional team that understands big data, knows much about administration, and has experience in big data applications. Hence, tertiary institutions need to make effort to develop mining talents.

2.0 An Architecture of Big Data

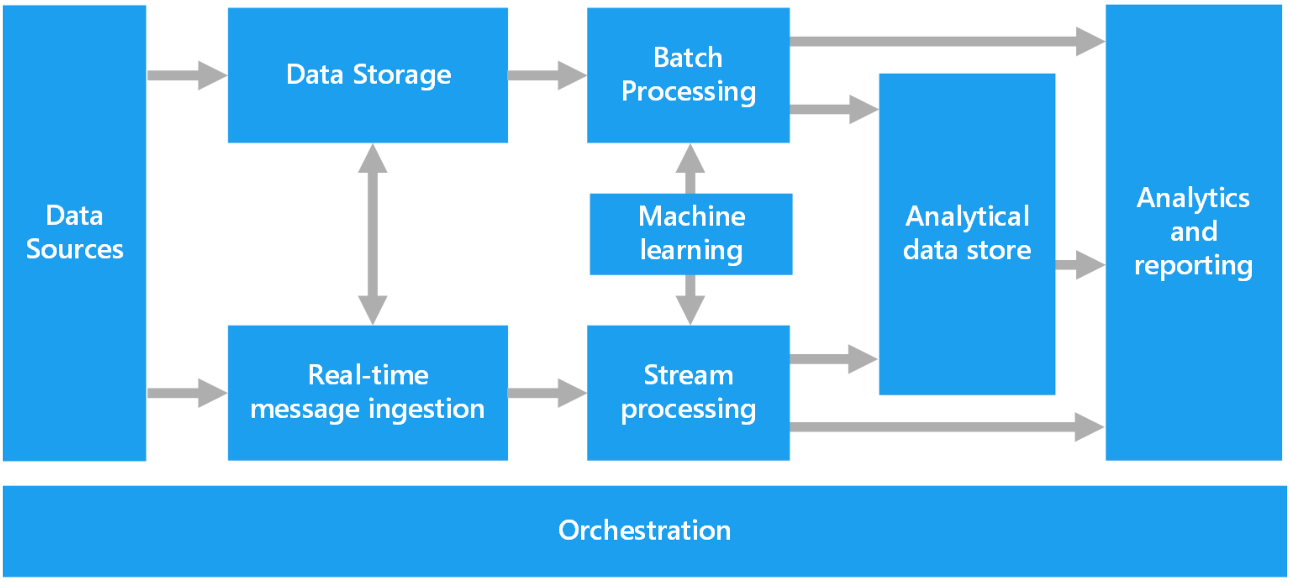

Figure 1: Big data architecture illustrating logical and physical structure that dictates how high volumes of data are ingested, processed, stored, managed, and accessed. (https://www.bigdataframework.org/big-data-architecture/)

System Orchestrator

System Orchestration is the automated arrangement, coordination, and management of computer systems, middleware, and services. Orchestration ensures that the different applications, data, and infrastructure components of Big Data environments all work together.

Data Provider

The Data Provider role introduces new data or information feeds into the Big Data system for discovery, access, and transformation by the Big Data system. The data can originate from different sources, such as human-generated data (social media), sensory data (RFID tags), or third-party systems (bank transactions).

The Big Data Application Provider is the architecture component that contains the business logic and functionality that is necessary to transform the data into the desired results. The common objective of this component is to extract value from the input data, and it includes the following activities:

- Collection;
- Preparation;
- Analytics;
- Visualization;
- Access.

The extent and types of applications (i.e., software programs) that are used in this component of the reference architecture vary greatly and are based on the nature and business of the enterprise. For financial enterprises, applications can include fraud detection software, credit score applications, or authentication software. In production companies, the Big Data Application Provider components can be inventory management, supply chain optimization, or route optimization software.

Big Data Framework Provider

The Big Data Framework Provider has the resources and services that can be used by the Big Data Application Provider and provides the core infrastructure of the Big Data Architecture. In this component, the data is stored and processed based on designs that are optimized for Big Data environments.

The Big Data Framework Provider can be further sub-divided into the following sub-roles:

- Infrastructure: networking, computing, and storage
- Platforms: data organization and distribution
- Processing: computing and analytic

Most Big Data environments utilize distributed storage and processing and the Hadoop open-source software framework to design these sub-roles of the Big Data Framework Provider.

The infrastructure layer concerns itself with networking, computing and storage need to ensure that large and diverse formats of data can be stored and transferred in a cost-efficient, secure, and scalable way. At its very core, the key requirement of Big Data storage is that it is able to handle very massive quantities of data and that it keeps scaling with the growth of the organization, and that it can provide the input/output operations per second (IOPS) necessary to deliver data to applications. IOPS is a measure for storage performance that looks at the transfer rate of data.

The platform layer is the collection of functions that facilitates high-performance processing of data. The platform includes the capabilities to integrate, manage, and apply processing jobs to the data. In Big Data environments, this effectively means that the platform needs to facilitate and organize distributed processing on distributed storage solutions. One of the most widely used platform infrastructures for Big Data solutions is the Hadoop open-source framework. The reason Hadoop provides such a successful platform infrastructure is because of the unified storage (distributed storage) and processing (distributed processing) environment.

The processing layer of the Big Data Framework Provider delivers the functionality to query the data. Through this layer, commands are executed that perform runtime operations on the data sets. Frequently, this will be through the execution of an algorithm that runs a processing job. In this layer, the actual analysis takes place. It facilitates the 'crunching of the numbers' in order to achieve the desired results and value of Big Data.

The benefits of using an 'open' Big Data reference architecture include:

- It provides a common language for the various stakeholders;
- It encourages adherence to common standards, specifications, and patterns;
- It provides consistent methods for implementation of technology to solve similar problem sets;
- It illustrates and improves understanding of the various Big Data components, processes, and systems, in the context of a vendor- and technology-agnostic Big Data conceptual model;
- It facilitates analysis of candidate standards for interoperability, portability, reusability, and extendibility.

3.0 Research Methodology

In this study, a practical implementation of the use of big data in the transporting system of the economy, specifically the aviation industry was examined. The dataset used was sourced from seaborn, which is one of the Python 3.0 frameworks. The programming language used is python language executed on google colab. This implementation demonstrates the rate at which passengers patronize flights within the twelve calendar months of the year.

In this implementation, a heatmap was used for data analysis and visualization; A heat map (or heatmap) is a graphical representation of data where values are depicted by color. Heat maps make it easy to visualize complex data and helps to understand it at a glance

The procedure involves:

1. Importing of required python libraries
2. Loading of the flight dataset
3. Analysing the dataset using statistical graphics tool(heatmap)
4. Visualization of the data analysis
5. Interpretation of results

Python libraries such as seaborn and matplotlib are imported at the beginning of this implementation. Seaborn is a library for making statistical graphics in Python. It was built closely with pandas data structures. Seaborn was used to exploring the datasets, its plotting function internally performs the necessary semantic mapping and statistical aggregation to produce informative plots. It is dataset-oriented and focuses on what the different elements of the plot means, rather than the details on how to draw them.

Heatmap is a statistical tool that was used to analyze these datasets. It gave deeper and faster insights by drawing attention to the risk-prone area of the data hereby given meaningful insights using the entire dataset. Heatmaps are used to show relationships between two variables, one plotted on each axis. By observing how cell colors change across each axis, you can observe if there are any patterns in value for one or both variables. A heatmap (aka heat map) depicts values for the main variable of interest across two axis variables as a grid of colored squares.

In other to demonstrate one of the applications of big data in a digital economy, a dataset from the aviation industry which is inbuilt on the seaborn library was loaded and analyzed. The data set comprises of a number of passengers that traveled by air each month of the year from 1949 to1960. The dimension of the dataset is 144 rows * 3 columns. The columns comprise of the year, month, and the number of passengers.

4.0 Results and Discussion

The output of the above implementation is the visualization of the data analysis, which was implemented with the python language. Figure 2 shows the rate at which passengers patronize the aviation industry within the specified period.

```
#arranging the columns to generate the pivot
flight_data = flight_data.pivot('month','year','passengers')
flight_data
```

year month	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
January	112	115	145	171	196	204	242	284	315	340	360	417
February	118	126	150	180	196	188	233	277	301	318	342	391
March	132	141	178	193	236	235	267	317	356	362	406	419
April	129	135	163	181	235	227	269	313	348	348	396	461
May	121	125	172	183	229	234	270	318	355	363	420	472
June	135	149	178	218	243	264	315	374	422	435	472	535
July	148	170	199	230	264	302	364	413	465	491	548	622
August	148	170	199	242	272	293	347	405	467	505	559	606
September	136	158	184	209	237	259	312	355	404	404	463	508
October	119	133	162	191	211	229	274	306	347	359	407	461
November	104	114	146	172	180	203	237	271	305	310	362	390
December	118	140	166	194	201	229	278	306	336	337	405	432

Figure 2: A display of the dataset on flight patronage between 1949 and 1960

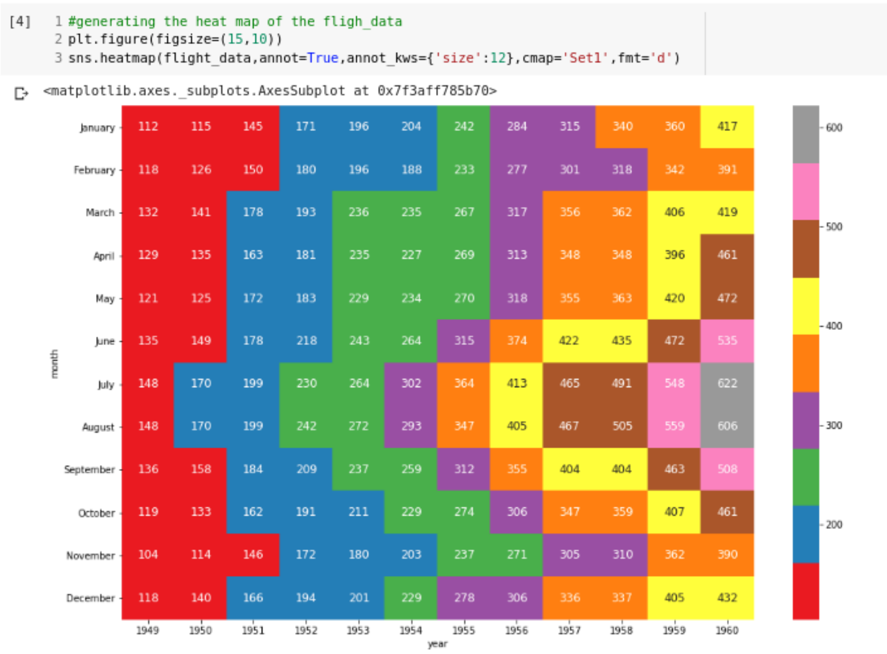

Figure 3: The visualization of data analysis on flight patronage between 1949 and 1960

Discussion

The heatmap visualization in figure 2, depicts the daily precipitation distribution, grouped by month, and recorded over eleven years in Seattle, Washington. Each cell reports a numeric count, like in a standard data table, but the count is accompanied by color, with larger counts associated with darker colorings. Using the legend of the heat map, it can be observed that the month with the highest patronage was colored grey that is July-August, indicating that more people make use of air-travel between these months than other months of the year. The months with the least patronage are colored red, as shown in figure 3, November, and December has the least patronage of air-travel.

Most frequently, there will be a sequential color ramp between value and color, where lighter colors correspond to smaller values and darker colors to larger values, or vice versa. However, a diverging color palette may be used when values have a meaningful zero point.

Conclusion

This paper has been able to highlight the efficacy of data especially big data in the building of a digital economy. Since data is generated by every activity of humans. The application of big data in diverse sectors of the economy was discussed ranging from politics, education, economy, transportation to mention a few. The effect of big data in the aviation industry was demonstrated by implementing a light dataset gotten from the seaborn library of matplotlib and visualized using heatmap statistical analysis and visualization tool. This is helpful to the aviation industry operators and decision-makers to be able to take reasonable decisions that can improve the performance of the industry.

Recommendation

It is hereby recommended that stakeholders and decision-makers utilize the availability of big data, to aid decision plans in all sectors of both public and private enterprises.

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AN ON-LINE DRUG AUTHENTICATION AND NOTIFICATION SYSTEM

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Abstract

Authentication is the act of proving the validity of an entity's stated true attribute of a single piece of data (a data). Authentication of medicines literally involves the act of verifying a drug's originality or validity and expiry date. Drug authentication, in other words, also requires testing the authenticity of at least one type of identification. Many ways of drug identification have been placed in place by the regulatory body to checkmate the adulterated drugs in circulation. The main objective of this study is to establish an Online Drug Authenticating System (ODAS) that can verify and validate expired drugs and also inform the pharmacist and consumers of any drug that is about to expire or expire. This system is designed to be a centralized authentication system with a centralized drug product authentication database. At the point of registration and screening of each periodic development or manufacture of pharmaceutical products, each medication will be given a specific barcode in which each product will be given a barcode accordingly via its production batch. This special code cannot be cloned and before the purchaser of the product unveils the code before or after payment, it remains invisible.

Keywords: Authentication, Notification, Barcode, Expiry date.

INTRODUCTION

For the pharmaceutical industry, counterfeiting is a major concern. Access to prescription drugs outside the regulated pipeline, especially with the ability to purchase prescription drugs online, is becoming a much larger problem. This is a field that needs to be more focused on ensuring consumer safety,' said Troy Turley (Director, Chesapeake Pharmaceutical and Healthcare Packing Business Development) of Pharmaceutical Products Monitoring and tracing (Marie, 2011).

Authentication (from Greek: authentikos, "actual, authentic," from authentes, "author") is the act of verifying the validity of an attribute that an individual claims to be true of a single piece of data (a data). In comparison to identification that relates to the act of stating or otherwise stating a claim that allegedly attests to the identity of a person or object, authentication is the method of actually verifying that identity. It may include checking a person's identity by validating their identity records, verifying the authenticity of a digital certificate website, tracing the age of an item by carbon dating, or ensuring that a product is what it appears to be in its packaging and labeling.

Authentication, in other words, also requires checking the authenticity of at least one type of identification.

The Drug Authenticating System is a system that determines authentic drugs using a mobile smartphone (technically stable, user-friendly, cost-effective and portable system).

It is not possible to underestimate the relationship between people's health stability and their intake. This called for a serious campaign against the counterfeiters' black / gray market, not just for their illicit financial benefit, but for protection.

The Drug Authentication System is a system (technically robust, user-friendly, cost-effective and portable) that uses a mobile device to assess the authenticity of drugs. This system is intended to be a centralized authentication system with a centralized food and drug authentication database in the world. At the point of registration and screening of each periodic production or production of the Pharmaceutical or Food Business, a specific barcode will be issued to each food and drug. This code is not the normal NAFDAC registration, but through its production batch, each product will obtain a barcode accordingly.

Unlike the numerous current authentication schemes that pharmaceutical firms currently have, NAFDAC will handle this system as a whole. This special code cannot be cloned and before the purchaser of the product unveils the code before or after payment, it remains invisible. It is not appropriate to underestimate the issue of whether or not NAFDAC registration is adequate to check the incidence of counterfeiting of drugs and foods, in that NAFDAC registration is only to assess the legality of a production business and not the product. Also, the name and trademark of the company can be stolen and cloned once the registration number does not have the used / unused status in the database, but a permanent status, unlike this specific code, which switches the code status from unused to immediately used once a product is checked.

Mobile technology is developing and spreading worldwide at a very high pace. Therefore, there is a huge demand for tools like "QR codes" that can help mobile phones and other portable device users to have an easier and faster access to information. QR code stands for (Quick Response code). It is a type of matrix barcode (Two Dimensional Barcode). It has four encoding modes are (Numeric, Alphanumeric, Bite/Binary and Kanji) characters. It has fast readability and more storage capacity than the other 1-dimensional barcode.

QR code is the combination or black and white square modes. It can encode information in both vertical and horizontal that is decoded by imaging devices (mobile phone camera, barcode scanner). QR code are mostly used in the product tracking general market, document management, item identification, time tracking, in hospital and in education, business and industry application.

QR codes have become common in consumer advertising. Typically, a smartphone is used as a QR code scanner, displaying the code and converting it to some useful form (such as a standard URL for a website, thereby obviating the need for a user to type it into a web browser). QR code has become a focus of advertising strategy, since it provides a way to access a brand's website more quickly than by manually entering a URL (Jenny, 2016). It can also be used as a means of authenticating various products to know if they are real or illegal.

Health hazards to consumers and huge loss to businesses have been the major challenges posed by expired products. Manually taking stock of products by small scale/medium scale business owners are still prone to human errors. When consumers are exposed to expired products, they may have various health challenges ranging from stomach upsets to food poisoning (which may result to death).Apart from law suits the pharmacist may face, he/she will be losing money if the products in the store expires without his/her notice.

These challenges are the main reasons the researcher sought to develop a computerized system that notifies the wholesalers, retailers, consumers, Chemists and managers of impending products that are about to expire. This system is significant in the sense that it will curb loses and prevent health hazards to consumers.

The primary aim of this research is to design an Online Drug Authenticating System (ODAS) which will be able to check and confirm expired drugs and also notify the pharmacist of any drug which is about to expire or expired.

Review of related works

In other to differentiate counterfeit drugs from substandard medicines which are both categories of poor quality medicines; the World Health Organization (WHO) defines a counterfeit drug as "a medicine, which is deliberately and fraudulently mislabeled with respect to identity and/or source" (Wondemagegnehu, 1999 cited in Chioma J. E 2015). "Counterfeiting can apply to both branded and generic products and counterfeit products may include products with the correct or wrong ingredients, without or with insufficient active ingredients or with fake packaging" (World Health Organisation 2010). It has also been discovered that counterfeiters may copy or imitate existing products. They can also manufacture completely new products (IMPACT, 2008). All counterfeits are, by nature, at high risk of being substandard (IFPMA, 2010).

According to WHO regional office for the Western Pacific (WPRO) (2005-2010) Counterfeit drugs can be classified as follows;

1. Fake packaging and correct quantity of correct ingredient;

2. Fake packaging and wrong ingredient

3. Fake packaging and no active ingredient;

4. Fake packaging and incorrect quantity of correct ingredient;

5. Genuine packaging and wrong ingredient (deliberate);

6. Genuine packaging and no ingredient (deliberate); or

7. Genuine packaging and incorrect quantity of ingredient (deliberate).

Chinwendu, 2008 concluded that NAFDAC has not been able to achieve good success in fighting of counterfeit drug in Nigeria despite their intense efforts to do so. The reasons not far fetch from lack of adequate and continuous support of the government, Inadequate support from some stakeholders meant to collaborate with NAFDAC in the fight such as the customs, police and the judiciary.

Gillian et al., (2013) in their research recommended that Governments should establish or strengthen systems to detect substandard, counterfeit, and unregistered medicines. This surveillance should be integrated with established public health surveillance systems. Analysis and reporting should precisely describe the product's quality, packaging, and registration.

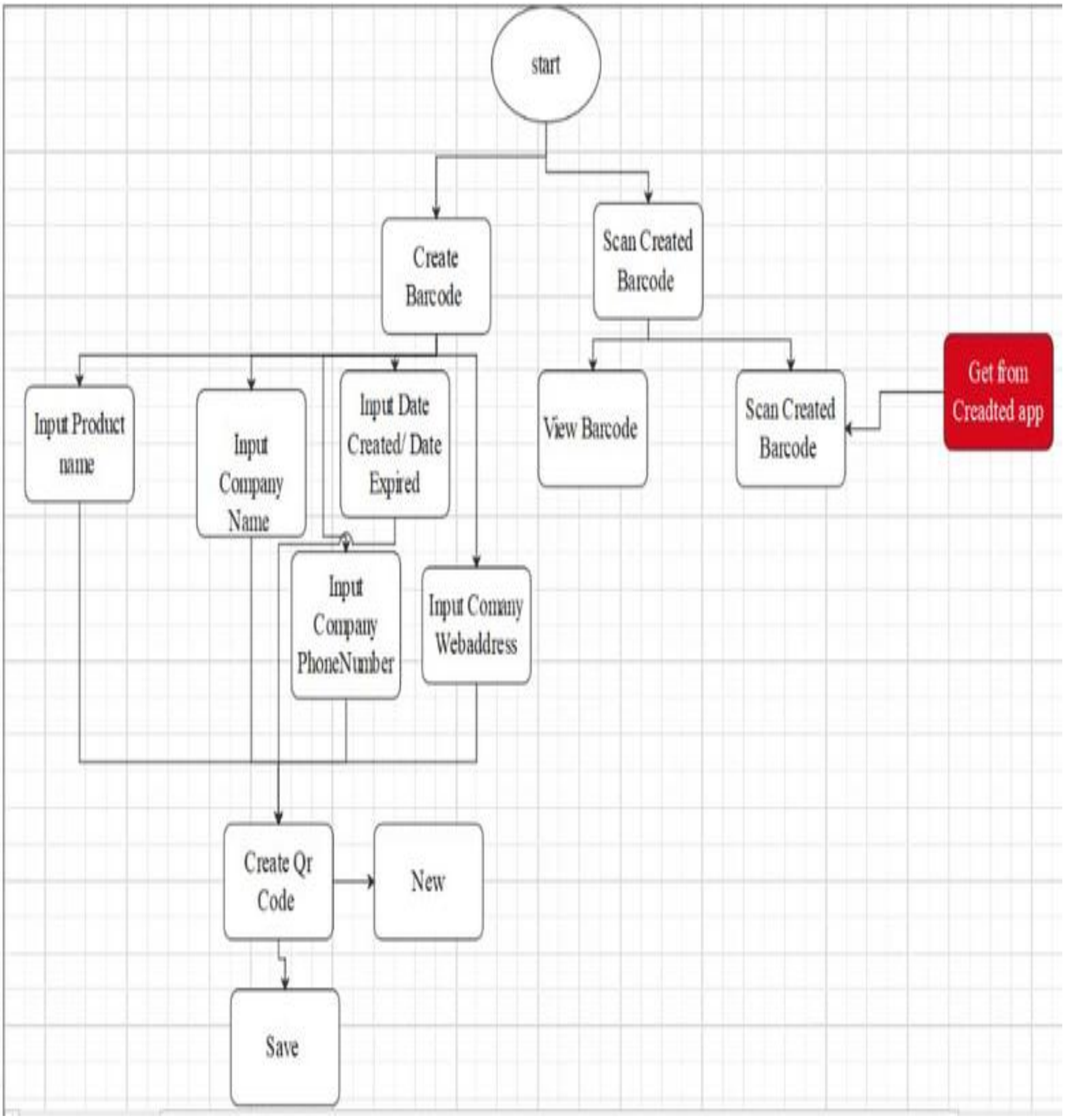
Methodology and Design

This research work "An on-line drug authentication and notification system" will be a mobile application and will be implemented on a relational database system (MySQL). Java android studio will be used as the serve-side script language to link the interface and the database.

Algorithm for drug authentication and notification

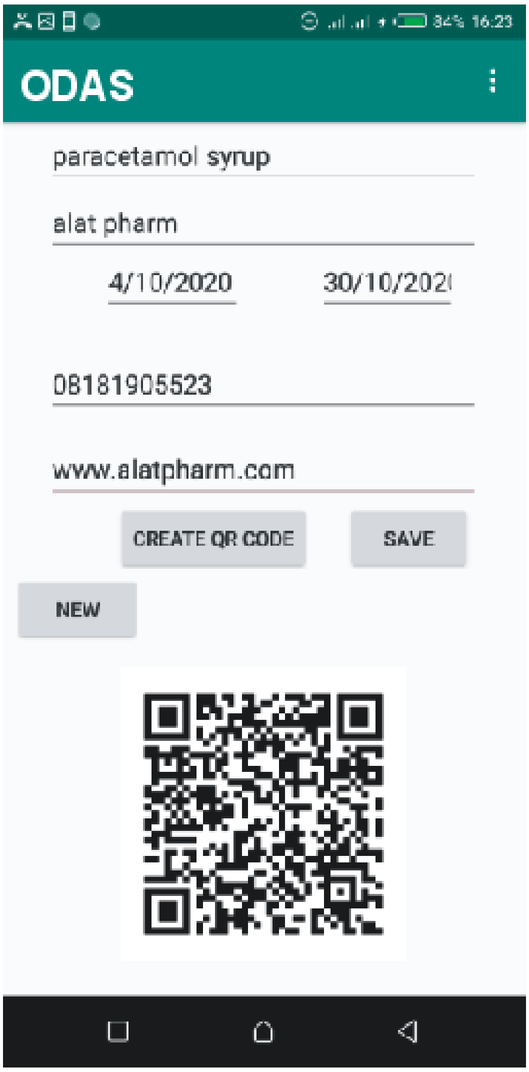
1. ODAS: Click on ODAS app icon on your mobile phone.
2. Scan the QR code on the drug package for authentication
3. Click on the "Check" button.
4. If QR code output details are the same as the details on drug package, drug is authentic.
5. Click on Expiry alert.
6. If QR code output details does not match package details, drug not authentic and click on report drug.
7. Click the "Send' button.
8. Exit ODAS.

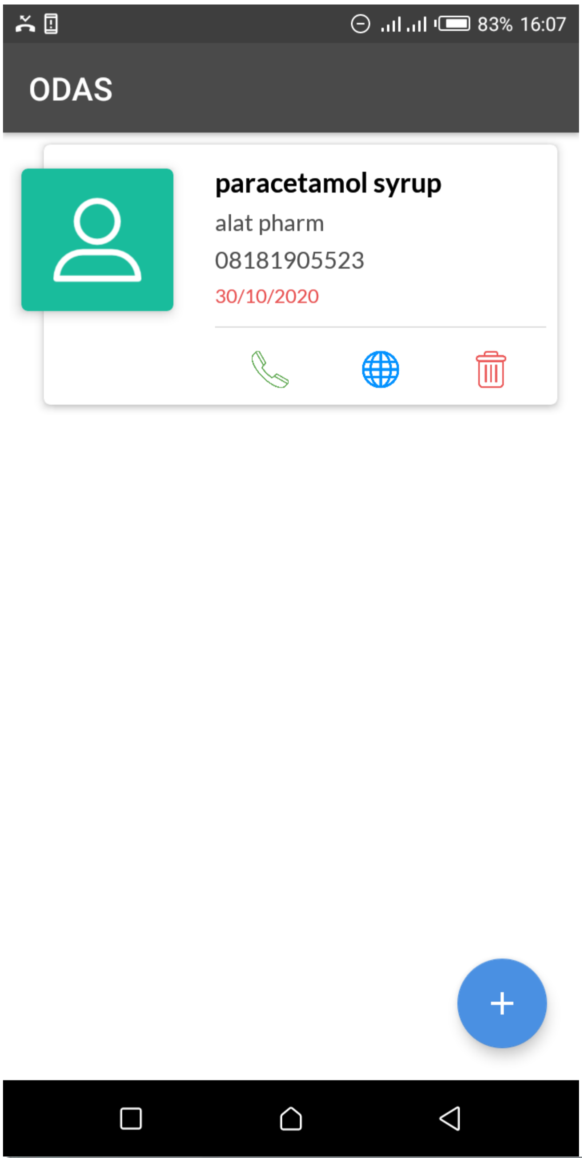
Flowchart of the system

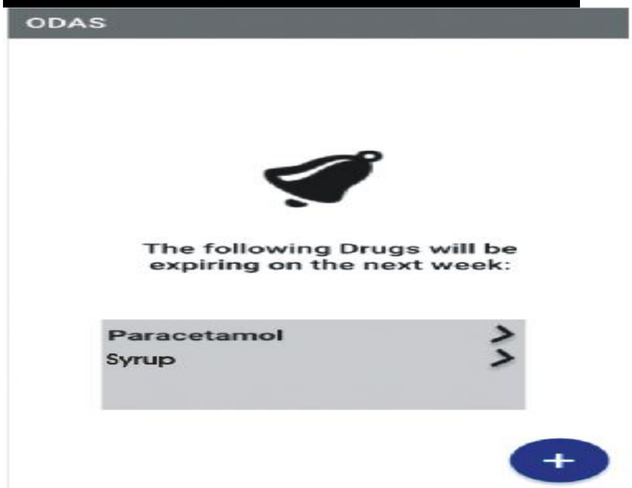


Case Diagram

Screenshots of ODAS




83% 16:07
ODAS
paracetamol syrup
alat pharm
08181905523
30/10/2020


ODAS
The following Drugs will be expiring on the next week:
Paracetamol
Syrup

Implementation and Result

As a modern mobile application that can be installed on a mobile phone, the proposed system is implemented and features interactive elements of the user interface, better visual signals, a much more responsive and faster system, and thus a user-friendly application.

The planned framework would provide a consolidated MySQL web database that is interconnected for simple medication data processing and a content management system (Word press). The stored drug data is further exposed in the JSON (Javascript Object Notation) format so that the exposed data can be conveniently incorporated into external applications such as the mobile app for smartphone users to use.

The proposed framework, like a typical smartphone app, has a rich and intuitive user interface with icons, text fields and buttons that make it easier for users to connect with the app.

When a user tries to authenticate a drug, the app links the app to the legitimate central database (NAFDAC) with the aid of an internet connection to pull out the drug details and an expiry alert button is triggered to notify the wholesaler, retailer or user via SMS when the drug is about to expire.

If, however, a match is not found, then the drug being tested is shown as an invalid drug and the patient is prompted to report the drug and place of purchase for law enforcement actions.

Conclusion and Future work

Sequel to the risks attached to the usage of an unauthentic drug which can lead to various diseases and sudden death, this research work has proved to be a valuable and problem solver in the aspect of drug authentication and notification of expiry date to wholesalers, retailers and even consumers to avoid using bad or expired drug.

With the level of achievement of this proposed system, extending it to other fields such as food, drinks even clothing would be a major success and eradicate unauthentic materials in circulation and curb the usage of expired food and drinks in the society.

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GLOBAL PANDEMIC, THE RESILIENCE AND SUSTAINABILITY OF THE NIGERIA ECONOMY

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Abstract

The global economy is fast dwindling while individual states are panicking due to the devastating impact of novel corona virus (Covid-19). Covid-19 is a global health emergency, a pandemic and menace that have disrupted global and national socioeconomic activities and even necessitate the death of more than 1.2million persons globally. Nigeria is caught in this web of the global pandemic beside her numerous national pandemic and haemorrhaging economy. Most economic activities were halt as both international and national flights were abruptly halted, and every other socioeconomic and governmental activities were dislocated, all in attempt to reduce the spread of the pandemic. These measures almost cripple and made the fragile economy of Nigeria more vulnerable to recession. This paper adopts content analysis and rational-comprehensive decision-making theory to examine the impact of the global pandemic and the resilience and sustainability of Nigeria economy. The study observed that the novel covid-19 has relatively come to stay in human society, because there is no sight of it ceasing out soon, the study also observed that the global pandemic has dealt a fatal blow to Nigeria economy, thwart development and necessitate job lost, health and food crisis. We also observed that the policy measures put in place by government to cushion the devastating impact of the global pandemic on the Nigeria economy were not enough to revamp the already fragile and cripple economy. We recommend that both the government and private sector massively invest in the health, agriculture and manufacturing sectors to make Nigeria economy more resilience and sustainable in this global pandemic. There should be a rapid and integrated response especially on health, finance, and trade sectors in order to address structural economic defect that may affect Nigeria resilience to this pandemic. Need for a comprehensive diversification of Nigeria economy in order to expand the channel of revenue generation. The reduction of unemployment and poverty which makes the people more vulnerable to covid-19 is very sacrosanct, adequate provision for unemployment benefits, employment retention, financial support and tax relief where necessary can stimulate the resilience and sustainability of the Nigeria economy in the post global pandemic.

Key words: Globalization, Covid-19, Pandemic, Economy Resilience and Sustainability

Introduction

The global economy and other socioeconomic and political activities were shock and shaken to their very foundation due to the disruptive outbreak of novel corona virus. Covid-19 was declared a global health emergency and pandemic by the world health organization WHO in 2020 as a result of its contagious and deathly character and impact. This global pandemic had seriously disrupted and dislocate global and national economy to the extent that developed economies like the United States of America, and China were adversely affected and even the US, European union economy is gradually sliding into recession. This global pandemic disrupted global businesses as countries halted their aviation sector and even Maritimes and other socioeconomic activities. Global business was almost at a standstill due to the devastating effect of covid-19, the human global cases has exceeded 42million, while the fatalities has exceeded 1.2million. Covid-19 cases are daily on the increase in countries especially in Asia, North America, South America and Europe compare to Africa. It is important to note that these four continents have the largest numbers of covid-19 cases and fatalities. Africa and Nigeria in particular is very much affected by this global pandemic, as most economic, business, trading, social and political activities were mostly grounded and halted.

It is pertinent to note that this global pandemic dealt a fatal blow to the already fragile and haemorrhaging Nigeria economy due to the sharp and steep fall in price of crude oil at the global market. There is no disputing the fact that Nigeria is almost a mono and rentier economy that heavily depend on crude oil. However, before the outbreak of Covid-19 global pandemic, Nigeria economy was almost in shambles with huge debt profile of above 30trillion naira, couple with the hundred percent increase in power or electricity tariff, removal of oil subsidy and the rising price of sample food. The government of the day is grappling to recover from the economic recession of 2014 with GDP growth of about 2.3 percent in 2019 before the unfortunate global shock of covid-19. The global pandemic has worsened the Nigeria economy woes as the pandemic brought about the disruption of business cash flows, disruption of production with huge employee implication as it concerns loss of jobs, increase in cost of production, increase in transportation and increase in the cost of living. The pertinent question is, can a fragile, weak and haemorrhaging economy like Nigeria weather through the storm of global pandemic economic shock that have devastated strong and developed economies in Europe and America?

This paper attempt to explicates the impact of the corona virus global pandemic on the Nigeria economy and how Covid-19 have invariably necessitate global and national awaken of new strategies, technologies and tools that could facilitate economic, business, trade and other socio-political and administrative resilience and sustainability measures to control and manage the pandemic for the time being and possibly exterminate it on the long run. However, it is imperative to states that Nigeria cases of Covid-19 global pandemic has exceeded 62000 with above 1100 death. The virus infects and affect people of all shades regardless of age, wealth, class, social status, religion, ethnic or region. The Nigeria state, international financial and global health bodies have put some measure in place to cushion it effect but the global pandemic seems to be on a stay-for-long mission as there appear to be no foreseeable time for it to cease out soon from human society.

Conceptualization

There are certain concepts that are relevant to this paper, of note are globalization, covid-19, pandemic, resilience and sustainability economy. We shall briefly review few literatures on them.

Gidden (2011) argued that globalization is the intensification of worldwide social relations which link distance localities in such a way that local happenings are shape by events occurring many miles away and vice versa, globalization is also the spread of modernity which is also linked with time, space and distance.

According to World Health Organization WHO (2020), the novel Coronavirus known as COVID-19 is an infectious disease caused by a new strain of Corona virus. It is a virus that cause illness ranging from common cold to more severe diseases such as Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). It symptoms include common cold, fever, cough, and shortness of breath. In severe cases, infection can cause pneumonia or breathing difficulties. The Nigeria Centre for Disease Control NCDC (2020), posit that coronavirus can be transmitted through direct contact with respiratory droplets of an infected person through coughing and sneezing or touching surfaces contaminated by the virus and touching their face e.g., eyes, nose, mouth. It is pertinent to note that this global pandemic was first discovered in Wuhan, the Hubei region of China. COVID19 as is usually called is an acronym 'CO' stands for corona; 'VI' for virus; and 'D' stands for disease, while the 19 stands for the year it was discovered '2019. COVID-19 is global pandemic because of its contagious spread beyond the initial area it was discovered.

Doshi (2011) posit that pandemic is the global outbreak of a disease, he further argued that pandemic is an epidemic which occur worldwide or over a very wide area crossing international boundaries and usually affecting a large number of people. Last (2001) view pandemic as an annual epidemic that occur in each of the temperate Southern and Northern hemisphere given that seasonal epidemic across international boundaries and affect a large number of people. WHO (2010), posit that pandemic occur when almost simultaneous transmission of epidemic disease takes place worldwide e.g. influenza (flu) virus, Spanish flu, French flu, Hong Kong flu and even the Ebola virus.

Anderies, Johnson & Walker (2002), posited that resilience and sustainability economy provide the means and goal of sustainable economy development for a state or society. Resilience and sustainability economy provide conceptual framework for economic analysis of risk management which illustrate the capacity for action. Hollings (1973), economy resilience is a prerequisite for achieving sustainable development because its guide policies towards sustainability.

Theoretical Framework

This paper deplores the rational-comprehensive model of decision making theory as its theoretical framework to explicate the nexus between the impact of the global covid19 pandemic and the resilient and sustainability of the Nigeria economy. This theory was propounded by Herbert Simon and other scholars, they view decision-making as the search for maximizing solution to complex societal problem (Simon 1965). He further argued that relevant information is gathered and applied rationally to the assessment and choice of decision options. The basic tenet of the theory posits that decision-makers are confronted with a given problem, for instance, this global pandemic of COVID-19, and that the objectives of the decision-maker is to solve the problem as specified in the case of global pandemic which appear to be top on the priority list of most countries including Nigeria.

Anderson (1975), argued that decision-makers consider various alternatives for dealing with problem or achieving the objectives as identified. It is pertinent to note that decision-makers as a rational being look at the consequences of any decision particularly in term of cost and alternative which must be identified and investigated. Each alternative and their attendant consequences are compared with the other alternatives and the alternative strategy that most solves the problem and achieves the objectives at the least cost of best result.

The global pandemic cause by the novel corona virus is a major problem that affect every corner of the globe, leaders of the various countries including Nigeria are making effort through their decision to control, manage and to possibly cease-out this global challenge. The states as represented by the government and other global, multinational and national organizations are constantly brainstorming, assessing, investigating, calculating and costing their priority before taking any decision about the pandemic, and most of their decisions are rationally articulated by decision-makers to solve the global pandemic. Nigeria government and other relevant stakeholders are not relenting in making rational and comprehensive decision to revamp the economy of Nigeria and also put some measure in place that would ensure the resilience and sustainability of Nigeria economy despite the shock from the global pandemic.

Global Pandemic and the Nigeria Economy

The COVID-19 global pandemic dealt a devastating blow on the Nigeria economy as there were abrupt disruption of global business, trading and economic activities. The global pandemic also affects the price of crude oil as there were steep fall of global oil price as low as 22-30 dollar per barrel, the steady fall in the price of crude oil affect the revenue generation of Nigeria, whereby making it difficult for the government to finance her budget. The implication is that the Nigerian government can no longer meet the targeted demand of crude oil benchmark of $57 per barrel to fund the 2020 budget as the fall in crude price has made it to reduce the benchmark to $30, which is a deficit, resulting to the slashing of 1.5 trillion Naira in order to make the budget a reality (Chike 2020).

The global pandemic is a serious national health emergency and economic challenge to the Nigeria society, in a bid to avert the spread of the global pandemic in the country, the Nigeria government particularly Lagos state government declared curfew in the state whereby disrupting economic activities and the federal government of Nigeria imposed two weeks initial lockdown in Lagos, Ogun, and the Federal Capital Territory Abuja, because these were the initial infected states in the country. It is pertinent to note that the federal government later imposed a comprehensive lockdown in the country, while some states have partial lockdown, there were closure of interstate borders and later national curfews was introduced nationwide. All these physical measures to avert the spread of the global pandemic have grave economic implications.

The economic implication of these control measures spell doom to many sectors and industries of the Nigeria economy, especially the education, agricultural, transport, aviation, manufacturing, and banking sector, entertainment and sport industries including worship centres were all affected. Major markets and shopping complexes were abruptly closed. This disruption and dislocation of productive, socioeconomic and business activities necessitate the slashed in the salaries of staff, laid-off of workers especially in the private sector, increase in the price of basic food stuffs, increase in the fare of transportation, and general increase in the cost of living. It is pertinent to note that Nigeria was already the headquarter of poverty globally. The imposed lockdown by the federal government also necessitate artificial scarcity of essential goods and the price of goods doubled due to panic buying. The global pandemic necessitates food crisis in the country, for instance, price of a loaf of bread that was about 300-400 Naira increases to N450-550, likewise other essential food in the country.

It is pertinent to note that Nigeria GDP was already below one dollar per day for an average Nigeria citizen, beside the country is heavily indebted, the abrupt crash of oil price in international market severely affect her annual budget and disrupt developmental project and also increase the expenditure of the government particularly in addressing the global health challenge and also providing palliative and relieve material to indigent citizens in attempt to address the effect of the pandemic on the economy. But this was measures were not transparent enough, weak and unreliable as there were compromise by key government at, religious, traditional and community leaders. The fallout of the #ENDSARS# Protest, brought out the real impact of the global pandemic in the country, as individual citizens and household were obviously seen looting warehouses where palliative and other relieve material were kept but not distributed by the government.

It is important to note, that the private sector especially the Small and Medium Enterprise which account for 96% of businesses in the country and 84% of employment, were seriously and adversely affected by the pandemic which lead to decrease in their turnover and laying off staff and workers. It is an obvious fact that more than 10,000 MSME business collapsed and more than 50,000 of the MSME cut the salary of their staff in Nigeria as a result of the economic impact of the global pandemic (Daily Trust 2020). It is pertinent to note that in the media sector, staff lost their job due to the uneven impact of Cœvid-19 global pandemic e.g. Iroko an online television network laid-off about 100 staff, Punch newspaper laid-off 40 of her staff. In the hospitality and entertainment industries employers count their loss as so many staff were also laid-off. In the aviation industry, airlines were daily counting their loss and to remedy the economic situation they also laid-off staff, of note is Airs Peace that laid-off 75 of her pilot staff, Briston helicopter laid-off 100 of her pilots while Aero laid-off 60percent of her staff (Olatokewa 2020).

In the education sector especially in private schools so many teachers stop receiving salary in April and some technically lost their job. In the public sector some state governments could not afford to paid their staff full salary and some were already owning their staff 6-10 months salary and allowances before the pandemic, so with the dwindling oil price and the fall in federal revenue generation couple with the global health emergency, some state slashes the salary of their staff and even attempt to laid-off some. According to National Bureau of Statistics NBS 42 percent of Nigeria workers lost their job due to the relative impact of COVID-19 global pandemic (Bamidele. S. A. 2020). Paul (2020) argued that unemployment in Nigeria is already 27.3% principally as result of Covid-19 global pandemic. The Director General of Lagos chamber of commerce and industry LCCI Yusuf posit that employer have very little capacity to absorb the shock inflicted by the COVID19 (Olatokewa 2020). There is no doubt that all these invariably affect the purchasing power of citizens and further weaken the fragile and haemorrhaging Nigeria economy. The restriction of movement disrupts the trading business of most small business owners that survive on daily sales, whereby making it very difficult for them to meet their daily family need.

It is pertinent to note that the restrictions of movement necessitate the fall and reduction in the consumption of nonessential goods in the country as demand was shifted to essential goods whose price continue to skyrocket. The fall in the price of nonessential goods definitely affect the income-generating capacity of those affected thus reducing their consumption expenditure. The global pandemic affect investments of both foreign and domestic investors because there appear to a be cloud of uncertain on the devastating effect of the pandemic on human society and when it will eventually come to end. The uncertainty and economic shock associated with the pandemic has led to a massive decline in stock prices in Nigerian Stock Exchange and this has eroded the wealth of some investors.

This COVID19 global pandemic has brought about a relative shift in human interaction, business and trading. The measures put in place to address and curtain the further spread of the global pandemic open channel of other business and even made some business and economic activities to thrives. Internet providers, and online businesses, carrier services, online shopping and services delivery sector were at their best as they made gains, because most human interaction and transactions were done online, e.g. conference, symposium, meeting and learning class were held via virtual online platform.

Resilience and Sustainability Economics Measures put in place by Nigeria Government

It is very obvious that the impact of the global pandemic on Nigeria economy is severe, huge and devastating, nevertheless the Nigeria government commit certain economic resources to curtain and cushion the effect to a minimum extent. Resilience and sustainable economic policies, programs and strategies measures were put in place to revamp the Nigeria economy. The first step by the government was the establishment of the Presidential Task Force on Covid19 (PTF) to develop a workable national response strategic template on daily review requirements needed to address the global health emergency and its economic implications. While state governments also establish similar task force to monitor, manage and strategize on the way forward.

The federal government through the office of the governor of central bank of Nigeria CBN Godwin Emefiele announced an economic policy measures e.g. the additional moratorium of one year on CBN intervention facilities, interest rate reduction on intervention facilities from 9% to 5%; the activation of N1.5 trillion for building critical infrastructure; the strengthening of lending to deposit ratio policy, additional N100 Billion intervention in healthcare loans to pharmaceutical companies; and the N1 trillion loan to boost local manufacturing and production across critical sectors of the Nigeria economy (Bamidele 2020). These resilience economic measures were effectively made to revamp and sustain the Nigeria economy.

The government also came up with economic policy measure of restructuring of loans to longer tenure for all sorts of companies whose businesses were adversely affected by the global pandemic. The sum of N50 Billion loan facilities was extended to household and businesses adversely affected by the global pandemic through NIRSAL Micro Finance Bank (Isaac 2020). The government also rolled out fund under the National Economic Sustainability Programme NESP, the sum of N50billion as payroll to support MSME with up to ten staff, N200billion loans to artisans and N10billion support to private transport companies and workers. The federal government also approved the sum of N75billion through the Nigeria Youth Investments Fund NYIF for Nigeria youth entrepreneurs and MSME to access soft loan to establish new MSME and also upgrade and revamp the almost collapse MSME. The federal government also permit free company name registration for 250,000 MSME and empowered 333000 artisans with 30000 each. It is also important to note that the federal government also suspends the repayment of all state government loans for one year to give states ample financing room to pay their staff salaries (Isaac 2020).

The federal government through the Federal Inland Revenue Service (FIRS) and even State Inland Revenue Services (SIRS) grant waiver on interest and penalties on tax debt. The government through the CBN increase the cash reserve ratio (CRR) from 22.5 percent to 27.5percent (Bamidele 2020). The CBN also imposed a loan to deposit ratio of 65percent compelling banks to lend to the private sector businesses. The government also through the Government Enterprise Empowerment Programme GEEP empower 84614 poor petty traders across twenty states of the federation in order to the revamp and sustain their business in this pandemic period. While in the second phrase of the programme the government also empower 412386 petty trade across the country (Isaac 2020).

These resilience strategies economic measures were put in place for the sustainability of the Nigeria economy that was badly hit by the global pandemic. In addition to the resilience economic measure put in place by the government, private sector particularly the banking sector through the Bankers Committee provide the sum of N3.5 trillion in support to pharmaceutical companies, assist essential health companies in purchasing raw materials, and encourage local production of drugs (Bamidele 2020). All these are strategic resilience economic stimulants that were needed for the revamping and sustainability of Nigeria economy in this global pandemic and post pandemic period.

The federal government in his own way of sustaining the Nigeria economy due to the effect of the comprehensive lockdown, rolled out economic palliative measures targeted at the downtrodden in the society, of note are the beneficiaries of tradermoni, marketmoni and farmermoni loans, the government declared three months interest holidays to them as issued by the Bank of Industry, Bank of Agriculture, and the Nigeria Export and Import Bank (Isaac 2020). The government also distribute physical palliative items e.g. food stuff like rice to poor household especially the poor of the poor and also transfer money to some target individuals in the society to cushion the economic effect cause by the global pandemic. The government also expand its scope by increasing the number of households for the direct distribution of food and cash from 2.6 million households to 3.6 million households (Bamidele2020).

Conclusion

The scourge of the global pandemic is biting hard on the Nigeria economy, it severely and abruptly disrupts, dislocate and almost cripple the fragile and haemorrhaging Nigeria economy to the extent that Nigeria government have to reduce both her capital and recurrent expenditure in the 2020 national budget. The Cove-19 global pandemic necessitates the loss of numerous jobs especially in the private sector, facilitate health and food crisis in the country due to the comprehensive lockdown declared by the government and halting of socioeconomic and business activities. The study observed that the COVID-19 pandemic might take a long period of time to completely cease-out from human society as there is no vaccine for it cure apparently. The pandemic is gradually being curtain but there are still community spread across the globe despite the physical preventive measure. The study observed that the resilience economic policy measures put in place by the government to cushion the devastating impact of the global pandemic on the Nigeria economy were not necessarily enough to revamp and sustain the already fragile, cripple and haemorrhaging economy. The study establish that it would take 3-5years for the Nigeria economy to normalise if proactive resilience economic measures were judiciously and religiously put in place. This Covid-19 global pandemic exposes the crisis and the infrastructural deficit and challenges in Nigeria health sector and why both the public and private sector has to massively invest in it.

Recommendations

There should be massive public and private investment in the health, agriculture, technological and manufacturing sectors of the Nigeria economy because these sectors have the magic resilience and sustainable wane to revamp the fragile, crippling and haemorrhaging Nigeria economy. Another strategical and technological tools to address the effect of the global pandemic is for both the public and private sector to focus on the intensification of local production for both essential and nonessential goods. Government and the private sector should massively invest in technological education there should be some sort of reduction in interest rate to encourage local production while keeping the economy floating.

There should be a rapid and integrated response especially in the health, finance, and trade sectors by the government in order to address structural economic defect that may affect Nigeria economy resilience to this pandemic. There should be a comprehensive diversification of Nigeria economy in order to expand the channel of revenue generation.

A coordinated policy both by the Government and private sector on rapid reduction of unemployment and poverty through effective economic engagement of the people especially youth and women, because unemployment and poverty increase the vulnerability of these people to covid-19. There should be some sort of adequate provision for unemployment benefits, employment retention, financial support and tax relief where necessary to stimulate the resilience and sustainability of the Nigeria economy in the post-pandemic era.

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STATISTICAL DISTRIBUTION OF COVID-19 INCIDENCE IN WEST AFRICA

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Abstract

This paper examines the statistical distribution of the daily cases of Covid-19 in the 16 West African Countries to understand the spread pattern of the virus. We collected the data for this study from www.ourworldindata.org/covid-cases. We compared the spreading pattern of the daily reported cases of the Covid-19 in these countries using five families of exponential distributions – Exponential, Gamma, Weibull, Normal, and Lognormal distribution. The Maximum Likelihood Estimation method was adopted to estimate the parameters of the distributions. The result showed that of all the five distributions considered, the spread pattern in the countries considered follows three distributions, say, Weibull, Lognormal, and Exponential distribution. The daily reported cases in Nigeria follows an Exponential distribution; Weibull distribution appears as the best fit for the daily reported cases in Guinea and Senegal, while the Lognormal distribution is the best fit for the remaining 13 West African countries. Although the number of daily cases is decreasing, however, with the current control measures put in place, the peak number of cases has not been reached yet in Guinea and Senegal. Benin, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea Bissau, and Mauritania are likely to record a more high number of cases of covid-19 if the government of these countries does not enforce more strict control measures on the citizens. The spread will possibly continue at a constant rate in Nigeria. The spread of the virus is likely to escalate beyond control if the government eases the lockdown and schools open fully for academic activities without proper preventive and control measures enforced. The findings of this study are very germane to control policymaking to understand the spreading pattern of the virus and to adopt the best control measure to further curb the spread of the virus amidst resuming economic and social activities in the country.

Keywords: COVID-19; Distribution; Spread pattern; West Africa

1.0 Introduction

Coronavirus, a new strain of acute respiratory syndrome widely regarded as Covid-19, is currently afflicting the world in totality. The World Health Organization (WHO) globally declared this deadly virus a pandemic on 11 March 2020. The spread of the virus, commonly believed to be accelerated by the migration of infected people has now reached a very alarming pace, cutting through developed, developing, and underdeveloped countries. The presence of this virus has paralyzed the social and economic life globally – resulting in the restriction on movements, closure of academic activities, and suspension of religious activities, among others. The virus tends to be spreading at a rapid rate. That is, a person with the virus could afflict close to two hundred persons within two to four hours. Despite all the preventive measures put in place to curb the spread of the virus, the spreading continues at a high pace. Where this new disease keeps coming from remain misery to researchers who are working restlessly to find a lasting cure to the virus (Wu et. al., 2020). As of 6 October 2020, the total confirmed cases of Covid-19 in the world had hit Thirty-Five Million, Five Hundred and Twenty-Three Thousand, Five Hundred and Eighteen (35,532,518) and a total of One Million, Forty-Two Thousand, Three Hundred and Ninety-Eight death cases recorded. Africa had 1,521,484 confirmed cases and 36,631 death cases recorded. Asia had 11,126,374 confirmed cases and 201,870 death cases recorded. America had 17,319,991 confirmed cases and 575,278 death cases recorded; Europe had 5,520,666 confirmed cases and 227,618 death cases recorded; Oceania had 34,307 confirmed cases and 994 death cases recorded, while Others had 696 confirmed cases and seven (7) death cases recorded (ECDC, 2020). The information shows that the United States of America has recorded the highest number of confirmed cases and number of deaths followed by the Asia continent.

As for the case of African countries, South Africa reported the highest number of confirmed cases of Covid-19 having recorded a total of 682,215 (approximately 44.8% of the total cases in Africa) with a total of 16,976 (approximately 46.3% of the total cases in Africa) death cases. Morocco (134,695), Egypt (103,781), Ethiopia

(79,437), Nigeria (59,465), and Algeria (52,270) are other countries with a high rate of confirmed cases. There are a total number of 186,430 confirmed cases in West Africa. Nigeria has the highest confirmed cases of Covid-19 in West Africa, followed by Ghana, both having recorded a total of 59,465 (approximately 31.9% of the total case) and 46,829 (approximately 25.1% of the total cases), respectively (ECDC, 2020). Presently, there is no globally acceptable vaccine for curing the COVID-19, hence taking preventive and control measures of the virus remains the only feasible option for public health safety (Fanoosh et al., 2020).

Few related works had used Covid-19 cases in other countries. Chikobvu and Sigauke (2020) examine the statistical distribution of Covid-19 cases and deaths in South-Africa. They used the daily recorded cases of the virus from 27 March to 20 May 2020. The study found that Gamma distribution with increasing hazard rate fits the data best. Another work by Elham et al. (2020) used the daily reported cases (confirmed and deaths) in Iran to determine the best distribution fit for the reported cases. The study found that the Weibull distribution with different parameter values fits the data best among the three distributions considered (Normal, Lognormal, and Weibull). The author concluded that the death rate is decreasing and that the peak number of cases has passed.

The rate and manner at which the virus spread, having taken control measures to minimize the spreading, has been a concern to global leaders. To better understand the pattern at which the virus spreads in West African countries, it is essential to examine the statistical properties of the daily cases recorded, hence the need for this study, which examines the statistical distribution of the daily incidence of Covid-19 in the 16 West African countries. This work is essential to adopt the best model fit to predict the behavior of the pandemic. We examine five (5) different distributions viz. Exponential, Gamma, Lognormal, Normal, and Weibull of the daily incidence of coronavirus in these countries.

2.0 Statistical Distribution

According to Box-Steffens et al. (2004), the Exponential Family of Distributions are continuous distributions used in modeling a random variable that assumes positive values. They provide the model that best fits a given set of observations. Hence, modeling the Covid-19 daily cases with these distributions would yield a good result. We discussed the density functions of the five continuous distributions that belong to the exponential family of distributions considered in this study as follows:

Exponential Distribution

In the distribution theory, exponential distribution, a continuous distribution used in modeling the time elapsed between one event and the other. How long time elapsed before an earthquake occurs in a country? How long time elapsed before the next Covid-19 occurs in West Africa country? Questions such as these are model using an exponential distribution. A continuous random variable X is said to have an Exponential (α) if it has the probability density function given as:

$$f(x;\ \alpha) = \begin{Bmatrix} \alpha \exp(-\alpha x) & x \geq 0 \\ 0 & x < 0 \end{Bmatrix} \tag{1}$$

where α is the rate parameter and assumes a positive value greater than zero ($\alpha > 0$); x is the daily confirmed incidence of Covid-19 in a West African Country.

Gamma Distribution

Gamma distribution, a continuous distribution used in modeling any continuous variables that always assume positive value and are skewed in nature. The probability density function of the gamma distribution given as:

$$f(x) = \begin{Bmatrix} \frac{\alpha^k}{\Gamma(k)} exp^{(-\alpha x)}\ x^{k-1} & , & x > 0 \\ 0 & , & x \leq 0 \end{Bmatrix} \tag{2}$$

where k is the shape parameters, and α is the rate parameter, both have a value greater than zero, that is, α, k>0; x represents the daily confirmed occurrence of Covid-19.

Normal Distribution

The normal distribution, a continuous distribution used in modeling a real-valued random variable. The probability density function of a gamma distribution given as:

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} \tag{3}$$

whereμ represents the mean of the distribution; σ represents the standard deviation; π is canonically taken to be 3.142, and x represents the daily confirmed cases of Covid-19.

Lognormal Distribution

A random variable, x, taking on positive values is said to follow a Lognormal distribution if the logarithm of the variable is distributed normally. It has a probability density function given as:

$$f(x) = \frac{1}{x\sigma\sqrt{2\pi}} e^{-\frac{(\ln x-\mu)^2}{2\sigma^2}} \tag{4}$$

that is, the logarithm of x is distributed normally if x is distributed normally.

Weibull Distribution

Weibull distribution is a continuous distribution used in modeling life data. The distribution assumes that the variable of the study is a non-negative random variable. The density function is given as:

$$f(x) = \left\{ \begin{matrix} \frac{\alpha}{\beta} e^{\left(-\alpha x^{\frac{1}{\beta}}\right)} x^{\frac{1}{\beta}-1} & x > 0 \\ 0 & x \leq 0 \end{matrix} \right\} \tag{5}$$

where β represents the scale parameter, assuming a positive value; α is the shape parameter, both have a value greater than zero; that is, α, β>0; x represents the daily confirmed cases of Covid-19.

3.0 Data and Empirical Results

We collected the number of daily confirmed cases of Covid-19 for the 16 West African countries from the website, www.ourworldindata.org/covid-cases. The data sample spanned 28 February to 6 October 2020, having 222 observations. Figure 1 presents the graph of the daily confirmed incidence of Covid-19 in the countries. As displayed in the Figure, between May and August, the spread of the virus is very alarming in Nigeria and Senegal. We observed a fluctuating pattern in the spreading of the virus in all the other countries except in Cape Verde where the spread appears to follow an upward trend. The spread of the virus seems to be nonlinear in virtually all countries except Cape Verde and Togo, where the spreading follows a linear pattern. Also, we observed that the spread of the virus reduces in the month of September in Benin, Cote d'Ivoire, Gambia, Ghana, Liberia, Mauritania, Niger, Nigeria, Senegal, and Sierra Leone (62.5% of the total cases). This result indicates that the preventive measures adopted in these countries are effective in reducing the spread of the virus. However, many confirmed cases are still being recorded in these countries – indicating that the enforcement of more preventive measures is still needed to curb the spread of the virus.

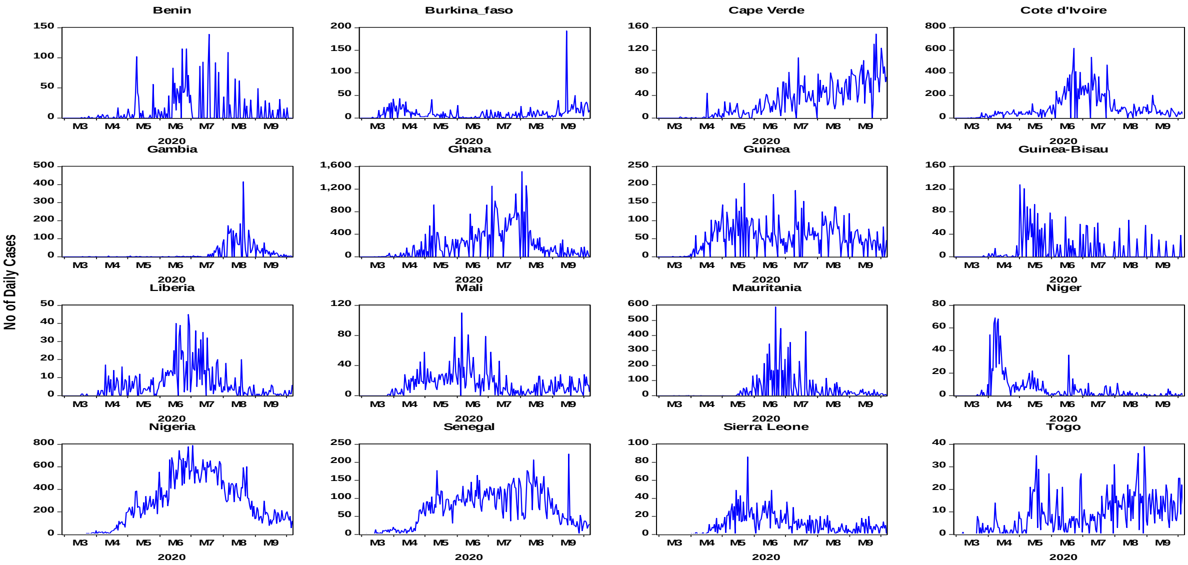


Figure 1: Time plot of daily confirmed cases of Covid-19 in West Africa

Table 1 presents a summary of the daily reported Covid-19 cases in West African countries. The table presents the date of recording the first case, the highest daily reported cases as well as the date of recording the highest number of cases in the countries. As of the time of reporting, Ghana had the highest number of cases (1513) reported on a day, followed by Nigeria (790). We observed that all the countries reported their first case(s) in the month of March except for Nigeria and Sierra Leone that reported their first case(s) in the month of February and April, respectively. Niger recorded her highest number of confirmed cases in the month of April 2020. Guinea, Guinea-Bissau, and Sierra Leone (18.7% of the total cases) recorded their highest daily confirmed cases in the month of May 2020. Cote d'Ivoire, Liberia, Mali, and Mauritania (25% of the total cases) recorded their highest daily cases in the month of June 2020. Benin and Nigeria recorded their highest daily cases in the month of July 2020. Gambia, Ghana, and Togo (18.7% of cases) recoded their highest daily cases in the month of August 2020. The remaining countries, Burkina Faso, Carbo Verde, and Senegal (18.7% of 16) recorded their highest daily cases in September 2020. This result indicates that Nigeria was the first West African country to report a case of the coronavirus. The majority (68.7%) of the countries recorded one case of Covid-19 as their first case. We observed that the most number of daily cases occurs between the month of June and August 2020. The intervention and control measures are inarguably effective in these countries, although a strict preventive measure still needed to be enforced to reduce the spread of the virus.

Table 1: Summary of COVID-19 daily reported cases

Country	**Code**	*First case date*	*Number of cases first recorded*	*Highest* **cases reported**	*Highest* **case date**
Benin	BEN	17/03/2020	1	139	18/07/2020
Burkina Faso	BFA	11/03/2020	2	193	14/09/2020
Cape Verde	CPV	21/03/2020	2	149	26/09/2020
Cote d'Ivoire	CIV	21/03/2020	1	618	22/06/2020
The Gambia	GMB	18/03/2020	1	416	20/08/2020
Ghana	GHA	13/03/2020	2	1513	02/08/2020
Guinea	GIN	14/03/2020	1	204	22/05/2020
Guinea-Bissau	GNB	27/03/2020	2	128	01/05/2020
Liberia	LBR	17/03/2020	1	45	28/06/2020
Mali	MLI	26/03/2020	2	110	05/06/2020
Mauritania	MRT	15/03/2020	1	590	21/06/2020
Niger	NER	21/03/2020	1	69	07/04/2020
Nigeria	NGA	28/02/2020	1	790	02/07/2020
Senegal	SEN	03/03/2020	1	223	16/09/2020
Sierra Leone	SLE	01/04/2020	1	86	25/05/2020
Togo	TGO	21/03/2020	1	39	29/08/2020

Source: *Authors' estimation* from original data

Table 2 presents the estimated parameters of the five distributions fitted to the daily cases of Covid-19 in West African Countries. We used the goodness of fit criteria, that is, Akaike's Information Criterion (AIC) and Bayesian Information Criteria (BIC), to determine the best fit for the reported cases of Covid-19 in each country. We found that the spread of the virus in all the West African countries followed Lognormal distribution except Nigeria, and both Guinea and Senegal, that followed Exponential distribution and Weibull distribution, respectively. As for the cases that follow the lognormal distribution, this means that if we take the logarithm of daily reported cases of Covid-19, it will tend to have asymmetry distribution, meaning that its mean and standard deviation parameters are close to 0 and 1, respectively. As for the case of Weibull distribution, the shape parameter of this distribution is greater than one ($\alpha > 1$), it means that the spread rate of the daily cases of Covid-19 in such countries is increasing with time. The exponential distribution suggested that the current virus spread at a constant rate over time. As observed in the graph above, the number of daily cases appears to be decreasing over time. However, with the current control measures put in place, the peak number of cases has not been reached yet in Guinea and Senegal ($\alpha > 1$ in both cases). Benin, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea Bissau, and Mauritania ($\ln(\sigma) > 0.6$) are likely to record more high number of cases of covid-19 if these countries do not enforce more strict control measures. The spread will possibly continue at a constant rate in Nigeria over time. Other countries: Burkina Faso, Liberia, Mali, Niger, and Sierra Leone (approximately 31.2% of total cases), are likely to report a lower number of Covid-19 cases daily.

Table 2: Distribution parameters estimation of COVID-19 cases

Country	**Code**	*Exponential*	*Gamma*		*Normal*		**Lognormal**		**Weibull**	
		A	α	K	M	σ	ln(μ)	ln(σ)	α	β
Benin	BEN	0.05	0.07	1.57	21.56	24.97	**2.72**	**0.71**	1.12	22.70
Burkina Faso	BFA	0.05	0.18	3.52	19.84	15.96	**2.84**	**0.49**	1.54	22.27
Cape Verde	CPV	0.02	0.04	1.72	38.98	30.49	**3.34**	**0.82**	1.34	42.68
Cote d'Ivoire	CIV	0.01	0.01	1.08	99.57	108.99	**4.07**	**1.07**	1.00	99.64
Gambia	GMB	0.04	0.04	1.11	26.19	43.36	**2.75**	**0.81**	0.93	25.02
Ghana	GHA	0.004	0.002	0.58	220.9	281.77	**4.33**	**1.66**	0.69	172.78
Guinea	GIN	0.02	0.03	1.54	58.65	42.62	3.71	0.94	**1.34**	**63.82**
Guinea-Bissau	GNB	0.05	0.08	1.62	20.64	22.93	**2.69**	**0.70**	1.14	21.89
Liberia	LBR	0.06	0.32	5.12	16.10	8.64	**2.68**	**0.41**	2.00	18.28
Mali	MLI	0.04	0.12	3.07	2.36	16.18	**3.02**	**0.57**	1.67	27.51
Mauritania	MRT	0.02	0.02	0.78	19.84	15.96	**3.02**	**1.04**	0.79	36.36
Niger	NER	0.06	0.25	3.90	15.40	11.43	**2.60**	**0.44**	1.60	17.41
Nigeria	NGA	**0.003**	0.003	0.99	277.86	217.9	5.04	1.35	1.05	282.81
Senegal	SEN	0.01	0.02	1.81	78.12	50.58	4.06	0.87	**1.51**	**86.46**
Sierra Leone	SLE	0.05	0.20	3.97	20.22	11.64	**2.87**	**0.49**	1.88	22.93
Togo	TGO	0.05	0.32	5.82	18.40	8.19	**2.82**	**0.41**	2.39	20.83

Source: *Authors' estimation. Bolded figures indicate the distribution with the lowest AIC and BIC value.*

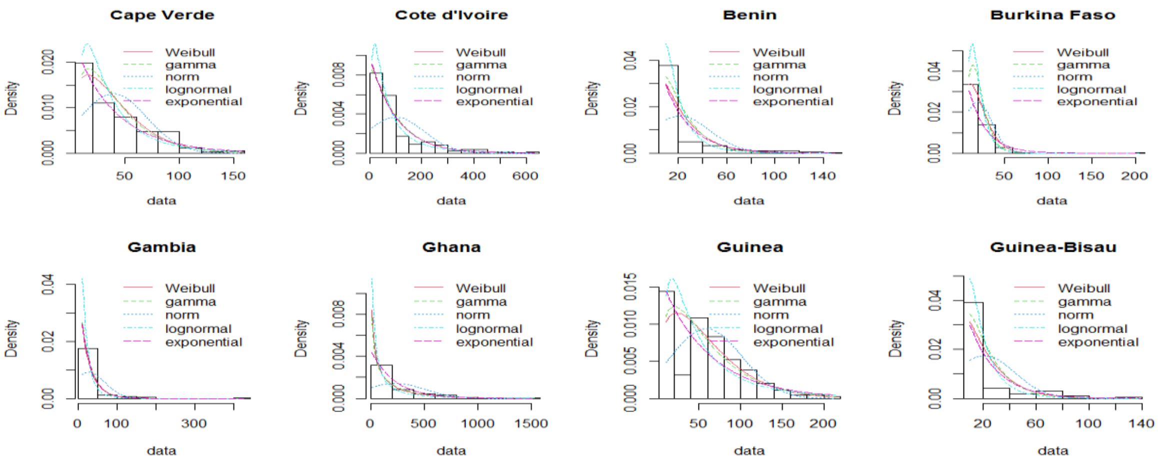
We present the goodness of fit statistics, Kolmogorov-Smirnov, and Anderson-Darling Statistics in Table 3. Considering the two goodness of fit statistics, their values show that all the distributions are significant at a 5% significance level, that is, $p>0.05$. This result indicates that all the exponential family of distributions (Exponential, Gamma, Normal, Lognormal, and Weibull) are fit to model the spread of the daily Covid-19 cases in West African countries. However, the lowest AIC and BIC values indicate the best-fitted distribution in Covi-19 cases in each country.

Table 2: Distribution's goodness-of-fit statistics

Country	Code	*Exponential*		*Gamma*		*Normal*		**Lognormal**		**Weibull**	
		K-S	A-D	K-S	A-D	K-S	A-D	K-S	A-D	K-S	A-D
Benin	BEN	0.37	33.30	0.36	37.86	0.33	41.92	**0.37**	**35.67**	0.33	34.31
Burkina Faso	BFA	0.39	28.83	0.17	7.34	0.27	∞	**0.14**	**5.24**	0.25	11.73
Cabo Verde	CPV	0.23	7.64	0.13	5.91	0.17	9.36	**0.14**	**6.50**	0.13	5.43
Cote d'Ivoire	CIV	0.10	3.33	0.11	3.67	0.23	18.34	**0.09**	**2.82**	0.11	3.34
Gambia	GMB	0.35	38.81	0.37	41.17	0.36	∞	**0.34**	**37.33**	0.35	36.75
Ghana	GHA	0.28	31.18	0.18	7.74	0.23	16.9	**0.19**	**11.01**	0.18	8.00
Guinea	GIN	0.16	8.66	0.16	7.59	0.13	4.63	0.18	12.26	**0.17**	**6.80**
Guinea-Bissau	GNB	0.38	44.49	0.40	43.92	0.38	44.49	**0.40**	**42.98**	0.38	37.59
Liberia	LBR	0.46	39.31	0.20	13.63	0.24	19.70	**0.18**	**11.25**	0.26	16.08
Mali	MLI	0.34	21.07	0.12	4.24	0.19	9.67	**0.10**	**3.62**	0.17	5.28
Mauritania	MRT	0.35	39.09	0.30	29.92	0.34	43.04	**0.30**	**24.75**	0.30	25.50
Niger	NER	0.47	42.98	0.28	25.46	0.32	35.38	**0.25**	**21.13**	0.34	28.67
Nigeria	NGA	**0.09**	**5.55**	0.09	5.50	0.11	4.82	0.15	11.27	0.11	5.86
Senegal	SEN	0.14	9.05	0.10	4.17	0.09	3.13	0.13	7.04	**0.10**	**3.58**
Sierra Leone	SLE	0.39	27.98	0.14	5.60	0.19	9.63	**0.13**	**5.00**	0.19	6.60
Togo	TGO	0.42	36.27	0.12	4.55	0.15	7.64	**0.11**	**3.77**	0.16	5.73

Source*: Authors' estimations; K-S = Kolmogorov-Smirnov; A-D = Anderson-Darling; Bolded figures indicate the distribution with the lowest AIC and BIC values.*

Figure 2 below gives the goodness-of-fit plot of the exponential family of distributions on the daily incidence of covid-19 cases in the West African country. The graph, histogram, and theoretical densities explained how each distribution fit the data points (the observed daily cases of the virus in each West African Country). The histogram plot displays the reported daily Covid-19 cases, while the theoretical density is the fitted line on the histogram. The more the line of the theoretical densities is closed to the histogram bars accordingly, the best the fit of distribution of such densities - this justifies the result presented in Table 2 and Table 3 above. From the graph, Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Sierra Leone, and Togo had their lognormal density line fit to the histogram shape. This result confirms that the Lognormal density function is the best-fitted distribution to these countries. Also, for Nigeria, the exponential density function fits the histogram, while Weibull density functions best fit those cases in Guinea and Senegal.



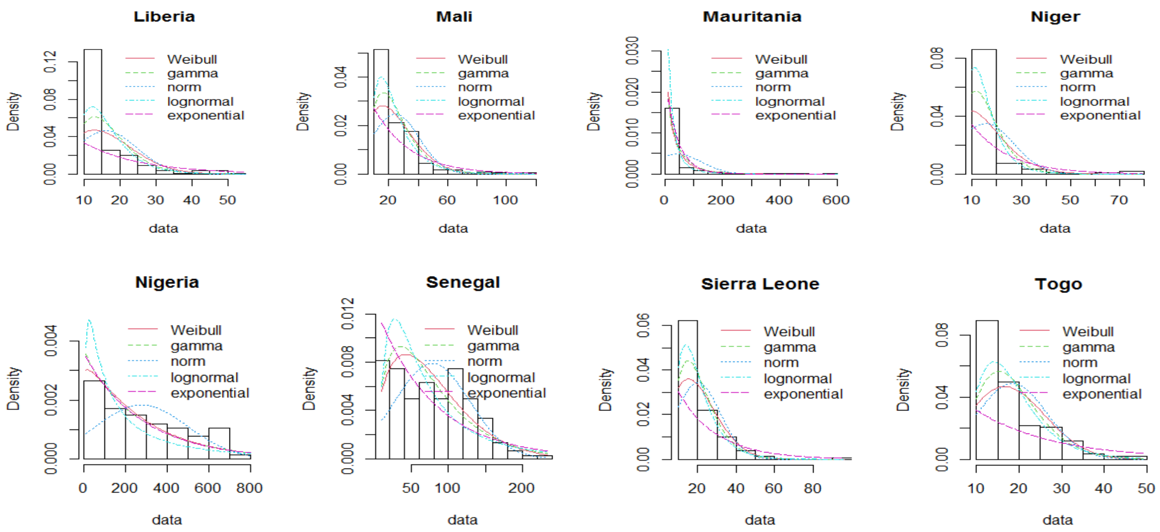


Figure 2: Goodness-of-fit plot of the distributions on daily covid-19 incidence in West Africa

4.0 Conclusion

This study examines the spread of daily reported cases of the Covid-19 pandemic in West African countries. To know the pattern of the spread, we modeled the daily cases of Covid-19 incidence in West African using 5 Exponential families of distributions. Our results indicated that the Weibull distribution with shape parameter greater than one is the best fit for the daily incidence of Covid-19 in Guinea and Senegal. The Lognormal distribution was estimated to be the best-fitted distribution for Benin, Burkina Faso, Cabo Verde, Gambia, Ghana, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Sierra Leone, and Togo. The Exponential distribution is the best-fitted distribution for daily covid-19 cases reported in Nigeria. Although the number of daily cases is decreasing, however, with the current control measures put in place, the peak number of cases has not been reached yet in Guinea and Senegal, where the number of Covid-19 cases is likely to increase over time. Benin, Cabo Verde, Cote d'Ivoire, Gambia, Ghana, Guinea Bissau, and Mauritania will possibly record more high number of cases of covid-19 if the government of these countries does not impose more strict control measures. The spread is likely to continue at the current rate in Nigeria. The spread of the virus is likely to escalate beyond control in West African countries if the lockdown is eased and schools open fully for academic activities without a proper preventive and control measures enforced to curb the spread.

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TELECOMMUNICATION APPROACHES FOR PREVENTION OF COVID-19 PANDEMIC

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Abstract

To win the war against COVID-19, timely, balanced and factual information is critical, writes Elizabeth Ntonjira. While the threat of COVID-19 has triggered a serious global health concern, a great deal of the fear surrounding the disease is being fueled by widespread misinformation. We live in a world of interesting parallels where we have access to more information than any previous generation, but at the same time we're plagued by fake news and misinformation. Separating truth from outright falsehoods can be a daunting task, especially in the era of social media, and what the World Health Organization (WHO) has termed the world's first infodemic – "an overabundance of information — some accurate and some not — that makes it hard for people to find trustworthy sources and reliable guidance when they need it".

Keywords : Coronavirus, Infodemic, pandemic, social media, Telecommunications

1. Introduction

The sudden outbreak of coronavirus disease 2019 (COVID-19) caused by infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus has happened since December 2019 in Wuhan City, Hubei Province, a central city in the People's Republic of China, where transportation is enormously convenient to connecting all other places in China and overseas [1, 2,3]. As of 7 March, 2020, a total of 80 813 confirmed cases reported in all provinces of China, and 21 110 cases reported in 93 countries/territories/areas of six continents [1,4]. In particular, some cases have been confirmed in African countries, such as Algeria, Egypt, and Nigeria [4].

End of January 2020, The COVID-19 outbreak was declared a Public Health Emergency of International Concern (PHEIC) by the Director-General of the World Health Organization (WHO), by the end of January 2020, and well before the declaration on March 11, 2020 of a "pandemic", WHO has been working together in collaboration with countries and the global community to stop the spread of the disease. On February 28, 2020 Nigeria reported the first case of COVID-19 in sub-Saharan Africa. As of March 30,2020, 3,217 people had been infected and 60 had died in the WHO African region. With the now rapidly increasing numbers, there are huge concerns on how African countries will fare.[21]

In the face of limited resources and weak health systems, the COVID-19 pandemic presented sub-Saharan Africa with new challenges: the urgent need for diagnostics, care and treatment for SARS-CoV-2 infected patients, the increased burden on health systems and collapsing economies. People are afraid for their lives and loved ones and means of livelihood have come under threat. I foresee panic buying of household and medical commodities, a rise in price of common goods, stigma and discrimination of suspected COVID-19 infected patients and false cases of COVID-19 reporting to health facilities for care and treatment. To win this virus war and impending social disruption, there is a need for effective risk communication and community engagement (RCCE) – an essential component of health emergency and response activities.

The World Health Organization (WHO) provided guidance on RCCE for countries to help protect the public's health in response to the COVID-19 pandemic. Practical actions were recommended on how to implement effective RCCE strategies in preparation for an outbreak and in an epidemic situation. Kudos to African leaders and the Africa Centres for Disease Control and Prevention (Africa CDC), they swept in and put in place systems to strengthen risk communication, internal and partner coordination, public communication engagement, capacity building, addressing uncertainty and managing misinformation in an effort to control the spread of disease. However, ineffective risk communication and community engagement (RCCE) in sub-Saharan Africa still jeopardizes effective control of the COVID-19 pandemic.

The “infodemic” has been identified as a major barrier to COVID-19 control by the WHO Director General, Tedros Adhanom. The term “infodemic” was coined by WHO to refer to the excessive amount of information (mostly false) about the COVID-19 outbreak that makes it difficult for sub-sahara Africa to identify or discern essential information. Sub-Saharan Africa might be worst hit with a truck-load of unverified SARS-CoV 2 information in the media, particularly on social media. Misinformation originates from various sources, from pulpits to the ordinary man on the street selling his wares, from twitter handles and short video clips on social media platforms such as Facebook, Instagram to online community users and from emergency call centres to the public. In Nigeria, Ghana and some other African countries, there were claims that COVID-19 is “a disease of the rich” and “God’s punishment for sinners”.

One of the negative effects of the infodemic is that it influences health seeking behaviour. Exposure to information and messages that downplay the magnitude of the disease and attribute the cause of disease to God’s vengeance lower perceived disease severity and susceptibility and thus, increase risky behaviour in the community. On the other hand, fear laden reports and news may also lead to anxiety and increase demand for health care services, further overburdening the health system in this way. Another negative effect is compulsive panic buying creating artificial scarcity of essential commodities as being witnessed in developed countries.

For an effective emergency response to the current pandemic, there is a need to contextualise RCCE strategies for optimal impact. This requires stakeholders’ involvement in decision making to ensure effective use of social structures, social mobilisation and preferred communication methods.

First and foremost, there is a need to popularise official sources of COVID-19 health information on the continent, where the latest news, guidelines and evidence on the pandemic are shared and frequently updated. Nigeria Centre for Disease Control (NCDC) has done well in this regard with a daily update on its social media platforms and official website. Partnerships with mobile network providers to disseminate COVID-19 information and the creation of hashtags on social media are low hanging fruits.

For the largely illiterate community and non-medically inclined in African states, there is a need for simple and easy to understand information sharing. Information on COVID-19 should be made available in local languages and pictorials that people can relate with for wider coverage and better understanding of the disease. Focussing on simple preventive measures like hand washing and social distancing would go a long way in achieving short term goals of infection control. The lower class living in rural areas and urban slums (in populous cities like Lagos, Nigeria and other metropolitan areas in sub-Saharan Africa) are most at risk and at the receiving end of fake news. This category of people can easily be reached with COVID-19 preventive messages on the need for hand hygiene and social distancing through radio programmes and communication through their traditional rulers and religious leaders.

2. A massive flow of health information

The scale of the crisis and governments’ responses have been matched by a colossal flow of information about COVID-19 in terms of 24/7 news coverage, televised press conferences provided by both political leaders and health authorities, prime time speeches to the people by kings, presidents, prime ministers and religious leaders, as well as news analyses, debates and social media posts. This massive flow of health information and viewpoints on the pandemic is unprecedented and varied. While young people prefer information through social media such as Instagram or YouTube, older adults are generally informed through national evening television and newspapers. Migrants and refugees may be more effectively reached by migrant community leaders and news sources from their countries of origin. As the pandemic has developed, the need to provide clear, honest and valid information to the public all over the world has become obvious, as expressed in a February editorial in the Lancet, concluding that "There may be no way to prevent a COVID-19 pandemic in this globalised time, but verified information is the most effective prevention against the disease of panic" [19,20].

Political leaders and health experts have a special responsibility to provide us with accurate information, and to implement measures that require behavior change to fight the pandemic. However, in the near chaotic flow of information, each and every one of us, in different roles and with different responsibilities, may contribute to improve the flow of information and debate on COVID-19.

Health communication is a key and necessary factor in saving lives during the COVID-19 pandemic crisis. Accurate and well-developed health communication can facilitate how societies handle uncertainty and fear, promote and accomplish adherence to necessary behavior change, and meet individuals' fear and foster hope in the face of a crisis. Professionals in the fields of health communication, patient education, and health behavior change have a special responsibility to contribute to the spread of concise and valid information in different contexts.[19,20].

Communication Outbreak via Social Media

The high penetration of internet use and rapid development of information and communication technologies have made the internet an increasingly important health information source worldwide [5-9]. Reading, commenting, sharing, and seeking health information from social media, particularly through a mobile device, has become an increasingly important pattern of health information consumption in China [5,6, 10,11]. During an epidemic, social media can facilitate the spread of epidemic awareness, attitudes toward control and preventive measures, emotional responses and behaviors, as well as misinformation and rumors in the public through online interactivity [5,12 -16]. As the epidemic evolves, this may facilitate homogeneous mental representations of the epidemic, leading to collective behavioral responses [5,17]. In China, Sina Weibo (the Chinese version of Twitter) is one of the most popular platforms that attracted 486 million active monthly users in 2019 [5,18], most of whom accessed their user accounts through a mobile device [5,10].

3. Effective crisis communication

A key component of managing any crisis is effective communication — which can be difficult during an infodemic. As the world scrambles to contain the coronavirus pandemic, the role of effective communication is becoming increasingly critical. Health experts and governments need to position themselves as trustworthy sources of information to the public, who need to understand the situation, be aware of the precautions they can take, and stay calm. Recently in Kenya, an audio recording claiming there were 63 cases of coronavirus in the country was circulated via WhatsApp. This was before Kenya reported the first case of coronavirus on 13 March. The Ministry of Health responded by issuing a press release assuring the public that the recording was part of a simulation exercise during a crisis communication training on COVID-19. By then, however, conspiracy theories had already begun to spread, accusing the government of hiding the truth. The WHO's efforts to maintain a constant stream of information through its daily press briefings has been a model example of how effective communication can be used to fight global disease outbreaks. This is not the first time the health body has deployed its communications machinery to keep the world updated on global health events, thus helping to manage real and potential public health emergencies. For example, during the 2018-2020 Ebola outbreaks in the Democratic Republic of the Congo, the WHO, UNICEF and other partners used communication specialists to engage with communities, raise awareness about the Ebola vaccination campaign, and provide vital information on prevention of transmission. Similarly, India's Social Mobilisation Network (SMNet) – which played a key role in eliminating polio in the country — has been lauded as one of the most successful public health platforms for engaging communities. At its launch, the SMNet was a network of mostly young women who were deployed to speak with parents and caregivers about the importance of polio vaccination, at a time when vaccine refusal was high among the underserved and marginalised. These social mobilisers complemented other communication initiatives, including billboards an advertisements in print and broadcast media, leading to increased trust in vaccination programmes and eventually a sharp drop in the number of polio cases in high-risk districts.

Engage communities

These examples point to the power of effective communication as well as the importance of community engagement in managing outbreaks. By going into communities and speaking with them through trusted media and community leaders, sharing factual information and taking time to allay fears while remaining open and honest, governments and health workers can build trust and use this in the fight against the COVID-19 pandemic and other disease outbreaks. Part of building this trust includes taking control of the narrative as the outbreak

evolves and recognising that what is communicated is just as important as how it is communicated. Governments, health authorities, the media and other key institutions need to show empathy and care while communicating, and need to ensure access to balanced information.

COVID-19 is unlike previous medical crises, in part because of our collective access to communication technologies. This is the first pandemic of its kind in the age of social media. As a result of the saturated information environment, we are getting overwhelmed, even though each medium is covering information in a careful and responsible way, especially the mainstream press. People are struggling with how to stem the tide of information flooding them. Unlike journalists, public health officials, and other "gatekeepers" of information, people on social media don't necessarily have to abide by strict standards of fact-finding. We are seeing both misinformation (drawing conclusions from wrong or impartial information) and disinformation (deliberately spreading falsehoods to further an agenda) about COVID-19.

What an Organization Can Do to Deliver COVID-19 Information

This won't be the last pandemic. Thus, organizations need to have a robust communications surveillance strategy in place for future crises. Ultimately, there are a few ways professionals conveying formal recommendations can develop and maintain trust:

- Understanding their audiences (class, age, risk, communication style) and tailoring the message to reach them. This might mean using platforms like social media to impart facts and resources.[24]
- Communicating uncertainty clearly—saying that not all information is available is more effective than speculating or making claims.
- Not over- or under-reassuring, but simply laying out risk and potential consequences with the appropriate tone.
- Providing figures, context, history, and changes to procedure in a timely and straightforward fashion, which can help bolster trust
- Telling people what they can do and how they can act to keep themselves and others safe.

4. The need for telecommunication in the fight against covid-19

Meaning of Telecommunication

Telecommunication (from Latin communicatio, referring to the social process of information exchange, and the Greek prefix tele-, meaning distance) is the transmission of information by various types of technologies over wire, radio, optical or other electromagnetic systems. It has its origin in the desire of humans for communication over a distance greater than that feasible with the human voice, but with a similar scale of expediency; thus, slow systems (such as postal mail) are excluded from the field It is also the sending and receiving of messages over distance, especially by phone, radio, and television. [22]

The transmission media in telecommunication have evolved through numerous stages of technology, from beacons and other visual signals (such as smoke signals, semaphore telegraphs, signal flags, and optical heliographs), to electrical cable and electromagnetic radiation, including light. Such transmission paths are often divided into communication channels, which afford the advantages of multiplexing multiple concurrent communication sessions. Telecommunication is often used in its plural form, because it involves many different technologies.

The African Telecommunications Union (ATU) Guidelines

The African Telecommunications Union (ATU), a specialised agency of the African Union in the field of telecommunications, has put together a set of guidelines to assist in combating the Coronavirus disease (COVID-19) pandemic, that every Member State should consider.

Africa has so far recorded relatively few coronavirus cases compared to the rest of the world. Twenty-seven African countries have recorded over 357 coronavirus cases, according to the World Health Organization on Thursday 19 March 2020. Egypt leads in cumulated confirmed cases at 196, South Africa 116, Algeria 72, Morocco 49, and Senegal 36. Other countries with over ten cases include Tunisia, Burkina Faso, D.R. Congo, Rwanda and Cameroon.

However, Heads of States and Governments across the continent are taking no chances as they race to stop the spread of the virus by sensitizing their citizens about the pandemic and the various ways to stop the spread of the virus by sensitizing their citizens about the pandemic and the various ways to combat the disease. [23]

Globally, telecoms/ICTs have become a pillar in the prevention, preparedness and response to the Covid-19 pandemic. The ATU, through the Secretary-General, Mr John Omo, is urging the Ministries of ICT, through the telecommunications regulators and operators in the Member States, to consider implementing the following recommendations/guidelines to fight COVID-19 pandemic:

1. Activation of the Common Alerting Protocol (CAP)

Regulators should implement the Common Alerting Protocol (CAP) to enable authorities to effectively prevent and mitigate the spread of Covid-19. The CAP involves the use of multiple modes of communication to educate Members of the public including vulnerable groups about the disease as well as the preventive measures. The CAP will make it possible for members of the public to receive information in many ways, such as through mobile and landline telephones, Internet (e-mail, Google, Facebook, Twitter, WhatsApp, smartphone apps, online advertising, Internet of Things (IoT) devices, in-home smart speakers, etc.), sirens (in-building or outdoor), broadcast radio and television, cable television, emergency radio, amateur radio, satellite direct broadcast, and digital signage networks (highway signs, billboards, automobile and rail traffic control), among others. [23]

2. Collaborative Practical Measures

Regulators should adopt the following:

(a) **Network Capacity**: Fixed and mobile telephony providers should reserve some dedicated network capacity which should be made available free of charge to the authorities handling Covid-19.

(b) **Emergency Numbers**: Fixed and mobile telephony providers should implement and enable the emergency numbers, for example 119, for voice messaging and promote short message service (SMS) as an alternative to telephony communications during this period. Emergency agencies – such as police, ministries of health and hospitals should adequately size their network capacity, e.g. lines and access trunks, to offer an efficient service when call demand is high. Also, telecommunication providers and amateur radio operators need to perform periodic emergency drills together. The public should adequately be informed of the availability of the service free of charge.

(c) **Guidelines for action during emergencies**: Calls to emergency numbers should be free. Local and long-distance backbone providers must have redundancy networks to handle traffic from other providers that experience difficulties. Broadcasters should support communication and messaging strategies to the public in coordination with all the other agencies that are involved.

(d) **Amateur radio operators and simplification of type-approval processes**: Radio amateurs are community based and should be involved in the information dissemination mitigation processes for Covid-19. Any type-approval acceptance could be waived during the period of emergency for equipment to be used by amateur radio operators or those processes simplified in order to gain time, for example, not subjecting such equipment to taxation at all. Regulatory authorities should recognize foreign type approvals to expedite the process and rely on the guidelines of the ITU Telecommunication Standardization Sector (ITU-T).

3. Streamlined Regulation Processes

Rapid response in the wake of a disaster is critical. Consequently, regulators should streamline the process to allow telecom/ICT services to be available as soon as possible. The following strategies should be considered by regulators:

(a) **Telecom/ICT services licensing**: As the continents fight the Covid-19 pandemic, the telecom/ICT regulatory authority should urgently grant telecom/ICT service licenses necessary to support emergency telecom/ICT efforts. Therefore, exceptional expedited licensing procedures should be in place, free of charge, for use. These licenses should be temporary and valid only during this period of emergency response and recovery until the government has determined that there is no further need for the service being provided.

(b) **Frequency allocation**: Frequency planning and allocation are critical at this time for mitigation, preparedness, response and recovery. Governments should make the necessary spectrum available on a national basis to allow for multiple types of applications and services, from narrowband voice services up to broadband-intensive applications. A combination of spectrum bands should be available free of charge for emergency communications, allowing both terrestrial and satellite systems to be quickly deployed with limited interference.

(c) **Priority call routing**: During such times, networks could fail to provide service for different reasons, one of them being overload thus delaying or altogether preventing critical communication. Regulators should establish priority call routing on both mobile and fixed networks for people engaged in Covid-19 response as well as other entities and institutions involved in such activities.

(d) **Network redundancy**: Network redundancy is a critical element of a robust network that will minimize telecom/ICT outages during this period. Disaster networks need to consider redundancy and resilience in their design, as well as increase the number of terminals. Regulators need to ensure that telecom/ICT providers have networks with adequate redundancy and multiple connectivity options for the authorities involved in combating Covid-19.

(e) Importing telecom/ICT equipment: Major delays during the importation of telecom/ICT critical equipment have a negative impact on the response time to a disaster, and even impact the likely loss of lives. Delays can occur for several reasons, including duties or tariffs, restrictions based on local standards, extensive paperwork, disorganized processes, etc. Rules should be in place to expedite the importation process of critical telecom/ICT equipment that might be used for response and recovery: e.g. exemptions from duties and tariffs, clear expedited processes and streamlined paperwork. In addition, once the equipment needs to be returned to the place of origin, expedited processes should be in place to help streamline the return process.

4. Multi-stakeholder collaboration

There should be coordinated efforts during this period and clearly defined functions for different government institutions, e.g. ministries of foreign affairs, ICT and communications, customs, regulatory agencies and first responders such as hospitals among others. Also, there should be a collaboration with the private sector, including telecom/ICT operators, private networks, and amateur radio among others to give support and insights to the government on the collection of data and dissemination of information to the public. Regulators should, therefore, carry out a set of activities and procedures to connect all actors in the ecosystem at the local, national and international levels and ensure effective flow of information as the continent fights Covid-19. [3]

5. Pattern of internet usage in 34 surveyed countries around the world.

1. In 32 of the 34 countries surveyed, more than half of people report using the internet at least occasionally or owning a smartphone. However, in advanced economies like South Korea, the Netherlands, Canada and Australia, nine-in-ten or more say they use the internet or own an internet-connected mobile device. While South Korea reports the highest percentage of internet users, with a nearly unanimous 98% usage, Usage is also generally high in the emerging economies surveyed, ranging from 48% in Kenya to 89% in Lebanon. India – which went into a country-wide lockdown on March 25 – is a notable outlier of the emerging economies surveyed, where 38% say they use the internet.

2. In each of the 34 countries surveyed, younger people are more likely than older people to say they use the internet. This difference is starkest in Indonesia, where 89% of people ages 18 to 29 say they use the internet or own a smartphone, compared with only 24% of those 50 and older. The divide between these two age groups is generally greater in emerging economies, but less stark in more advanced economies like Canada and the Netherlands.

3. Whether people use the internet varies widely by level of education in each of the surveyed countries. Internet use (including smartphone ownership) is particularly rare among people with a lower level of completed education in Nigeria, where only 13% of people say they use the internet, compared with 73% of those with more education in that country.

4. Across all publics surveyed, people with incomes higher than the national median are more likely to report using the internet than those with lower incomes. Differences in reported internet use are most pronounced in Central and Eastern Europe, as well as Tunisia, where differences exceed 30 percentage points. Only in Spain, Australia, the Netherlands and South Korea are there differences of less than 10 points between those with higher and lower incomes.

5. Majorities in each of the 34 countries surveyed own a mobile phone. In Europe, a median of 93% report owning a mobile phone, with a high of 97% in the Netherlands and Sweden. Only in Mexico, Kenya, Indonesia and India is mobile phone ownership below 80%. Smartphone ownership rates are similar but vary globally. Only 36% of Kenyans and 32% of Indians say they own a smartphone, while highs of 97% in South Korea and 88% in Lebanon say the same.

6. There is a strong relationship between smartphone ownership and per capita gross domestic product. Those in wealthier countries tend to report owning a smartphone in higher shares than those in less wealthy nations. However, the relationship is not perfect. Smartphone ownership in Lebanon is just below that of South Korea, even as Lebanese have less than half the per capita income of South Koreans.

7. While social media use falls below general internet use in 30 of 34 countries surveyed, a majority in most countries say they use some form of social media. Three-quarters or more use social media in Lebanon, Israel, South Korea and Sweden. Germans (52%) have the lowest level of use of social media of those surveyed in Europe, more closely resembling their eastern neighbors in Poland (58%) and the Czech Republic (56%) than their western counterparts in France (70%) and the Netherlands (65%). This contrasts with India, where only 31% of people say they use social media, although a majority there do not use the internet at all.

8. There are wide gaps in social media use between the youngest and oldest age groups. In most countries surveyed, this difference exceeds 50 percentage points. In Lithuania, nearly all young people (95%) say they use social media, compared with only 28% of those 50 and older. In some countries, like South Korea, Israel and Lebanon, social media use is more prevalent across all age groups. Only in seven countries surveyed do a majority of people 50 and older report using social media.

6. Conclusion

Most Africans are religious and hold their religious and traditional leaders in high esteem. Therefore, meaningful engagement with these leaders is key to raising awareness and ensuring that primary preventive messages are well received and acted on by the people.

We can learn from the success story of the NINERELA+ project that aimed at improving access to HIV prevention and treatment services through mobilization of faith leaders for HIV stigma reduction in northern Nigeria. Designated epidemic control centres can provide the latest information on the state of COVID-19 epidemic control to these leaders in order to avoid conflicting messages. Government and development partners including implementing partners of donor-funded programs should promote information sharing to alleviate concerns relating to vulnerable populations' health – the elderly, chronically ill patients, people living with HIV and/or Tuberculosis patients and internally displaced persons' camps (IDP). Webinars and seminars on the management of co-morbidities such as HIV and COVID-19 can be organised for health program managers, health workers and patients.

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PREVALENCE OF TYPE 2 DIABETES MELLITUS AND ITS RISK FACTORS AMONG MALE AND FEMALE ADULT 50 YEAR ABOVE OF OUTPATIENTS IN EKITI STATE NIGERIA

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Abstract

Diabetes mellitus is caused as a result of insulin deficiency. It is chronic progressive endocrinological disorder of carbohydrate, protein and lipid metabolism characterized as hyperglycemia. The incidence of diabetes mellitus in the human population has reached epidemic proportions worldwide. The aim of our study was to determine the prevalence of type2 diabetes mellitus among male and female adult 50 years above of outpatient in Ekiti state, south west Nigeria. Descriptive research design method was adopted. Questionnaires were designed and used to collect demographic data of one hundred and fifteen confirmed cases of type 2 diabetes mellitus patients of Ekiti State Specialist Hospital, Ikere-Ekiti by simple random sampling technique. SPSS 19 software was used to analyze data. Data were expressed as mean and frequency expressed as percentage. A total of 115 type 2 diabetes mellitus patients, aged between 50 and 80 years and above were analyzed. Their age mean ± standard deviation is 3.48 ±1.93 years. There were male 43 (37.4%) and female 72 (62.6%), male and female ratio of 1:1.67. The prevalence of previously diagnosed diabetes mellitus among outpatients at Federal Medical Center, Ido-Ekiti aged ≥ 35≤85 (n=308) was higher among female (59.4%) than male (40.6). The prevalence of newly diagnosed diabetes mellitus was similar among female (62.6%) than male (37.4%).Therefore, the previously and newly diagnosed diabetes mellitus was higher among female than male. Nature of job, nutrition, hereditary and lifestyle differences may be contributed to the higher prevalence of diabetes mellitus among female than male.

Key words: Diabetes mellitus; Endocrinological; Metabolism; Hyperglycemia; Epidemic

Introduction

Diabetes mellitus (DM) is caused as a result of insulin deficiency. DM is a metabolic disorder characterized by the presence of chronic progressive hyperglycemia accompanied by greater or lesser disorder in the metabolism of carbohydrates, lipids and proteins (Baynes, 2015). The incidence of diabetes mellitus in the human population has reached epidemic proportions worldwide, and it is increasing at a rapid rate. Ninety percent of the present cases are type 2 diabetes and most of the increase will be in type 2, paralleling the increase in the incidence of obesity (William, 2005).

In type 2 diabetes these mechanisms break down, with the consequence that the two main pathological defects in type 2 diabetes are impaired insulin secretion through a dysfunction of the pancreatic β-cell, and impaired insulin action through insulin resistance (American Diabetes Association, 2010). Type 2 diabetes is due to increased insulin resistance, associated with weight gain, inactive lifestyles and poor diet. Type 2 diabetes is more frequently found in men, especially at ages of 35-54, where men are twice as likely to develop diabetes, with onset at a much lower average body mass index (BMI) (Simmons, 2019). Sex-related differences in lifestyle may lead to differences in the risk of developing diabetes mellitus and, in consequence, to differences in the prevalence of this condition in women and men (Esayas , Hiroshi, Leo and Atsuko, 2013). Diversities in biology, culture, lifestyle, environment, and socioeconomic status impact differences between males and females in predisposition, development, and clinical presentation Kautzky-Willer, Harreiter and Pacini, 2016**)**. Genetic effects and epigenetic mechanisms, nutritional factors and sedentary lifestyle affect risk and complications differently in both sexes (Kautzky-Willer et al, 2016). Research has recently shown that there is link between this hormone and development of type 2 diabetes in men, with lower testosterone levels leading to a greater risk. Conversely, it has been identified that women with high blood testosterone levels are at greater risk (Simmons, 2019). However, the relationship between a known risk factor for diabetes mellitus – such as obesity – and the development of symptomatic diabetes mellitus may not be simple. For example, in many countries of sub-Saharan Africa, women are more likely to be obese or overweight than men and might therefore be expected to have higher prevalence of diabetes mellitus (Esayas, et al, 2013). Assessing the prevalence of type 2 DM is important for national health planners; therefore, the purpose of present study was to determine the prevalence of type2 diabetes mellitus among male and female adult 50 years above of outpatient in Ekiti state, south west Nigeria.

Little is known about the sex that more vulnerable to diabetes type 2 in Ekiti state. Due to this survey research was conducted on type 2 diabetes out patients attending Ekiti State Specialist Hospital in Ikere- Ekiti.

Methodology

Descriptive survey study was carried out on the type 2 diabetes outpatient attending Ekiti State Specialist Hospital in Ikere- Ekiti between July and August 2019. These areas were chosen because of their relative social disadvantage compared to many other areas of the south Nigeria. Simple random sampling techniques were adopted to select respondents among the type 2 diabetes out-patient in Ikere-Ekiti. The patients were informed about the purpose, aims and objective of the study and informed consent was sought from participants at the commencement of the study. Questionnaires were administered to them randomly to collect information about the patient or guardians. The data obtains included biodata and present complain.
The results were analyzed by using the SPSS software, version 19.0. Means, standard deviation and frequencies were calculated. Then, the data was represented in descriptive forms as tables, bar and pie charts.

Results

The study was carried out on 115 type 2 diabetes out-patient of State Specialist Hospital in Ikere- Ekiti. There were 72(62.6%) females and 43(37.4%) males with a male female ratio of 1:1.67. The age mean ± deviation of the study participants was 3.48 ±1.93 years with a significant age difference between the males and the females. This is illustrated in table 1.The highest age groups involved were (50-55). The least age group affect were ago of (71-75). In this study marital status married 74(64.3%), single 17(14.8%), divorced 10(8.7%) and widow/widower 14(12.2%). Majority of the studied populations were Christian 87 (75.7%) and Muslim 28 (24.3%). No education 25(21.7%), Primary school level education 19(16.6%), Secondary school level education 17(14.8%), and Tertiary institution 54(47%).The occupation of the participants: traders were 32(27.8%), farmers were 28(24.3%), civil servants were 34(29.6%) and pensioners were 21(18.3%). This is shown in table2

Table1: Age of mean and standard deviation

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	115	1.00	6.00	3.4783	1.93013

Figure 1 Sex and age distribution of the out- patients

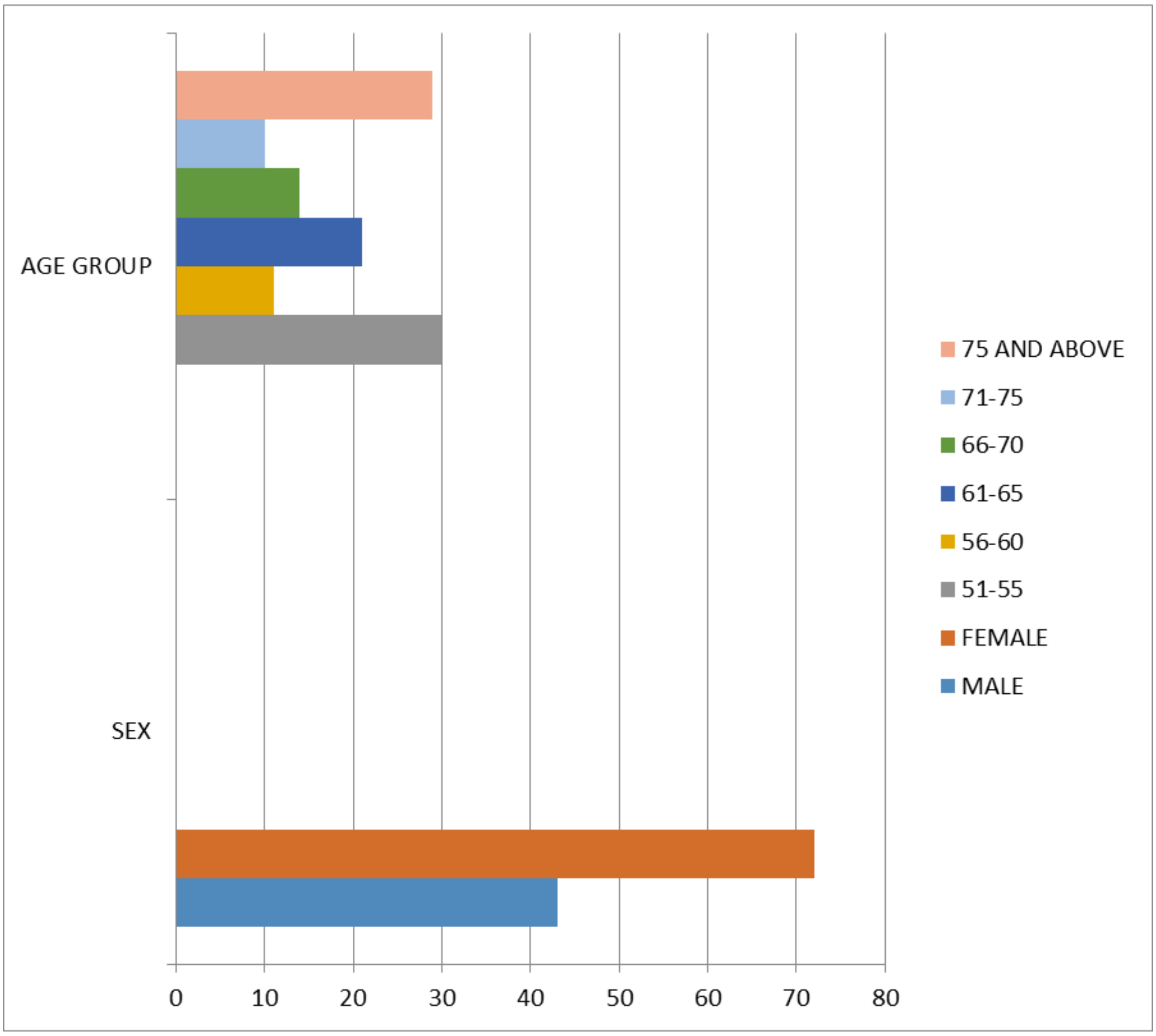

Table 2 Socio demographic data of the out-patients

Variables		Frequency	Percentage (%)
SEX	Male	43	37.4
	Female	72	62.6
AGE GROUP	51-55	30	26.1
	56-60	11	9.6
	61-65	21	18.3
	66-70	14	12.2
	71-75	10	8.7
	76 and above	29	25.2
MARITAL STATUS	Single	17	14.8
	Married	74	64.3
	Divorced	10	8.7
	Widow/Widower	14	12.2
EDUCATION STATUS	Primary Education	19	16.6
	Secondary Education	17	14.8
	Tertiary Education	54	47.0
	No Education	25	21.7

RELIGION	Christianity	87	75.7
	Islamic	28	24.3
OCCUPATION	Civil servants	34	29.6
	Traders	32	27.8
	Farmers	28	24.3
	Pensioners	21	18.3

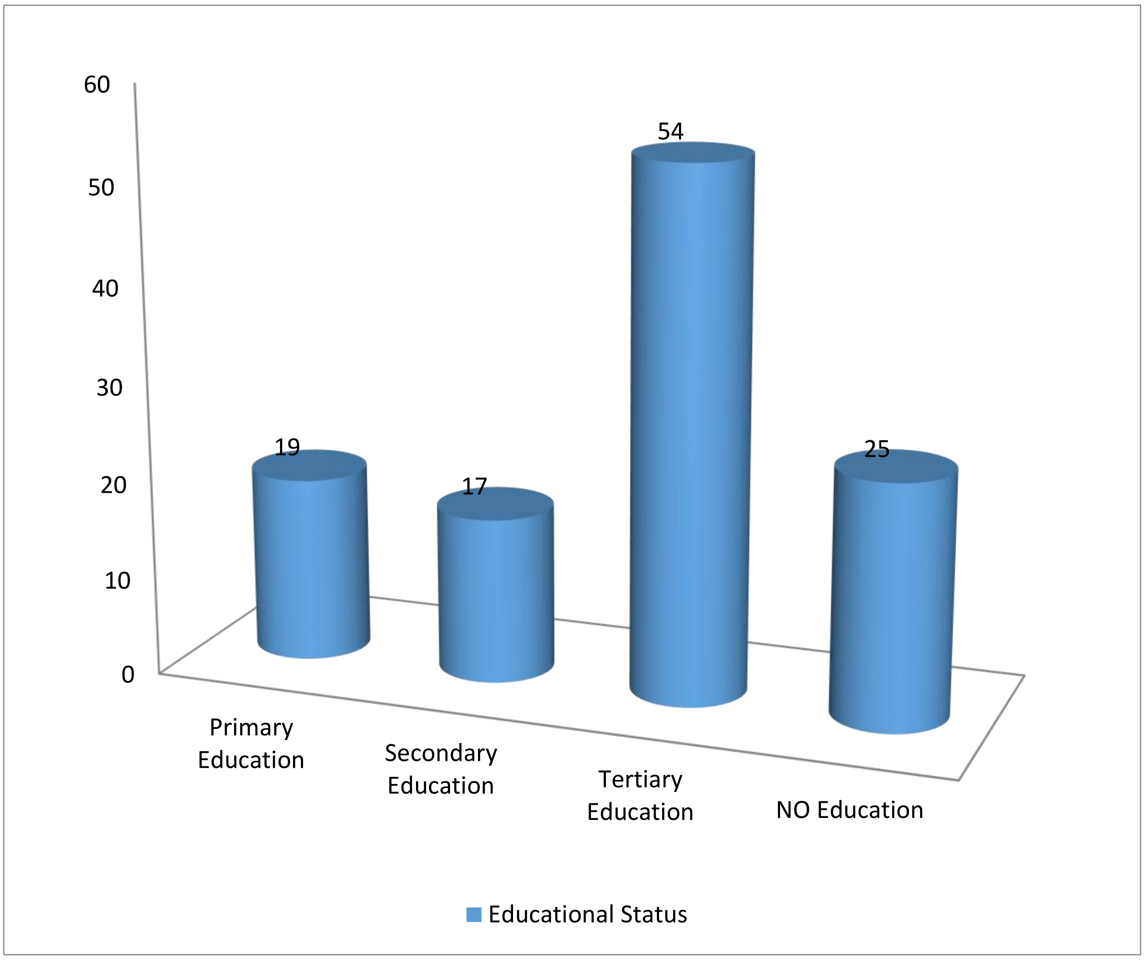

Figure 2 Educational Status of the participants

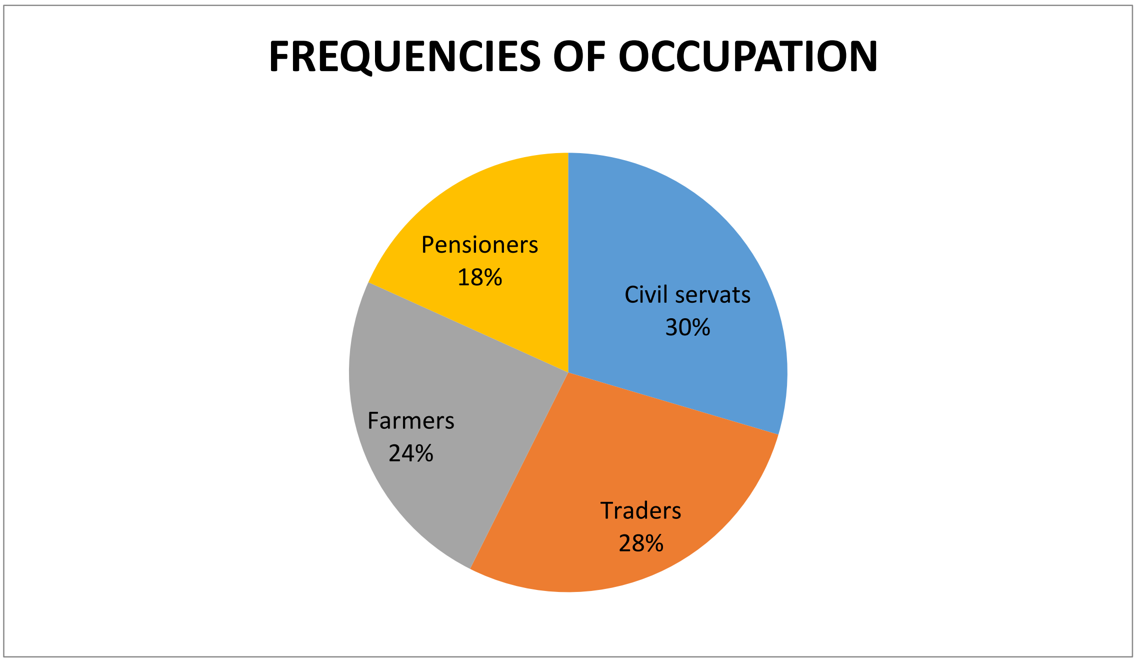

Figure 3 Occupation of the participants

Discussion

In this survey study, the result shows that female had higher prevalence of type 2 diabetes than male. These results were similar to the study by Ajayi el al, stated that there were 125 males (40.6%) and 183 females (59.4%) giving an M: F ratio of 1:1.46. However, the study by Bahendeka et al. who reported a prevalence of diabetes mellitus among males and females was 1.6% and 1.1%, respectively is disagree with this study. Machado-Alba et al state that females are highly affected by type 2 diabetes because they are less muscular which does not support high uptake of fixed glucose load and have relatively high levels of estrogen and progesterone which are involved in the reduction of the whole-body insulin sensitivity. Physical inactivity and unhealthy diet have also both been associated with impaired glucose tolerance (Esayas et al 2013). In many countries in sub-Saharan Africa, women are more likely to be physically inactive than the corresponding men (Kruger et al, 2012).

This study found that the age group 51-55 (26.1%) mostly affected by type 2diabetes mellitus followed by age group 76 and above (25.2%), this is agree to some extent with findings by Cho et al. Where adults aged 45-64 was the most diagnosed age group for type 2 diabetes mellitus. Kirkman, et al stated that older adults with diabetes may either have incident disease (diagnosed after age 65 years) or long-standing diabetes with onset in middle age or earlier. The management of diabetes is directly affected by gender and a person's age, where females and adults of 60 years and above are affected due to the coexistence of multiple medical conditions involving the heart and the kidney leading to limitation and insufficiencies of medical prescription (Debrah, et al. **2020)**. Older adults are at high risk for the development of type 2 diabetes due to the combined effects of increasing insulin resistance and impaired pancreatic islet function with aging. Age-related insulin resistance appears to be primarily associated with adiposity, sarcopenia, and physical inactivity (Kirkman, et al. 2012).

The study revealed that nature of job; nutrition, hereditary and sedentary lifestyle were the causes of type 2 diabetes. Weight gain resulting from these factors may then lead to obesity, a lifestyle and socioeconomic factor that are another strong predictor of diabetes (Grant, Hicks, Taylor, et al, 2009). Personal lifestyle and eating habits which lead to overweightedness and obesity were the primary causes of type 2 diabetes (Bahendeka et al, 2019). Thus, visceral fat may mediate the effects of a high macronutrient intake, especially a high-fat high-carbohydrate diet that has been shown to be proinflammatory and to induce endotoxemia (Anna, Jenny, Tommy, Paul and Peter, 2016). Type 2 diabetes had a hereditary factor from a close family and was associated with gene mutations that are transferred to the genetic line of the family (Bahendeka et al, 2019)

A low household income, as another social structural factor, was consistent in both groups and it is acknowledged that people on lower incomes generally have poorer health than those on higher incomes. Therefore, improving the social conditions of a household may not only assist those currently faced with decreasing health and wellbeing, but future generations to come. This may be particularly salient for women who traditionally had less opportunity to study and therefore less access to secure, well paid employment (Grant,et al,2009).Women therefore are often cast in a support role, often working in part-time or casual employment due to their need to move in and out of the workforce to have and look after children, as well as provide care to ageing family members (Artazcoz, Borrell, Benach, Cortes and Rohlfs ,2004). The incidence of Type 2 diabetes mellitus among adults with low socioeconomic status was found to be generally higher in women than in men; it was suggested that the women who lived in impoverished areas were more likely to be obese, physically inactive and under high levels of psychosocial stress than the men in the same areas (Esayas,et al.2013)

Conclusion and Recommendation

In this study, it was observed that prevalence of type 2 diabetes was high in female than male at ratio male female 1:1.67, which compared to studies done in previous years which raise a public health concern. It was found that patient aged 50-51 years were most affected by diabetes. Lastly, Hereditary, sedentary lifestyle and low income were found to increase incidence of type 2 diabetes.

From findings of this study I recommended investment in research and health system at Ekiti state to reduce increased rate of diabetes. Secondly, improvement on sensitization of general public about the burden and complications of type 2 diabetes should be emphasized on media. Thirdly, people should do aerobic exercise three times per week to reduce body mass index and increasing sensitivity of insulin receptors. In case of hereditary which increases the risk of having type 2 diabetes, lifestyle, environmental factors and many others can be adjusted to alter the occurrences.

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IMPACT OF AUDIT QUALITY ON THE FINANCIAL PERFORMANCE OF QUOTED OIL FIRMS IN NIGERIA

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Abstract

This study which focused on the "the effect of audit quality on the corporate performance of quoted oil firms in Nigeria" was prompted as a result of inability of audit to prevent the occurrence of fraud and material misstatement in the firm's financial reports. Specifically, the study examined the effect of audit firm size on return on asset of Nigerian oil firms; determined the extent audit independence affect return on asset of Nigerian oil firms and ascertained the effect of joint audit on return on asset in the Nigerian oil firms. Data for the study were extracted through the financial statement of the oil firms from 2008 to 2017 and was tested with regression statistical tool using the statistical package STATA version 11. Based on the data analyzed, the study found that firm size has significant effects on return on assets of quoted Nigerian oil firms; also that audit independent has significant but negatively inclined with return on asset affect return on asset of quoted Nigerian oil firms . Another finding is that firm size has significantly affects return on asset of quoted Nigerian oil firms. Based on this, the study recommended among others that companies should make use of the services of audit firms with unquestionable track records of audit quality and reputation; hence the debate on audit quality is not a settled matter.

Keywords: *Audit Quality, Financial Performance and Oil Firms*

INTRODUCTION

The Audit quality can be seen from two perspectives: first, detecting misstatements and errors in financial statement and second, reporting these material misstatements and errors (Matoke & Omwenga, 2016). For the fact that these characteristics are largely unobservable, different proxies have been used by researchers like; Bogale (2016); Hassan (2015); Yi-Fang, Lee-Wen, and Min-Ning (2015) to measure audit quality like: audit size, audit hours, audit fees, reputation, litigation rate and discretionary accruals (Krishnan & Schauer, 2000).

Audit quality is subject to many direct and indirect influences. In relationship with the stakeholder theory (Khan, 2006), perceptions of audit quality vary amongst stakeholders depending on their level of direct involvement in audits and on the perspective through which they assess audit quality. In recent times, a series of well-publicized cases of accounting improprieties in Nigeria has captured the attention of investors and regulators alike. The search for mechanisms to ensure reliable, high quality financial reporting has largely focused on the structure of audit quality (Adeyemi & Fagbemi, 2010).

The spate of audit failures in the world has brought a great deal of disappointment to investors and other corporate financial reporting stakeholders. Longevity of audit firm tenure has also been linked with fraudulent financial reporting (Adeyemi, Okpala & Dabor, 2012). If empirical studies are not carried out with respect to specific environmental factors the problem of poor audit quality may be exacerbated with likely grave consequences for the selected banks.

Although, various researchers have carried out study on this area such as the following: Adeyemi and Fagbemi, (2010) Audit quality, corporate governance and firm characteristics in Nigeria; Musa & Shehu, (2014) in his study investigates the impact of audit quality on financial performance of quoted firms in Nigeria. Gholamreza & Samira, (2015) the relationship between auditing quality and the profitability in the companies accepted in Tehran's securities exchange market; Matoke and Omwenga, (2016) Audit quality and financial performance of companies listed in Nairobi Securities**;** Amahalu and Ezechukwu, (2017) ascertain the determinants of audit quality with a focus on selected Deposit Money Banks listed on the floor of Nigeria Stock Exchange from 2010-2015; Egbunike and Abiahu (2017) The effect of audit firm characteristics on financial performance of money deposit banks in Nigeria.

However, despite all these studies on audit quality, a gap exists in the literature pertaining to the audit quality and financial performance, the study discovered from the ongoing review of previous researchers, that majority of the studies were done outside Nigeria, there exist location gap. Besides, these studies used different methods and design like survey research design which employed the use of questionnaire but the researcher adopted *ex-post facto* which employed the use of secondary data and reports from financial statements, there exist methodology gap. It is for this reasons that the researcher set up to investigate the effect of audit quality on the corporate performance of selected Oil Firms in Nigeria.

Owing to the problem of the study, the main objective of this study is aimed at assessing the effect of audit quality on the corporate performance of selected Oil Firms in Nigeria.

CONCEPTUAL REVIEW

2.1.1 Audit Quality

The various changes in accounting, financial reporting and auditing were all designed to provide protection to investors. This is being achieved by imposing a duty of accountability upon the managers of a company (Crowther & Jatana, 2005). More precisely, the role of auditing is to reduce information asymmetry on accounting numbers, and to minimize the residual loss resulting from managers' opportunism in financial reporting. Effective and perceived qualities (usually designated as apparent quality) are necessary for auditing to produce beneficial effects as a monitoring device. The perceived audit quality by financial statements users is at least as important as the effective audit quality. Conceptually, Agency theory recognizes auditing as one of the main monitoring mechanisms to regulate conflicts of interest and cut agency costs (Adeyemi & Fagbemi, 2010).

According to DeAngelo (1981), audit quality is defined as the competency and independence of auditors in detecting and reporting material misstatement. Zehri and Shabou (2011) asserted that high quality auditors are more likely to discover questionable accounting practices by clients and report material irregularities and misstatements compared with low quality auditors. Due to this, a higher audit quality is able to better constrain earnings management, and in turn enhance the quality of financial reports (Ching, Teh, San & Hoe, 2015). Previous research in the related literature has employed various measures as proxies of audit quality. Several studies have indicated that a higher quality of auditing mitigates accruals based earnings management (Okolie, 2014; Soliman and Ragab, 2014; Gerayli, Yanesari and Ma'atoofi, 2011; Becker, DeFond, Jiambalvo, & Subramanyam, 1998). This study used audit firm size, audit fees, and audit partner as audit quality measures.

Conceptually, the auditing quality can be measured through the three basic aspects of inputs, outputs and environmental factors. Except auditing standards, there are other inputs for the auditing quality. One such an input is the unique and prominent features of the auditor such as his or her experience, moral values and his propensities. One of the other important factors is the auditing process (Rahimi & Amini, 2015). This process includes auditing methodology, the amount of the effects of the applied auditing methods and the amount of access to the required auditing documents and evidences.

Empirical Review

Shafie Hussin Yusof and Hussain (2009) examined the relationship between audit firm tenure and auditor reporting quality in Malaysia. This study employs well-established going concern model of logistic regression. Their findings show that audit firm tenure is positively significant relationship with auditor reporting quality.

Adeyemi and Fagbemi, (2010) state the audit quality, corporate governance and firm characteristics in Nigeria. Therefore, this study provides evidence on corporate governance, audit quality, and firm related attributes from a developing country, Nigeria. Logistic regression was used in investigating the questions that were raised in the study. Findings from the study show that ownership by non-executive director has the possibility of increasing the quality of auditing. Evidence also exist that size of the company and business leverage are important factors in audit quality for companies quoted on the Nigerian Stock Exchange.

Empirically, Zahid, Haider and Asif (2010) investigated the impact of prior year firm's performance on subsequent year firm's corporate governance mechanism. They used board size, CEO–Chairman combined structure and audit expenditure as a firm level corporate governance mechanism. The panel data of fifty two companies listed on Karachi Stock Exchange covering the period from 2006 to 2010 was used for this study. Hypotheses were tested by using fixed effect model and random effect model. Their results revealed that prior year firm's performance has positive relationship with board size but negative relationship with audit expenditure.

In another Nigerian study, Umaru, (2011) in his study examined which the impact of audit firms attributes on financial reporting quality of quoted building material firms in Nigeria. The study employed correlation research design using a sample of four listed building material firms for the period of ten years (2002-2011). Ordinary Least Square (OLS) multiple regression technique was employed in the analysis of the panel data collected for the study. The study found that audit compensation and audit firm independence have significant positive impact on the financial reporting quality of quoted building material firms in Nigeria at 99% confidence level.

Further, Adeyemi, Okpala and Dabor, (2012) investigated the factors affecting audit quality in Nigeria. This research was carried out in order to investigate the factors affecting audit quality in Nigeria. The primary data were supplied by 430 respondents across several stakeholders in the fields of financial reporting and auditing. The secondary data were generated from the financial statements of forty annual reports of companies quoted on the Nigerian Stock Exchange. The test of hypotheses and other analysis of data were done using SPSS, version 17. The tests revealed that among others, multiple directorship is the most significant in affecting audit quality in Nigeria. In addition, it is found that provision of non-audit service would likely have a significant effect on the audit quality in Nigeria.

Ondieki, (2012) in his study examined effect of internal audit on financial performance in commercial banks in Kenya. Internal audit was looked at from the perspective of internal audit standards, professional competency, internal controls and independence of internal audit. The study selected one senior manager in the finance department.

Muazu, (2012) assesses the role of internal auditors in ensuring effective financial control at local government level, a case of Alkaleri L.G.A Bauchi State. The methodology employed for data collection is only primary source, which involved the use of questionnaires, in which 50 questionnaire were administered to the staff of Accounting and Internal audit department of Alkaleri L.G.A, out of which only 35 questionnaires were completed and returned. The data generated for the study were interpreted using simple percentage. The main finding of the study include among other; lack of proper independent exercise by the internal auditor, understaffing in the side of internal audit unit, the internal control system is very weak toward financial and other controls and also non adherence by the auditors on general auditing standard.

In the study of May and Rasha (2019), the study examined the effect of audit quality on firm performance. It uses financial statements of non-financial firms listed as EGX 100. The population studied consists of thirty non-financial firms. The study covers a five year period 2010-2014. It applies panel data analysis. Independent Variables are Auditor Experience (measured by Big-4) and Auditor Independence (measured by auditor Rotation ROT). Dependent Variables are Return on Assets ROA and Return on Equity ROE. In accordance with the Random Effect Model results, BIG 4 and ROT have an insignificant impact on the ROA and ROE of the firm. External and internal financial statement users may benefit from the study only when dealing with high-profit firms.

Empirically, in Jordan, Baker, Ahmad and Yasin, A. A. (2015) examined the impact of audit quality on financial performance of quoted firms in Jordan. The study is descriptive in nature and the co relational and ex-post facto designs were adopted in carrying out the research. Data were obtained basically from the published annual reports and accounts, and notes to the financial statements of the firms that represent the sample of the study. The data collected were quantified and presented in tables. Multiple regression analysis using the SPSS Version (15.0) was employed in analyzing the data and testing the stated hypotheses. The results of the findings shows that auditor size and auditor independence have significant impacts on the financial performance of quoted cement firms in Jordan. However, auditor independence has more influence than auditor size on financial performance. The study recommends that the management of quoted cement firms in Jordan increase the remuneration of auditors in order to improve their financial performance. The study further recommends that management should employ the services of audit firms whose character and integrity is beyond question.

In kenya, Ondieki, (2013) also determined the effect of internal audit on financial performance in commercial banks in Kenya. Internal audit was looked at from the perspective of internal audit standards, professional competency, internal controls and independence of internal audit. The study selected one senior manager in the finance department. The researcher administered a survey questionnaire to each member of the target population since it was the most appropriate tool to gather information. Quantitative analysis and regression analysis were used as data analysis technique. From the findings, the study concludes that internal audit standards, independence of internal audit, professional competency and internal control had a positive relationship with financial performance of commercial banks, the study found that a unit increase in internal audit standards would lead to increase in financial performance of commercial banks, a unit increase in independence of internal audit would lead to increase in financial performance of commercial banks, a unit increase in professional competency would lead to increase in financial performance of commercial banks and further unit increase in internal control would lead to increase in financial performance of commercial banks. The study recommends that management in commercial banks in Kenya should adopt effective internal audit practices such as internal auditing standards, independence of internal audit, professional competency and internal controls to enhance financial performance of the banks.

Further, Navid et al (2014) in their study titled "The Effect of Independent Audit Quality on the Quality of financial Disclosure -Evidence from Tehran Stock Exchange" This study is ranged from 2008 to 2013 for firms listed in Tehran stock exchange. Audit quality is the independent variable in this study and measure by six factors. Dependent variable is the quality of financial disclosure. Study has six hypotheses models is multiple regression and software used is Eviews version 8. The results demonstrated that there is no ralationship between auditor industry specialization, auditor tenure, audit fee income of the audit firm, to quality of information. But there is a significant relationship between auditing firm antiquity and audit quality to quality of information. Finally, according to the hypothesis test is concluded that, contrary to popular perception, there is no relationship between the quality of audited financial statements and the quality of information presented in the financial statements companies in Tehran Stock Exchange.

Further study by Yahn-Shir, Hsu, Mei-Ting and Ping-Sen, (2013) it was observed that this study examines the relations between audit quality, audit firm size, and financial performance. This study estimates audit quality of audit firms from human capital-related factors, such as educational level of auditors, work experience of auditors, and professional training. From the perspective of market segmentation, the sample is divided into three categories: national, regional, and local firms. Empirical results report a positive association between audit firm size and audit quality for the three categories of audit firms.

Mohd, TanjongMalim, AyoibChe and Baharudin, (2013) examined the managerial ownership, audit quality and firm performance in Malaysian. This study investigates the relationship between managerial ownership and company performance of public listed companies in Malaysia. Further, this study investigates the effect of audit quality on company performance. As multivariate regression is used to analyze the data in this study, assumptions of multicollinearity, hemoscedasticity and linearity are also tested. Furthermore, this study applied the F-test, Chow test and Hausman test to determine the best statistical method. The analysis utilizing GLS fix effects estimations technique is applied. The results showed that the managerial ownership had negative and significant relationship with ROA and Tobin's Q.

Farouk and Hassan, (2014) opined the impact of audit quality and financial performance of quoted cement firms in Nigeria. This research work was designed to examine the impact of audit quality on financial performance of quoted cement firms in Nigeria. The study is descriptive in nature and the correlational and ex-post facto designs were adopted in carrying out this research. Data were obtained basically from the published annual reports and accounts, and notes to the financial statements of the four firms that represent the sample of the study. The data collected were quantified and presented in tables. Multiple regression analysis was employed in analyzing the data and testing the stated hypotheses. The results of the findings shows that auditor size and auditor independence have significant impacts on the financial performance of quoted cement firms in Nigeria.

Morteza, (2014) investigated that audit opinion shopping has been studied extensively in accounting research. A firm engages in opinion shopping by influencing or even manipulating its auditor's decision in certain ways to obtain an opinion that is more favorable that that warranted by the quality of its accounting information.

Musa and Shehu (2014) in their research reveal that the financial statement audit is an important tool for reducing information asymmetries and maintaining an efficient market environment. The study is descriptive in nature and the co relational and ex-post facto designs were adopted in carrying out this research. Data were obtained basically from the published annual reports and accounts, and notes to the financial statements of the four firms that represent the sample of the study. The data collected were quantified and presented in tables. Multiple regression analysis using the SPSS Version 15.0 was employed in analyzing the data and testing the stated hypotheses. The results of the findings shows that auditor size and auditor independence have significant impacts on the financial performance of quoted cement firms in Nigeria. However, auditor independence has more influence than auditor size on financial performance.

Dangana, (2014) examined the impact of audit firms attributes on financial reporting quality of quoted building material firms in Nigeria. The study employed correlation research design using a sample of four listed building material firms for the period of ten years (2002-2011). Ordinary Least Square (OLS) multiple regression technique was employed in the analysis of the panel data collected for the study. The study found that audit compensation and audit firm independence have significant positive impact on the financial reporting quality of quoted building material firms in Nigeria at 99% confidence level. The finding suggested that, audit compensation and provision of non-audit services in the quoted building material firms in Nigeria have improved the quality of their financial reporting during the period under review.

Gholamreza and Samira (2015) who studied the present study deals with the evaluation of the relationship between auditing quality and the profitability in the companies accepted in Tehran's securities exchange market. The total number of 52 companies accepted in Tehran's securities exchange market has been surveyed. The study findings showthat generally there is a positive and weak relationship between the auditor size (auditor's good fame) and the auditor's tenure period and the profitability ratios. To survey the auditor's size the member auditing institutions of the formal accountant society are regarded as small auditing firms and accounting organization due to the great many staff members working in it and also due to their long working history is considered as the big auditing institution. Also, there is a positive but non-significant relationship between profitability and auditors size and there is a positive and significant relationship between tenure period and profitability.

Hamed, Rohaida, Siti and Mohamed, (2016) examined the impact of audit quality on firm performance for Malaysian listed companies for the period of 2003 to 2012. In this study, they use audit fees and audit firm rotation as proxies for audit quality. Return on assets and Tobin's q are used as measures for firm performance. They found that there is insignificant relationship between audit quality proxies (audit fees and audit firm rotation) and ROA. They also found that an audit fee is significantly and positively related to Tobin's Q. However, audit firm rotation is insignificantly related to Tobin's Q.

Matoke and Omwenga, (2016) conducted a research work on audit quality and financial performance of companies listed in Nairobi Securities Exchange. This study adopted a descriptive research design. The study used Cronbach (Alpha – α) model to test the reliability of the data. Quantitative and qualitative data that was collected using questionnaires was inspected for errors and gaps. The data was then well examined and checked for completeness and comprehensibility. After inspection, the data was coded and analyzed by the use of descriptive statistics using SPSS. Data was analyzed by multiple linear regression analysis. Findings of the study indicate that the effect of audit quality on financial performance is positive and significant and the greater the degree of an auditors independence, the greater the propensity of a firm making substantial net profit margins. The impact of auditor size was also positive and significant, although, its impact was lesser that of auditor independence.

Stakebrand, (2016) examined the effects of auditor rotation on audit quality, by focusing on European companies for the period 1995-2014. Similar studies focusing on European companies are rare. Based on prior studies it is hypothesized that audit quality will decrease on the short term after rotation, but will increase on the long term. Also a differential effect between voluntary and mandatory rotation is hypothesized. Three different measures of audit quality are used; discretionary accruals, abnormal working capital accruals, and the ratio of loss avoidance. The results are mixed as dependent on the measure of audit quality there is supporting or contradicting evidence.

Zayol, Kukeng and Iortule (2017) opined the effect of auditor independence on audit quality: a review of literature. This paper reviews literature related to auditor independence and audit quality in order to determine the effect of the former on the latter. The ex post facto research design is employed. Information for this study was obtained from secondary sources to include journals, text books and other internet materials. Based on the review, findings show that there is a strong relationship between auditor independence and audit quality. The review also revealed four threats to auditor independence, which are client importance, non-audit services (NAS), audit tenure, and client's affiliation with CPA firms. However, some studies indicated a positive relationship while others showed contrary due to the type of study design employed, sample size, data collection instruments and analysis techniques used. Most of the studies on auditor independence and audit quality were centered on one or two of the threats and majorly done outside Nigeria.

In Nigeria, Ogbodo and Akabuogu (2018) study "the effect of audit quality on the corporate performance of selected banks in Nigeria". Specifically, the study examined the effect of audit firm size on return on asset of Nigerian banks; determined the extent audit committee independence affect return on equity of Nigerian banks and ascertained the effect of audit committee on the profit margin of Nigerian banks. Three research questions and hypotheses were formulated in line with the objectives of this study. The population of the study consists of sixteen deposit money banks quoted on the Nigerian Stock Exchange. Data for the study were extracted through the financial statement of the banks from 2008 to 2017 and was tested with regression statistical tool using the Scientific Package for Social Sciences (SPSS) Version 20. Based on the data analyzed, the study found that firm size has significant effects on return on assets of quoted Nigerian banks; also that audit committee independent has significant affect return on equity of quoted Nigerian banks. Another finding is that audit committee size has significantly affects profit margin of quoted Nigerian banks. Based on this, the study recommended among others that companies should make use of the services of audit firms with unquestionable track records of audit quality and reputation; hence the debate on audit quality is not a settled matter.

Although, various researchers have carried out study on this area such as the following: Adeyemi and Fagbemi, (2010) Audit quality, corporate governance and firm characteristics in Nigeria; Adeyemi, Okpala and Dabor, (2012) investigated Factors Affecting Audit Quality in Nigeria; Mohd, TanjongMalim, AyoibChe and Baharudin, (2013)examined the The managerial ownership, audit quality and firm performance in Malaysian; Beisland, Mersland and Strøm, (2013)study the audit quality and corporate governance: evidence from the microfinance industry.

Farouk and Hassan, (2014) assessed the impact of audit quality and financial performance of quoted firms in Nigeria. Musa & Shehu, (2014) in his study investigates the impact of audit quality on financial performance of quoted firms in Nigeria. Gholamreza & Samira, (2015) the relationship between auditing quality and the profitability in the companies accepted in Tehran's securities exchange market; Matoke and Omwenga, (2016) Audit quality and financial performance of companies listed in Nairobi Securities**;** Amahalu and Ezechukwu, (2017) ascertain the determinants of audit quality with a focus on selected Deposit Money Banks listed on the floor of Nigeria Stock Exchange from 2010-2015; Egbunike and Abiahu (2017) The effect of audit firm characteristics on financial performance of money deposit banks in Nigeria.

However, despite all these studies on audit quality, a gap exists in the literature pertaining to the audit quality and firm performance, As we can discover from the ongoing review of previous researchers, that some of the study were done outside Nigeria, there exist location gap, some were done using different variable as proxy for performance and audit quality such as return on asset, profit margin, audit fee, audit rotation respectively, there exist variable gap from this study. Some of the researchers used different methods and design like survey research design which employed the use of questionnaire but the researcher adopted *ex-post facto* which employed the use of secondary data and reports from financial statements, there exist methodology gap.

Therefore, this study focused on audit quality and financial performance of universal banks in Nigeria since none of the study was done on this area in Nigeria. This study therefore fills the research gap by assessing the effect audit quality and financial performance of universal banks in Nigeria using return on asset, profit margin, return on equity and return on capital employed as a variable for performance.

RESEARCH METHODOLOGY

Research Methods

The ex-post factor research design was used in this research work. The listed Nigerian oil marketing companies in 2017 constitute the population of this study; from which seven companies were sampled out as representatives of the population. The study cover a period of ten year

3.1 **Population of the Study**

The research population of this study comprises of all the oil marketing companies that are quoted on the floor of the Nigerian Stock Exchange. This can be seen in the table below.

Table1: Study Population

S/N	COMPANY NAME	YEAR OF INCORPORATION	YEAR OF LISTING
1	OANDO PLC	1969	1992
2	AFROIL PLC		1990
3	BECO PETROLEUM PLC	1986	2009
4	CONOIL PLC	1960	1989
5	ETERNA OIL & GAS PLC	1989	1998
6	FORTE OIL PLC	1964	1978
7	MOBIL OIL NIG. PLC	1951	1979
8	MRS OIL NIG. PLC	1969	1978
9	TOTAL NIG. PLC	1956	1979

Source: Generated by author from the NSE 2018/2019 Fact book.

Table1 shows the population of the study consisting of nine quoted petroleum marketing companies drawn from the 2008/2017 fact book of the Nigerian Stock Exchange (NSE), out of which the population of the study was derived. The criteria for choosing the population is the availability of the data from 2008 to 2017, the justification for this criteria to ensure the availability of comparable data from 2008 to 2017, and the companies that met with these criteria are listed in table 3.2. However, Beco Petroleum PLC and Afroil PLC did not met with the criteria, as Beco was only listed on the Nigerian Stock Exchange in 2009 and Afroil has been de-listed from Nigerian Stock Exchange since 2008, and as such they did not have complete required data.

Table 1.1: working population

S/N	COMPANY NAME	YEAR OF INCORPORATION	YEAR OF LISTING
1	OANDO PLC	1969	1992
2	FORTE OIL PLC	1964	1978
3	MOBIL OIL NIG. PLC	1951	1979
4	MRS OIL NIG. PLC	1969	1978
5	TOTAL NIG. PLC	1956	1979
6	CONOIL PLC	1960	1989
7	ETERNA OIL & GAS PLC	1989	1998

Source: Generated by the researcher from table 1.

2 The Variables of the Study and their Measurement

This study used two set of variables: dependent and explanatory variables

The Dependent Variable

The dependent variable is return on asset.

The Explanatory Variables

The explanatory variables of this study include the independent and control variables

a) Independent Variables

The study follows the recent direction in audit quality literature of assessing the relationship between financial performance and audit quality. The proxies for audit quality are, (audit independence, audit size, and joint audit) as independent variables on the extent of financial performance and audit quality in annual reports of companies listed in the Nigerian oil sector.

b) Control Variables

A review of the literature on audit quality led to the decision to include one (1) control variables in the regression models. This is:

Firm Size

Firm size is the most common variable in disclosure literature either in developed or developing countries. In the corporate financial performance, firm size is one of the main variable as control.

Variable and measurements:

ROA (net income divided by total assets) represents a corporation's profitability accruing from the total asset. It has been used in numerous studies of this kind as a proxy for CFP (Aras et al., 2010; Usman and Amran, 2015).

Audit Size: Empirical support was found in (Velnampy, Sivathaasan, Tharanika, &Sinthuja, 2014). The big 4 audit firms in Nigeria are namely, Price Water House/Cooper (PWC), Ernst and Young (EY), Akintola Williams/Delliote (AWD) and KPMG Professional group (KPMG). Accordingly, a dummy variable of 1 is used if a firm is audited by any of the big 4 audit firms otherwise a 0 value is assigned.

Audit Independence: This represent the amount paid as audit and non-audit fees as used by Hassan (2013) Abdel-fattah (2008).

Joint Audit: this is when two big 4 audit firms audit any of the firms. A dummy variable of 1 is used if any of the 2 big 4 audit a firm otherwise 0 value is assigned as used by Damagun and Chima (2013), Abdel-fattah (2008), Ronnie lo (2009).

Model Specification

Accordingly, the following econometric model in general form is thus specified for the study:

Dependent variable = β + Σβ + Independent Variables + Σβ Control Variables +□

Where β = Intercept of regression line and □ = error term.(1)

Source: Adapted from (Wan-Hussin & Haji-Abdullah, 2009).

In adopting it, the following models evolved.

$ROA = \beta o + \beta 1AI + \beta 2\ AS + \beta 3JA + \beta 4FS + e$ (2)

ROA = Return on Asset.

AI = Audit Independence.

AS = Audit Size.

JA = Joint Audit.

FS = Firm size,

4. Results and Discussion

Table 1: Multicollinearity Test

Variable	VIF	1/VIF(TV)
AS	1.27	0.789254
AI	1.19	0.836873
JA	1.15	0.870915
FS	1.10	0.910104
Mean VIF	1.18	

Source: out of VIF developed by researcher using STATA 11 (2020)

The two common ways to check for the presence of Multicollinearity between independent variables are correlation coefficients and variance inflation factors (VIF) with tolerant values. This study used VIF to check whether the explanatory variables of the model suffer from Multicollinearity. The VIF in excess of 10 should be taken as an indication of harmful Multicollinearity (Neter, Wasserman & Kutner 1989, and Gujarati 2003), and the result of the test show that the maximum VIF is 1.27 and the minimum VIF is 1.10 and this is less than 10 which indicate absence of Multicollinearity.

Table 2: Descriptive statistics

Variables	Observation	Mean	Std.dev	Min	Max
ROA	70	14.61875	1.754272	10.44616	18.1753
AS	70	.6714286	.4730851	0	1
JA	70	.7428571	.4402145	0	1
AI	70	31.38601	18.48835	3.97	71
FS	70	20.04392	.997578	18.019	21.603

Source: Output of summary statistics developed by research using STATA 11 (2019)

Table 2, the mean total return on assets score for the sampled oil companies in Nigeria shows an average of 14.61875. This means that Nigerian industrial goods companies return on asset is over 14 million naira. This shows element of high level of business doing well in the industry, with a minimum of over 10 million naira and maximum of over 18 million naira. The standard deviation of 1.752 indicates that there is no significant variation in return on asset between the sampled oil companies during the period of the study. As indicated in the Table 4.1, the mean .67 which represent 67%. An indication that 67 % of the sampled firm are audited by the big 4 audit firm, with minimum of 0 and maximum of 1. The standard deviation of .473 shows that there is significant variation about the size of the audit firms of the sampled oil companies. On the average, joint audit is .74 28 which represent 74%. An indication that 74 % of the sampled oil firm used more than one audit firms to carry out their audit, with the minimum of 0 and maximum of 1. The standard deviation is .4402 which shows a significant variation about the joint audit. The average of audit independence is 31.886 which represent over 31 million naira and indication that money paid as audit and non-audit fees is on the high with the minimum of 3.97 million naira and maximum of 7.1 million naira. The standard deviation is 18.4. This indicates high level of dispersion. Firm size, measured by the natural logarithm of total assets has a mean of about 20.04, with a minimum of about 18.01 and maximum of about of 21.06. But the standard deviation of 0.997 suggests a high level of dispersion in the total assets among the sampled companies.

Table 3: Correlation matrix

	ROA	AS	JA	AI	FS
ROA	1.000				
AS	0.4298	1.000			
JA	0.3095	0.3539	1.000		
AI	-0.3916	-0.3363	0.1726	1.000	
FS	0.5833	0.1938	0.1047	-0.2794	1.000

Source: Correlation output developed by researcher using STATA 11 (2019)

Table 3 shows the correlation coefficients on the relationship between the dependent variable (ROA) and explanatory variables audit size, joint audit, audit independence, and firm size). The values of the correlation coefficient range from -1 to 1. The sign of the correlation coefficient indicates the direction of the relationship (positive or negative), the absolute value of the correlation coefficient indicates the strength, with larger values indicating stronger relationships. The correlation coefficients on the main diagonal are 1.0, because each variable has a perfect positive linear relationship with itself. As shown in table 3, the relationship between audit independence with return on asset and audit size are weak and negative with correlation coefficient value of -0.3916 and -0.3363 respectively. Likewise, weak and negative firm size with audit independence with -0.2794 and -0.2670. And finally a strong and positive relationship exists between audit size, joint audit and firm size with return on asset with correlation coefficient value of 0.4298, 0.3095 and 0.58.33 respectively. All other relationships are positive and strong.

Table 4: Regression results

TVD	COEFF	STD. ERRORS	T VALUE	PROB
AS	.7448688	.3795103	1.96	0.054**
JA	.5286082	.3981933	1.33	0.189
AI	-.0203278	.0100363	-2.03	0.047**
FS	.9206619	.1710577	5.38	0.000***
INTERCEPT	-4.089718	3.481437	-1.17	0.245
R Sq.	0.5112			
PROB.	0.00000***			

Source: Regression output developed by researcher using STATA 11(2020). (*, **. ***, indicate significant levels at 10%, 5%, and 1* respectively).

The R-square is 51 % which shows the audit quality variables explain ROA to the extent of 51% while the remaining percentage are explained by other factors that are not captured in the model. The probability is significant at 1% an indication that the model is fitted and the study results can be relied upon.

The regression result of the study's model indicates that some independent variables have positive impact ROA while others have negative impact. Thus; ROA = -.4.089718 + .7448688AS + .5286082JA - .020378AI + .9206619FS + e. from the regression results, AI have negative relationship with ROA while JA, AS and FS have positive relationship with ROA.

The results in table 4. Show that audit size has positive and has significant influence on return on asset in the Nigerian listed oil companies at 5% level of significance. The regression result shows that audit size board is positive and statistically significant with return on asset in the Nigerian listed oil companies 5%. This support the result of Ogbodo and Akabougu (2018) and in contrary to the results of Matoke and Omwenga (2016).

The joint audit is positive with return on asset but not statistically significant. Hence it is significant at 19% with the return on asset.

Concerning the relationship between audit independence and return on asset in the Nigerian listed oil companies, the regression result in table 4 reported a negative and significant association at 5%. This significant association indicates that joint audit is one of the determinant of financial performance in the oil companies in Nigeria. This result is consistent with the findings of Dangana (2014). But, is inconsistent with findings of Baker, Ahmed and Yasin (2015), who find positive and significant association between audit independence and return on asset. Thus, the study's result implies that the higher the proportion of money paid as audit and non-audit the lower the return on asset.

Table 4 indicates that firm size, measured by the natural log of total asset, is significant and positively associated with return on asset at 1% significance. This finding is in line with the findings of Ogboro and Akabunagu (2018). The finding of this study shows that large firms have more resources to positively influence financial performance than smaller ones.

5. Conclusions and recommendations

Audit size enhances financial performance in the Nigerian listed oil companies as the empirical result indicates above.

Audit independence negatively influence financial performance Size in the Nigerian listed oil companies in Nigeria. The more money paid as audit fees the less the return on asset.

Since size of firms has positive impact on the extent of financial performance in the Nigerian listed oil companies.

The result shows that audit quality have an aggregate impact on financial performance in quoted oil firms in Nigerian. First, we can conclude that audit size is one of the major elements of audit quality that influences financial performance in Nigerian listed oil firms. Second, apart from the audit quality variables, the study confirms that firm size also have a significant relationship with financial performance.
Based on the empirical findings of this research, the following recommendations are made;

The empirical result shows that audit quality mechanisms have aggregate positive impact on financial performance. Hence the study recommends that audit firms with good reputation should be engaged by firms to audit their financial statement in view of bringing out the best in them as shown in this research.

On the issue of audit independence, the result shows that it negatively correlated with return on assets. Thus, the study recommend that the audit fees should be review because it has negative impact on financial performance.

Empirical result also shows that firm size has a significant impact on financial performance. The study therefore recommend that firms in oil sector should diversify their resources to accumulate more wealth for the firms.

This research used only three audit quality variables to study financial performance in Nigeria. Further research could be carried out by including more audit quality variables such as Audit committee characteristics, auditor's reputation etc. to study their impact on financial performance.

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EFFECT OF CEMENT AND PALM KERNEL SHELL POWDER AS ADMIXTURES ON ATTERBERG LIMIT, UNCONFINED COMPRESSION STRENGTH AND PERMEABILITY OF A CLAYEY SOIL

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Abstract

The use of agricultural waste such as rice husk ash, palm kernel shell powder etc., which are pozzolanic in nature, will considerably reduce the cost of construction and as well help in pollution control which is a burning issue over world. This research investigates the effect of cement and Palm kernel shell powder as admixture on Atterberg limit, permeability and unconfined compression strength for a clayey soil. The experimentation work carried out on this research includes particle size distribution test (Sieve Analysis), Atterberg limit, permeability and unconfined compression strength test in accordance with the American Society for Testing and Materials (ASTM) Codes. The soil tests were carried out on clayey soil samples that were mixed with each of the admixtures based on various percentages (0%, 3%PKP + 1.5%CEM, 6%PKP + 3%CEM, 9%PKP + 4.5%CEM and 12%PKP + 6%CEM). The soil is classified as sandy loam, silty clay and A-2-7 according to textural, unified and AASHTO soil classification systems. The values of uniformity coefficient and coefficient of curvature are 1.11 and 1.36 respectively which indicates that the soil is well graded and it is free from any gravel fraction. The addition of admixtures to the soil decrease the plasticity index by 12.8% which makes its less susceptible to swelling, increase the degree of impermeability by 66.7% which changes its nature from semi pervious to impervious according to USRB earth manual table and increase the values of unconfined compressive strength by 23.40% and improve the soil consistency from stiff to very stiff according to USC table. The soil can be used in the construction of earth dam.

Keywords: Palm kernel shell powder, Atterberg limit, unconfined compression strength, permeability.

Introduction

Economic progress and growth of a country is closely dependent on the infrastructural development. Pavements of least thickness are found to be the most economical. This is possible only when the underlying soil has greater strength. Failures of Nigeria highways are general due to poor geotechnical properties of the underlying soils which constitute the base or sub grade material for the entire road configuration. Necessity to improve soil properties for road building has resulted in the use of various stabilizers (Amu *et al.*, 2011). Soils are stabilized for improvement of their durability and strength to render them more suitable for construction (Khalid *et al.*, 2012). Such improvements are the result of a number of chemical processes that take place in the presence of a stabilizer (Sadeeq, 2015).

Clayey soil possesses low strength, if the soil is weak, then the thickness of the pavements increases. So for such problematic soil, it is essential to stabilize them in the most economic and affective way (Afsal, 2013). Much dependence on the use of manufactured soil improving additives like cement, and lime, has made the cost of road construction on stabilized soils huge. Thus, the use of waste materials such as rice husk ash, palm kernel shell powder, sawdust ash etc., which are pozzolanic in nature will considerably reduce the cost of construction and as well help in pollution control which is a burning issue world over (Asiagwu *et al.*, 2012). The palm kernel shell, which is the crushed shell housing the palm kernel seed is an economically valuable tree that is widespread throughout the tropics. The palm kernel shell can be regarded as a natural pellet and a high grade solid renewable fuel for burning. They are yet to be utilized to a great extent as a construction material, but blended palm kernel shells have been used to modify lateritic soil because of their good interlocking characteristics, low specific gravity and high porosity. Research has been conducted to see whether they can make suitable stabilizing agents for the improvement of soils for civil engineering construction, Ekeocha and Agwuncha (2014). According to Adeyemi and Joseph (2015), palm kernel shells have very low ash and sulphur content.

Materials and Method

Site Description: The clayey soil samples were taken from the back of electrical electronic department student toilet area of Federal Polytechnic Ede (north campus) falling within the Ede township, Osun State and the area lies at geographical 84^0SE of Ede (lat. $7^0$43’48’’N and $4^0$25’26’’E).

Stabilizing binder: The binders selected for this study was cement and palm kernel shell powder (PKP). The cement was gotten from a retailer while the Palm kernel shell powder sample was collected from women at local oil processing (Ebu) in area Ede, Osun State, it was pulverized and then air dried in order to remove the moisture.

Sample preparation: The clayey soil samples were stabilized with cement-palm kernel shell powder (PKP) at varying percentages of 0% CEM + 0% PKP, 1.5% CEM + 3% PKP, 3% CEM + 6% PKP, 4.5% CEM + 9% PKP, 6% CEM + 12% PKP.

Experimental Methods: Soil index property and classification tests namely particle size distribution analysis and Atterberg limit tests were performed on the clayey soil. Unconfined compressive strength test were conducted on the stabilized samples. These tests were conducted at the Geotechnical Engineering Laboratory of Federal Polytechnic Ede, Osun State in accordance with the American Society for Testing and Materials (ASTM) codes as follows; Atterberg limit tests (ASTM, 2010), particle Size Distribution (ASTM D422), permeability test (ASTM D2434) and unconfined compressive strength test (ASTM D2166).

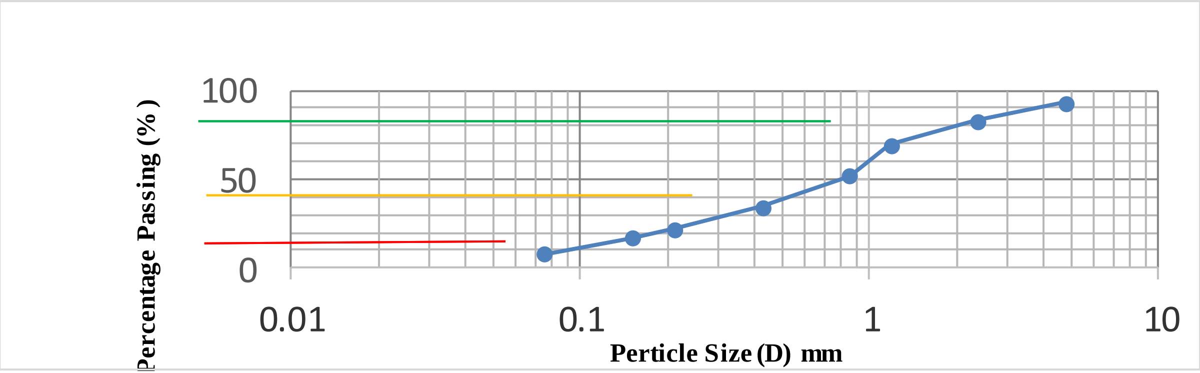
Results and Discussion

Soil Characterization Results: The general properties of obtained natural clayey soil were tabulated in Table 1. For the clayey soil, the percentages passing sieve No. 200 (0.075 mm), No. 40 (0.425 mm), No. 10 (2.00 mm) and No.4 (4.75mm) were 8.0%, 80.0%, 91.50% and 96.4% respectively. The soil is classified as sandy loam and silty clay according textural soil classification and unified soil classification system respectively. From the gradation curve shown in Figure 1, the values of D_{10}, D_{30} and D_{60}, are 0.09, 0.35 and 1.00, the values of uniformity coefficient and coefficient of curvature are 1.11 and 1.36 respectively which indicates that the soil is well graded and it was found that the soil is free from any gravel fraction. The soil can be further classified as A-2-7 under the AASHTO classification and its soil of Medium Plasticity index.

Table 1: Summary of Properties of Natural Clayey Soil

Property	Values
Natural Moisture Content (%)	19.08
Specific Gravity	2.55
Plastic Limit (%)	32.50
Liquid Limit (%)	54.00
Plastic Index (%)	21.50
Percentage Passing No. 200 BS Sieve (%)	8.00
USCS	Silty Clay
AASHTO Classification	A-2-7
Maximum Dry Density (g/cm^3)	1.63
Optimum Moisture Content (%)	23.30
Colour	Dark Brown

Figure 1:



Particle Size Distribution for Clayey Soil Sample

The result of X-ray fluorescence (XRF) analysis in Table 2 indicates that the clayey soil and palm kernel shell powder contain 25.31%, 8.19% of silicon (Si), 20.57%, 1.64% of aluminum (Al), 11.495%, 3.0578% of iron (Fe), and 0.0097%, 0.0226% of calcium (Ca). Craig (2005) asserted that the liquid limit is defined as the water content at which 25 blows are required to close the bottom of the groove over a distance of 13mm. From the result of Atterberg limit test in Table 3, the five values exceeded the standard 40% liquid limit for soil that has good subgrade quality and they can be classified as A – 2– 7 group soils. The liquid limit (LL) and plastic limit (PL) increased with increase in the cement and PKP content as shown in Figure 2, although the increase was more when the clayey soil was stabilized with 6% CEM + 12% PKP (that is 17.6% and 37.7%) than when it was stabilized with 1.5% CEM + 3% PKP (that is 3.7% and 6.9%). The plasticity index (PI) which gives a measure of the plasticity of a soil, also decreased with an increase in the cement and PKP content. According to Dahms and fritz (1998), these results indicate that the clay is of medium plasticity index in nature. High plasticity is an indicator of potential swelling; clay is prone to large volume changes if PI is greater than or equal to 30%, Amu *et al.* (2005) but addition of admixture to the soil decrease the PI from 21.50% of natural clay to the lowest value 18.75% which equivalent to 12.8% decrease. From the foregoing, there is an indication that the addition of additives enhanced the soil properties by decreasing the PI values which is attributed to the change in the soil's nature (its granular nature after flocculation and agglomeration) (Ibtehaj *et al*., 2014). Cement and PKP application to the clayey soil led to the exchange of hydrated monovalent cations in the contaminated soil with the divalent cations (such as Ca^{2+} and Mg^{2+}) in the cement. Beetham *et al*. (2014) stated that "the valence of the charge-balancing cations, among several other factors, primarily controls the thickness of the DDL".

Table 2: Chemical Composition of Natural Clayey Soil & Palm Kernel Shell Powder (PKP)

Element	**Natural Clayey Soil**		**PKP**	
	Intensity	**Content**	**Intensity**	**Content**
Mg	0.0000	0.0000	0.0000	0.0000
Al	0.1021	20.5743	0.0052	1.6371
Si	0.2185	25.3131	0.0793	8.1853
P	0.0024	0.1121	0.0049	0.2314
S	0.0061	0.4391	0.0093	0.7147
K	0.0164	1.3291	0.0168	1.3585
Ca	0.0097	0.1776	0.0226	0.4686
Ti	0.0023	0.2721	0.0017	0.1488
V	0.0002	0.0074	0.0002	0.0087
Cr	0.0002	0.0091	0.0002	0.0066
Mn	0.0009	0.0630	0.0009	0.0575
Co	0.0038	0.2380	0.0007	0.0190
Fe	0.1202	11.4953	0.0313	3.0578
Ni	0.0010	0.0565	0.0015	0.0880
Cu	0.0023	0.0611	0.0023	0.0612
Zn	0.0030	0.1021	0.0034	0.1166
As	0.0008	0.0000	0.0004	0.0000
Pb	0.0007	0.0253	0.0003	0.0070
W	0.0000	0.0000	0.0003	0.0705
Au	0.0000	0.0000	0.0000	0.0000
Ag	0.0000	0.0000	0.0001	0.0010
Rb	0.0045	0.0333	0.0026	0.0088
Nb	0.0012	0.0089	0.0045	0.0518
Mo	0.0016	0.2077	0.0030	0.2060
Cd	0.0000	0.0000	0.0000	0.0000
Sn	0.0094	1.8089	0.0099	1.9190
Sb	0.0125	1.5652	0.0130	1.6262

Table 3: Impact on Varying % of PKP and Cement of Atterberg Limit Test

% PKP + % CEM	**Liquid Limit (LL) %**	**Plastic Limit (PL) %**	**Plasticity Index (PI) %**
0 + 0	54.0	32.50	21.50
3 + 1.5	56.0	34.75	21.25
6 + 3	58.0	38.50	19.50
9 + 4.5	62.0	42.70	19.30
12 + 6	63.5	44.75	18.75

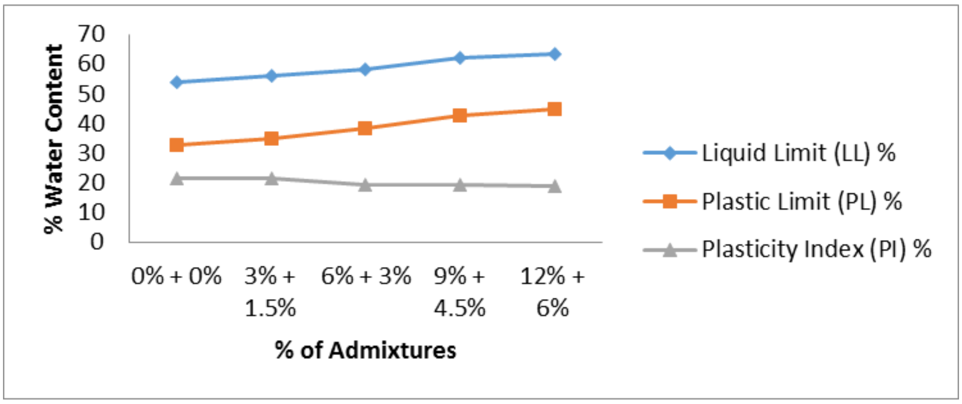


Figure 2: **Variation of LL, PL & PI with varying Percentages of CEM and PKP**

Permeability Test Results: The results obtained from Table 4 shows that the coefficient of permeability decreases as the percentage of admixtures increases, this occurred as result of PKP and cement filled the pore of the clayey soil sample and making it impervious. The present of additives in the soil has change the nature of the soil from semi-pervious (2.244×10^{-5}cm/sec) to impervious (7.89×10^{-5}cm/sec) which can be used in the construction of earth dam. The coefficient of permeability is used to assess drainage characteristics of the soil to predict rate of settlement in the soil bed and as well as soil type. From the result the soil can be classified as very fine sand, organic lots, mixture of sand, silt and clay stratified clay deposit with poor drainage condition (USBR Earth Manual, 1974).

Table 4: Influence of Permeability on Varying % of PKP and Cement on Permeability

% PKP + % CEM	Coefficient of Permeability (k) (cm /sec)	k in Standard Form (cm /sec)
0 + 0	0.00002244	2.244×10^{-5}
3 + 1.5	0.00001632	1.632×10^{-5}
6 + 3	0.00000842	8.420×10^{-6}
9 + 4.5	0.00000789	7.890×10^{-6}
12 + 6	0.00000747	7.470×10^{-6}

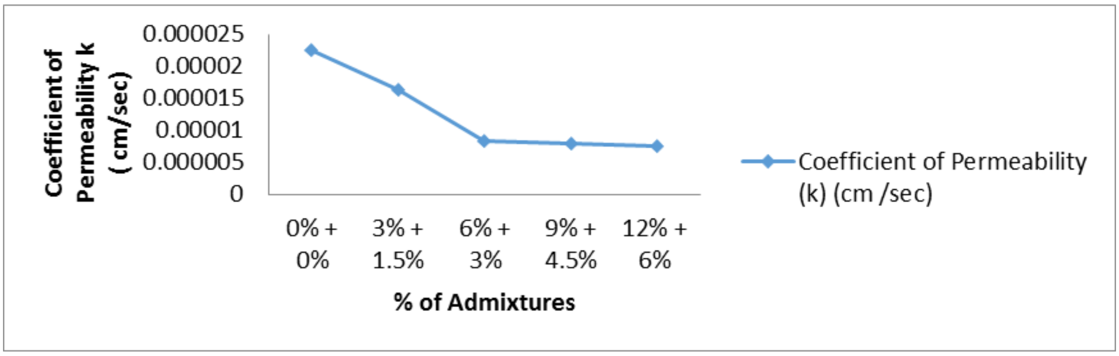


Figure 3: **Graph of influence of varying Percentages of CEM and PKP on Permeability**

Unconfined Compression Strength Test (UCT): The results obtained showed that the UCS, cohesion and angle of shearing resistance values increased with increase in the PKP and cement content. The UCS value of the natural soil sample increased from 197.90KPa to the highest value 254.20KPa which is equivalent to 28.40% increased, cohesion values increased from 41.60KPa to the highest value 56.50KPa which is equivalent to 35.8% increased and the values of angle of shearing resistance values increased from 20.40^{o} to peak value 24.50^{o} which equivalent to 20.1% increased as shown in Table 5 and Figure 4. The increase in the UCS values can be attributed to the ion exchange at the surface of clay particles. The increase in the strength values of the stabilized soil samples were similar to those reported in Amu *et al.* (2005) and Ogunribido (2012), agglomeration of clay particles and the increase in the UCS values was mainly due to the formation of some compounds such as Calcium Silicates Hydrates (CSH) and Calcium Aluminate Hydrates (CAH) and micro fabric changes which are responsible for strength gain, (Sadeeq et al., 2015).

Table 5: Influence of on varying % of PKP and Cement on Shear Strength Properties of Clayey Soil

% PKP + % CEM	Unconfined Compression Strength UCS (KPa)	Cohesion C (KPa)	Angle of Internal Friction (ϕ^o)
0 + 0	197.90	41.60	20.40
3 + 1.5	204.20	43.50	21.40
6 + 3	233.00	46.20	22.70
9 + 4.5	245.02	49.40	23.20
12 + 6	254.20	56.50	24.50

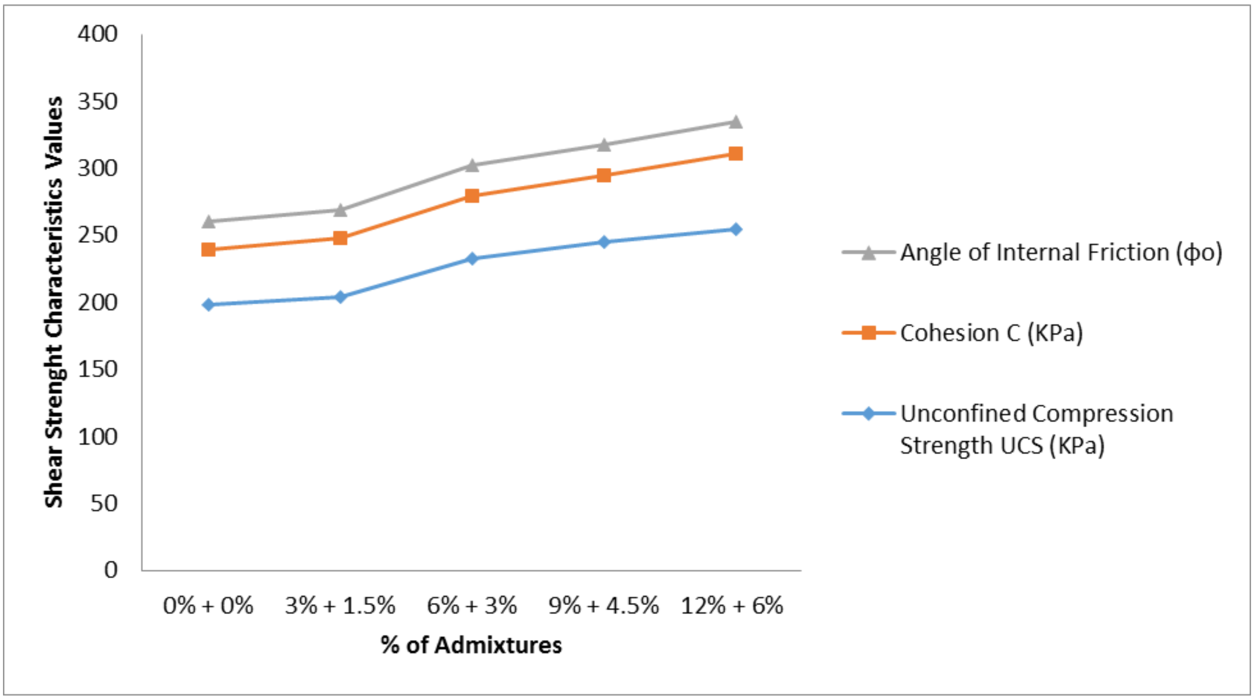


Figure 4: **Graph of influence of varying Percentages of CEM and PKP on UCS, angle of internal friction and cohesion**

Conclusion

This study presented the effect of cement and palm kernel shell powder (PKP) as admixtures on Atterberg limit, unconfined compression strength and permeability of a clayey soil**.** It can be concluded that addition of PKP and cement reduce the swelling characteristic of the clayey soil, it changes permeability property from semi-pervious to impervious which can be used in the construction earth dam, and it increases the strength of the clayey soil by 28.4%. It also improves the soil consistency from stiff to very stiff according to USC table (Sharma, 2015). The soil can be used in the construction of earth dam. Based on the knowledge and experience acquired from the research work, it can be recommended that the percentages of PKP and cement should be swap and the whole tests repeated.

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CASHLESS TRANSACTIONS AND SUSTAINABILITY OF DEPOSIT MONEY BANKS IN NIGERIA IN A POST PANDEMIC ECONOMY

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Abstract

The cashless policy was conceptualized by the apex bank to migrate Nigeria's economy from cash based economy to a cashless one through electronic payment system, not only to enable Nigeria monetary system be in line with international best practices or discourage movement of cash manually, but at the same time increase the proficiency of Nigeria's payment system which will in turn improve the quality of service being offered to the banking public. This study examined the effect of cashless transactions on financial sustainability of Deposit money banks in Nigeria in a post pandemic economy. The study employed secondary data with the use of purposive sampling technique to select ten Deposit money banks operating in Nigeria covering the periods from 2012 to 2018. In light of prior literature, the independent variables are value of transaction of ATM, value of transaction of POS, value of transaction of Internet banking. Result using multiple least square regression with the aid of E-view 10 application exhibited that value of ATM terminals transactions have positive and non-significant effect on Return on Asset, value of POS terminals transaction has positive and significant effect on Return on Asset and internet banking transactions has negative and significant effect on Return on Asset of deposit money banks. Also, value of ATM terminals transactions have positive and significant effect on Return on Equity, value of POS terminals transaction has negative and non-significant effect on Return on Equity and internet banking transactions has positive and significant effect on Return on Equity of deposit money banks. Therefore, this study recommends more *ATM centers/ outlets should be opened in order to enhance the success of the cash less policy. Point of sales (P.O.S) should be encouraged by organizations and other businesses at effectuating business transactions for enhancing sustainability and financial performance of deposit money banks.*

Key Words: Return on Asset, Return on Equity, Financial Performance, Automated teller Machine, Point of sale and Internet banking.

Introduction

Information technology plays an important role in bringing about sustainable development in every nation. Without an optimal use of information technology, no country can attain a speedy social- economic growth and development. The future of all business particularly those in the services industry lies in information technology, in fact, information technology has been changing the ways companies and banks compete.

A cashless economy is an environment in which money is spent without being physically carried from one place to another. Electronic devices as means of information that reveal how much a person has deposited and has spent are needed. The cashless policy was conceptualized by the apex bank to migrate Nigeria's economy from cash based economy to a cashless one through electronic payment system, not only to enable Nigeria monetary system be in line with international best practices or discourage movement of cash manually, but at the same time increase the proficiency of Nigeria's payment system which will in turn improve the quality of service being offered to the banking public.

Cashless economy is an economy where transaction can be done without necessarily carrying physical cash as a means of exchange of transaction but rather with the use of credit or debit card payment for goods and services (Omotunde, et al. 2013). It is assumed that the proper implementation of mobile phones and other technologies can aid the implementation of cashless policy and hence, the growth of cashless economy in Nigeria. Cashless economy aims at reducing the amount of physical cash circulating in the Nigeria economy and thereby encouraging more electronic–based transaction. Cashless economy is not the complete absence of cash, it is an economic setting in which goods and services are bought and paid for through electronic media.

Cashless economy is an economy where the physical cash circulating in the economy is minimized while other forms of payment especially electronic based payments are utilized. In other words, cashless economy is a combination of the cash-based payment system and electronic payment systems with the latter exceeding the former in terms of utilization (Ajayi, 2014). Cash-less banking may be defined as that banking system which aims at reducing, not eliminating the amount of physical cash (notes and coins) circulating in the economy, whilst encouraging more electronic based transactions (payment for goods, services, transfers etc.) (Salihu, 2013).

The banking sector is considered as most important source of economic development of a country. As the time passes the banking industry integration is more towards virtual side, instead of branch banking. The extensive use of internet and information technology, most of the banks are creating innovative solutions that may lead towards branchless and cashless banking. Some of the examples include use of internet banking, POS Transactions and mobile banking. All these innovative options are useful to provide better customer support and reduction in the costs of banking sector for the enhancement of profitability (Kamboh, 2016). The banking industry of Nigeria is revolutionized with the integration of IT to provide innovative solutions for the general public. Due to technological advancement, banking industry is able to attract more and more customers towards cashless banking that reduces the customer traffic towards branch banking. Even in Nigeria, a number of banking customers are using the internet and mobile banking services for sending and receiving payments.

Financial performance is a subjective measure of how well a firm can use assets from its primary mode of business and generate revenues. The term is also used as a general measure of a firm's overall financial health over a given period. Analyst and investors use financial performance to compare similar firms across the same industry or to compare industries or sectors in aggregate
The survival of a bank depends on its financial performance. Financial performance is important for different investors of the company. Researchers have measured financial performance through ROA, ROE, EPS, DPS, market to book ratio etc.

However, not many studies have been done on the profitability of deposit money banks in Nigeria. The fact still remains the reality of using IT in banks is necessitated by the huge amount of information being handled by these banks on a daily basis. The software used by banks is usually renewed on short term basis which incurs huge financial costs on banks. Capital providers expect that they would gain tremendous returns which may accrue from the project as information technology driven by the internet is adopted. Since the introduction of internet banking, Nigerian banks have been forced to invest more in assets in order to meet up its competitive positioning. Many earnings have been retained to meet up with this obligation which led to the denial of dividend for shareholders with expectation that the future dividend will be fatter.

Statement of the Problem

The widespread availability of internet banking is expected to affect the mixture of financial services produced by these banks. In addition, industry analysis outlining the potential impact of internet banking on cost savings, revenue growth and risk profile of the banks have also generated considerable interest and speculation about the impact of the information technology on the banking industry.

However the fact that internet banking is fast gaining acceptance in Nigerian banking sector does not assuredly signify improved banks performance nor would conspicuous use of internet as a delivery channel make it economically viable, productive or profitable.

In line with the above, the study tend to look into the problems with the following objectives:

To ascertain the effect of the Cashless Policy on the financial Performance of Deposit Money Banks in Nigeria. The specific objectives are to:

1. Determine the effect of cashless transactions on the return on asset of Deposit Money Banks in Nigeria
2. To ascertain the effect of cashless transaction on return on equity of deposit money banks in Nigeria?

Literature review

Concepts of Financial Performance (Return on Asset, Return on Equity)

According to Al-Hussein et al. (2009), financial performance is explained as the degree to which financial objectives are being or has been accomplished. It is the process of measuring the results of a firm's policies and operations in monetary terms. It is used to measure firm's overall financial health over a given period of time and can also be used to compare similar firms across the same industry or to compare industries or sectors in aggregation. Gilbert, Meyer and Vaughan (2000) also is of the opinion that financial performance is a subjective measure of how well a firm can use assets from its primary mode of business and generate revenues. This term is also used as a general measure of a firm's overall financial health over a given period of time, and can be used to compare similar firms across the same industry or to compare industries or sectors in aggregation.

Abaenewe, Ogbulu, and Ndugbu (2002) proxied financial performance using return on asset (ROA) and return on equity (ROE). However, it is pertinent to note that firms' profitability is not the only performance measure of an organization. Ibukunle and James (2012); Olorunsegun (2010) and some other researchers have measured performance in a different perspective like productivity, increase in sales, cost reduction, competitiveness, efficiency, and effectiveness.

A commonly used measure of bank financial performance is the level of bank profits (Ceylan, et.al 2008). Bank profitability can be measured by the return on a bank's assets (ROA), a ratio of a bank's profits to its total assets. In other words, the income statements of deposit money banks' profits report before and after taxes. Another good measure on bank performance is the ratio of pre-tax profits to equity (ROE) rather than total assets since banks with higher equity ratio should also have a higher return on assets (Ceylan, et.al 2008).

Bank Financial performance has often been measured using return on asset (ROA) and profit before tax. Return on asset is defined as net income before tax divided by total assets. This ratio is an indicator of managerial efficiency; it indicates how capable the management of the bank's assets is to net earnings (Adegbaju, 2008). Abaenewe, Ogbulu, and Ndugbu (2002) proxied financial performance using return on asset (ROA) and return on equity (ROE). However, it is pertinent to note that firms' profitability is not the only performance measure of an organization.

Emekekwue (2008) sees the return on assets (ROA) as a ratio that seeks to measure the amount of profit made from the entire assets of the firm. It is expressed as Profit after tax divided by Total Assets. Ekwe and Duru (2012) opine that return on assets (ROA) was used as dependent variables because it is an indicator of managerial efficacy. It is the quotient of dividing profit after tax by total assets. According to Ross et al., (2006) return on asset (ROA) is a comprehensive measure of overall bank performance from an accounting perspective. It is a primary indicator of managerial efficiency. It indicates how capable the management of the bank has been converting the bank's assets into net earnings.

Return on Equity also known as; Return on Net worth, measures how effectively a company has used the owner's resources (Anyanwuokoro, 2008). It is used as a measure of performance or profitability of the deposit money banks in the study. Return on equity is described in the study as:

ROE = Profit after tax ÷ Shareholders fund or Profit after tax ÷ Total equity. According to Sofyan (2001), return on equity (ROE) is a ratio that shows what percentage of Net income is earned when measured from the owner's capital. The higher the profits Generated by the company, the higher the return will be generated company. A high corporate Return will cause its stock price to move up, so investors will buy more of the company's Stock. Return on equity ratio (ROE) is treated as an important measure of a company's earnings performance. The ROE tells common shareholders how effectively their money is being employed. With it, one can determine whether a firm is a profit-creator or a profit-burner and management's profit-earnings efficiency.

According to Tan et al. (2012), Return on Equity (ROE) is more concerned about how much the bank is earning on their equity investment, the net income per birr of equity capital. The amount of net income returned as a percentage of shareholders equity. It measures how efficiently a bank can use the money from shareholders to generate profits and grow. Unlike return on Assets ratios, ROE is a profitability ratio from the investor's point of view. This ratio calculates how much Investment is made based on the investors' investment in the bank, not the company's investment in assets or something else. Return on equity is the return to shareholders on their equity. This means that, return on equity reflects the capability of a bank in utilizing its equity to generate profits

According to Dietrich et al. (2009), banks with a lower leverage ratio (higher equity) report a higher ROA, but a lower ROE. However, the ROE disregards the higher risk that is associated with a higher leverage. Even if ROE is commonly used in different studies, it is not the best measure of profitability (Ghazouani et al.2013). (Rose and Hudgins, 2006), ROE measures accounting profitability from shareholder's perspective that illustrates the rate of return flowing to the banks' shareholders. It approximates the net benefit that the stockholders have received from investing their capital Simply stated much of the current performance literature describes the objective of financial organizations as that of earning acceptable returns and minimizing the risks taken to earn this return.

Concept of Cashless Policy

Nelson (2015) noted that a cashless economy is an environment in which money is spent without being physically carried from one place to another. Electronic devices as means of information that reveal how much a person has deposited and has spent are needed. Acha et al (2016) Information technology plays an important role in bringing about sustainable development in every nation. Without an optimal use of information technology, no country can attain a speedy social- economic growth and development. The future of all business particularly those in the services industry lie in information technology. In fact, information technology has been changing the ways companies and banks compete.

According to Morufu and Taibat (2015), Cashless policy is defined as "one in which there are assumed to be no transaction frictions that can be reduced through the use of money balances, and that accordingly provide a reason for holding such balances even when they earn rate of return". Onoh (2017) expressed the difficulty in rightly defining the electronic money but agree that it blends technological and economic characteristics. Daisi (2016) emphasized that Cashless policy does not mean a total elimination of cash, as money will continue to be a means of exchange for goods and services in the foreseeable future. It is a financial environment that minimizes the use of physical cash by providing alternative channels for making payments. Contrary to what is suggestive of the term, cashless economy does not refer to an outright absence of cash transactions in the economic setting, but one which the amount of cash-based transactions are reduced to the barest minimum(Wali,2013)

Cashless banking is that banking system aimed at reducing, but not eliminating, the volume of physical cash circulating in the economy whilst encouraging more electronic based transactions. In other words, it is a combination of e-banking and cash-based system (Odior and Banuso, 2012). Ejiofor and Rosak (2013) see the cashless system as one with the ability to store money in an electronic purse on a card which is then used to purchase product at vending machine or at any point of sales terminal located within the business premises. Akhalumeh and Ohiokha (2012) see cashless economy as a system in which transactions are not done predominantly in exchange for actual cash. It is essentially a mobile payment system which allows users to make payment through GSM phones with or without internet facilities. This system increases convenience, create more service options, reduce cost of cash related crimes and provide cheaper access to credit (Okey, 2012; Obina, 2013).

Automated Teller Machine (ATM)

The automated teller machine (ATM), also regarded as automated banking machine (ABM) or cash machine (CM) and by several other names, is a computerized technology infrastructure that provides clients of financial institutions with access to financial transactions in a public space without the need for human personnel. Characteristically, a user inserts into the device a special plastic card that is encoded with information on a magnetic strip. The strip contains an identification code that is transmitted to the bank's central computer by modem. To prevent unauthorized transactions, a personal identification number (PIN) must also be keyed in by the user with the aid of a keypad. However, after this operation, the computer permits the machine to complete the transaction (Okwute, 2007; Solomon and Ajagbe, 2014; Anup, 1997). Okon and Amaegberi (2018) Automated Teller Machine (ATM): These are computer enhanced telecommunication machines that permit bank customers to have accessibility cash and perform financial transactions, usually situated in public places and in the enclosure of banks

Rose (1999) describes ATMs as follows: it combines a computer terminal, recordkeeping system and cash vault in one unit, permitting customers to enter the bank's book keeping system with a plastic card containing a Personal Identification Number (PIN) or by punching a special code number into the computer terminal linked to the bank's computerized records, 24 hours a day". Once access is gained, it offers several retail banking services to customers. They are mostly located outside of banks, and are also found at airports, malls, and places far away from the home bank of customers. At the outset they were function as cash dispensing machines.

However, because of the advancement of technology, ATMs are able to provide a wide range of services, such as making deposits, funds transfer between two or more accounts and bill payments. The primary advantages of ATMs are they save the customer's time in service delivery and it is cost efficient way of yielding higher productivity per period of time than human tellers. Furthermore, as the ATMs continue when human tellers stop, therefore, there is continual productivity for the banks even after banking hours. Okafor (2008), described the ATM as an electronic device which allows a financial institution's customer to use a secured method of communication to access their accounts, make cash withdrawals or cash advances using credit cards and checking their account balances without need for human Teller or Cashier.

Point of Sale (POS) machine

Okon and Amaegberi (2018), POS terminal is a machine used to accept cards for payment of goods and services. POS terminal allows a cardholder to have a real-time online access to funds and information in his/her bank account through debit or cash cards. POS system can include the ability to record and track customer orders, process credit and debit cards, connect to other systems in a network, and manage inventory. Point of sale terminal is represented in this study by value of point of sale transactions. According to (Mutuola et al, 2019) Point of Sales (POS) machine or terminal is an electronic device used in payment for goods and services. You find it in supermarkets, hotels, filling stations, shops etc. A charge known as Merchant Service Charge (MSC) is charged on all transactions done on POS terminals, this charge is borne by the merchant.

Electronic point of sales (EPOS) electronic payment system is user friendly simple multi-functional equipment with many possibilities of use. It enables the operators to administer payments by the customer in a simple way and subsequently to record the payments for clear accounting purposes. Evidences from the literature show that 28 billion transactions are made using dial-up POS systems in North America. Also in the United States, there are 10 million Payment terminals; over 60% currently dial-up terminals (Sumanjeet, 2009).

According to Dieterich (2014), POS covers a variety of services rendered through machines located at retail establishments. POS terminals are generally clerk generated devices located at the checkout or convenience counter or retail establishment. Electronic cash register versions of these terminals have been in operation for several years, maintaining store records on sales, inventories, accounts receivable and the like. Now, POS devices have been linked to financial institution computers, allowing retail customers to receive approval for check cashing and electronically initiate transfers from their accounts to the retailer's.

Internet Banking

Internet banking is a new age banking concept. It uses technology and brings the bank closer to the customer. Internet banking refers to systems that enable bank customers to get access to their accounts and general information on bank products and services through the use of banks website, without the intervention or inconvenience of sending letters, faxes, original signatures and telephone confirmations (Thulani et al, 2009).

Internet Banking is an electronic payment system that enables customers of a bank or other financial institution to conduct a range of financial transactions through the financial institution's website via electronic devices like mobile phones, IPad, laptops, Desktops etc. right at the comfort of their homes, offices and other places of convenience. In Siyanbola, (2013) internet banking, uses the electronic card infrastructure for executing payment instructions and final settlement of goods and services over the internet between the merchant and the customers). Internet banking gives customers the opportunity of enjoying banking services from the comfort of their homes and offices.

The E-payments channels are the apparatus used to safely and efficiently transfer monetary value in exchange for goods and services as well as financial assets (Akara and Asekome 2018). According to Atteh (2012), payment systems are related collection of structure of instruments for settling payments and transactions or part thereof. Although the system work together but each of the instruments share attributes of being exchangeable with one another through substitution and Convertibility mechanisms.

Tijani and Ilugbemi (2015) observed that payment systems are accessible and can be measured in terms of their reliability, transaction costs and risks. The reliability of payment system can be increased if all factors surrounding the efficiency of the electronic payments could be upgraded to prevent system breakdown and area of financial risks which may arise in form of liquidity risk, credit risk and systematic risk. The internet is an innovative form of information technology, yet most commercial web sites function as well-defined information systems. The internet banking, compared to traditional banking system, heavily involves no-human interactions between customers and online bank information systems. This means that the satisfactory delivery of service not only rely on the traditional service quality identified in existing literature but also on a reliable online system to provide a comfortable end-user computing environment. Internet banking as a key component of e-finance has gained research attention. The emerging trend in Internet banking in Nigeria is of global concern.

Methodology

Data Presentation and Analysis.

The study adopted *ex-post facto* research design to source requisite information from the financial statements of the selected Deposit Money Banks. An *ex-post Facto* research design is a systematic empirical inquiry that requires the use of variables which the researcher does not have the capacity to change its state or direction in the course of the exercise (Kerlinger,1973 & Onwumere,2009). The ex-post-facto research design is used because the data are already documented by reputable institutions like the World Bank, International Monetary Fund (IMF), Central Bank of Nigeria (CBN) and National Bureau of Statistics. Thus, researchers adapt and rely on such official publications for valid and reliable academic exercise.

The population for this study comprise of all Listed Deposit Money Banks in Nigeria which are Twenty one Banks (21) and out of which Fifteen Banks (15) are quoted presently at the Nigeria Stock Exchange. Purposive sampling techniques was adopted for this study where 10 banks was purposively selected. However, the financial statements of these Deposit Money banks covering a period of 7 years (2012-2018) was used for the purpose of this study. The period was chosen as the cashless policy took effect in Nigeria in 2012.

This study made use of secondary data as the main source of information and was sourced from the annual report and accounts of the banks and data from CBN payment statistics from 2012 to 2018. Base on this study, the researcher used the Regression Analysis method to analyze its data. However, Multiple Least Square technique was adopted for this purpose.

Model Specification

$Y= f(X)$

$Y= f(x_1, x_2, x_3)$

$ROA= f\,(ATM, POS, IB)$

$ROE= f\,(ATM,POS,IB)$

$ROA= \sum\beta_0 +\beta_1\, ATM +\beta_2 POS + \beta_3 IB + \mu$……………………………………………(i)

$ROE= \sum\gamma_0 + \gamma_1 ATM + \gamma_2 POS + \gamma_3 IB + \mu$ ……………………………………………(ii)

Where,
ROA: Return on Asset
ROE: Return on Equity
ATM: Automated Teller Machine
POS: Point of Sale Machine
IB: Internet Banking.
μ: Error term

Measurement of Variables

Variables	Description	Measurements
ROA	Return on Assets	$\frac{Net\ Profit}{Total\ Asset}$
ROE	Return on Equity	$\frac{Net\ Profit}{Shareholders\ Equity}$

***A Priori* Expectations**

It was expected that Cashless policy will have positive impact on Return on asset. It was also expected that Cashless policy will have a positive impact on Return on Equity of Deposit Money Banks in Nigeria.

Dependent Variables	Independent Variables	*A Priori* Expectations
RETURN ON ASSET	ATM, POS, IB	+ (Positive)
RETURN ON EQUITY	ATM, POS, IB	+ (Positive)

Data Analysis and Result

Ordinary Least Square Regression Analysis

The Ordinary Least Square (OLS) technique was used to estimate the link cashless variables and bank financial performance indicators, using multiple regression models. The OLS enabled us to estimate their individual variables coefficients, coefficient of determination (R^2), t-statistic, f-statistic (and their respective probabilities), and the Durbin Watson statistic, Which enables the study to make inferences and evaluate the significance of the estimated parameters of the regression model, and also test the hypotheses formulated?

Restatement of hypothesis 1 (H_{01}): There is no significant relationship between cashless policy and return on asset of deposit money banks in Nigeria

Table 1

Dependent Variable: ROA
Method: Least Squares
Date: 15/10/20 Time: 15:26
Sample: 2012 2018
Included observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.190841	0.121001	1.577185	0.2129
ATM	4.61E-14	3.55E-14	1.298933	0.2848
POS	2.73E-12	2.28E-13	11.96194	0.0013
IB	-8.86E-12	1.16E-12	-7.616580	0.0047

R-squared	0.999346	Mean dependent var	1.318860
Adjusted R-squared	0.998692	S.D. dependent var	1.256406
S.E. of regression	0.045447	Akaike info criterion	-3.048983
Sum squared resid	0.006196	Schwarz criterion	-3.079892
Log likelihood	14.67144	Hannan-Quinn criter.	-3.431006
F-statistic	1527.554	Durbin-Watson stat	2.154098
Prob(F-statistic)	0.000028		

The result in Table 1 showed that Automated teller machine has a positive effect on return on asset which is in line with ***Apriori Expectation*** indicating that an additional increase in Value of ATM transactions would result in increase in return on asset by 4.61. However, it is not significant since $p<0.05$. That is at 0.05 significance level. The R-square values of the model was 0.999346 the result indicates that about 99.93 % of the variability in the dependent variable (Return on Asset) is explained by the independent variables used in the model. The remaining 0.14% of the variability in the dependent variable is left unexplained by the explanatory variables used in the study due to stochastic error term. Furthermore, the F-statistic was 1527.554 and the probability of not rejecting the null hypothesis that there is no statistically significant relationship existing between the dependent variable (ROA) and the independent variables, is 0.0000 indicates that the overall model is highly significant at 5% and that all the independent variables are jointly significant in causing variation in return on asset. Even though probability value is insignificant at 5% the researcher failed to reject the null hypothesis that value or price of transaction of ATM has a positive role on return on asset. This means, there is no sufficient evidence to reject the null hypothesis. The relationship is positive as expected and this positive relationship between value of transaction of ATM and return on asset could be attributed to the fact that more transaction of ATM tend to move return on asset. This finding is similar to the finding of (Hamed et al., 2016) Price of transaction of ATM studied as independent variable the results of study showed that the effect of price of ATM of selected banks is positive role on return on asset. The possible reasons are increasing in amount of ATM transaction executed the more commission will generated by deposit money banks.

The table1 also presented that, the coefficient of value of transaction of POS (VPOS) measured by ROA is 2.73 and its P-value is 0.0013.Holding other independent variables constant at their average value, when value of transaction executed by POS (VPOS) increased by one percent, return on asset (ROA) of sampled deposit money banks will increase by 2.73 percent and statistically significant at 5% level of significance this is also in line with the ***A priori***

Expectation. Also the coefficient of value of transaction of IB (VIB) measured by ROA is -8.86 and its P-value is 0.0047. Holding other independent variables constant at their average value, when value of transaction executed by IB (VIB) increased by one percent, return on asset (ROA) of sampled deposit money banks will be reducing by -8.86 percent and statistically significant at 5% level of significance this is contrary to the ***A priori* Expectation** this findings is similar to (Oladejo, 2016) that showed that there is significant negative effect of Internet banking services on the profitability of deposit money banks in terms of ROA.

Restatement of hypothesis 2 (H_{02}): There is no significant relationship between cashless policy and return on equity of deposit money banks in Nigeria

Table 2

Dependent Variable: ROE
Method: Least Squares
Date: 10/15/20 Time: 15:21
Sample: 2012 2018
Included observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.116542	0.329195	-0.354022	0.7467
ATM	3.29E-13	9.65E-14	3.414599	0.0420
POS	-5.87E-13	6.20E-13	-0.946893	0.4135
IB	8.07E-12	3.16E-12	2.551737	0.0838

R-squared	0.993196	Mean dependent var	1.964386
Adjusted R-squared	0.986392	S.D. dependent var	1.059904
S.E. of regression	0.123643	Akaike info criterion	-1.047284
Sum squared resid	0.045862	Schwarz criterion	-1.078192
Log likelihood	7.665492	Hannan-Quinn criter.	-1.429307
F-statistic	145.9692	Durbin-Watson stat	2.736710
Prob(F-statistic)	0.000951		

***Source*:** Author's Computation, 2020 using E-view version 10. Note: return on equity = ROE (dependent Variable), Automated teller machine = ATM, point of sale = POS, Internet banking = IB

The regression result in Table 2 above shows that there is a statistically significant positive relationship between ATM transactions and the return on equity of deposit money banks in Nigeria. This result implies that increased use of ATMs will lead to increase in the return on equity by 3.29. Furthermore, the result indicates that there is a negative and statistically non-significant relationship between (POS) transactions and the return on equity of deposit money banks; this indicates that an increase in the use of POS will lead to reduction on ROE of deposit money banks by

5.87. However, Internet banking (IB) transactions had a positive and statistically relationship with the return on equity of deposit money banks in Nigeria at 10 percent level of significant. This finding implies that increase in the implementation of internet banking will lead to increase in the return on equity of deposit money banks by 8.07. However, the coefficient of determination ($R^2 = 0.993196$) indicates that about 99% of the variations in deposit money banks profitability can be explained by changes in cashless variables (ATM, POS, MB) in Nigeria. This implies that a significant portion of deposit money banks performance is explained by cashless policy variables while the remaining 0.006804 were explained by other variables not included in the model. The F-Statistics of (145.9692) which is significant at 5% confirms the impact of cashless policy on deposit money banks performance in Nigeria; for the period 2012-2018 showing the overall significant of the model. The influence of the explanatory variables on the dependent variable is statistically significant and this is also confirmed by the F-probability which is statistically significant at 0.05 significance level.

Conclusion

The use of mobile banking is wide spread in banks and most financial institutions nowadays. The internet has really changed the dimensions of competition in the retail banking sector. New distributive channels used in rendering services to customers are being achieved. Bankers and banks customers have adopted mobile banking because of acceptance of the new innovative information technology of which customers in Nigeria are not exempted. The notion that mobile banking would significantly impact return on asset and return on equity (profitability) has been established in this study which means that cashless policy is an integral part of the participating banks business strategies to make profits. The adoption of cashless policy will impact positively on banks' profits and would be a resilience and sustainability factors in a post pandemic economy.

The result shows that ATM, POS, and internet banking all exhibit a strong relationship with the dependent variable. It therefore implies that cashless policy is strongly and significantly correlated with bank financial performance in Nigeria and would be a sustainable factors in a post pandemic economy.

Recommendation

With reference to the finding of the study, the researchers recommends the following:

- More ATM centers/ outlets should be opened in order to enhance the success of the cash less policy. This is suggested in that ATM contributes positively to the success of the cashless policy and income generation, consequently the financial performance of the banks in the Nigerian banking sector in a post pandemic economy.

- Point of sales (P.O.S) should be encouraged by organizations and other businesses at effectuating business transactions as this would enhance its contribution to the cash less policy in Nigeria.

- The monetary authorities should create and enlighten their customers on the convenience and importance of internet banking channel in completing their transaction to enhance performance in a post pandemic economy.

More ATM centers/ outlets should be opened in order to enhance the success of the cash less policy. Point of sales (P.O.S) should be encouraged by organizations and other businesses at effectuating business transactions

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LANGUAGE AND HEALTH: A SYNTACTICO-PRAGMATIC EVALUATION OF NIGERIAN COVID-19 EXPRESSIONS

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Abstract

Language is the hub on which human activities revolve. Its presence in human beings distinguishes human beings from other beings. Thus, this area of unique dichotomy of human beings from others is mostly experienced when it comes to employment of language for critical reasoning. That is what has shown during this time of pandemic. A lot of expressions has been used to explain, describe, expose and define the spate of and pang of the pandemic, that has come to ravage the entire world population. This paper takes a cursory look at these expressions with a view to analyzing and examining how they curtail and contain the pandemic. The paper relies on secondary data by analyzing, syntactico-pragmatically, expressions made by the government(s), the health workers and the individuals on some selected Nigerian newspapers and other news media in a bid to interrogate the debilitating effects of the pandemic on people the world over. The paper concludes that the pandemic has a lot to tell about the economic, political, religious, educational and social life of not only Nigerians, but of the world at large.

Key Words: Language, COVID-19, Pandemic, Health and Syntactico-pragmatics

INTRODUCTION

Language plays a very important role in human lives. It is a social phenomenon that we use to communicate among ourselves. When someone speaks, he intends a specific purpose. He wants to convey a message through that language. But among all beings, only the human beings have a monopolistic advantage of using language. That is why the 'uniqueness quality' of all human languages is substantiated and maintained. For an effective coexistence of human beings in a modern society, one or more languages must be in operation.

That was what interplayed during the time of the pronounced pandemic in Nigeria, when the Nigerian official language, English was employed to serve as a tool of dashing out the COVID-19 preventive guidelines/expressions, in a bid to combat the worldwide pandemic. The syntactico-pragmatic evaluation of these expressions remains the crux of this paper. Before that is done and in order to have the background knowledge about the paper, the next segment deals with the conceptual explanation and exposition of the keywords.

REVIEW OF RELATED LITERATURE

Language is a system of conventional or written symbols by means of which human beings as members of social groups and participants in its culture, communicate. In other words, it is a system of communication of which human beings express themselves. Thus, it is a system of communication or arbitrary vocal sounds by means of which human beings are used to communicate and interact with each other in their everyday's life. According to Lyons (2018), languages are the principal systems of communication used by particular groups of human beings within the particular society of which they are members. Especially Lyons points out that, language is the best communicative system of human beings by particular social groups.

COVID-19 (Coronavirus Disease 2019) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. This disease is a notorious one as the world in general battles with it.

Also, what do we mean by **Pandemic**? A pandemic is defined as an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people. This has to do with the health condition of people. By **health** we mean a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.

Syntax is the part of linguistics that studies the structure and formation of sentences. It explains how words and phrases are arranged to form correct sentences. A sentence could make no sense and still be correct from the syntax point of view as long as words are in their appropriate spots and agree with each other. Structurally, sentences can be organized into six groups: simple, compound, complex, compound-complex, multiple and multiple-complex sentences. And functionally too, sentences can be declarative, imperative, interrogative and exclamatory in nature. What classifies each sentence is the number of main ideas or complete thoughts they contain. A complete thought is also called an **independent clause**. It is a sentence with at least one subject and one verb that can exist on its own and conveys a clear message. If a sentence sounds unfinished and unclear, then it is a **dependent clause**: It has a subject and a verb but does not express a complete thought. In this case, it needs to be combined with an independent clause to create a clear sentence.

Pragmatics is a subfield of *linguistics* and semiotics that studies how context contributes to *meaning*. *Pragmatics* encompasses speech act theory, conversational implicature, talk in interaction and other approaches to language behavior in philosophy, sociology, *linguistics* and anthropology. Pragmatics is a branch of linguistics concerned with the use of language in social contexts and the ways people produce and comprehend meanings through language (Richard, 2019).

The combination of the fields of syntax and the field of pragmatics brings about the **syntactico-pragmatics** which means getting the messages of well formed expressions by considering a contextual representation of the factors that surround their formations. Earlier, writers have deeply talked much about the use of language during COVID-19 era. Digan (2020) talks on *Natural language processing for rapid response to emergent diseases: Case study of calcium channel blockers and hypertension in the COVID-19 pandemic*. He concludes that Natural language processing pipeline can be adapted quickly to the domain of a novel disease, as that can perform well enough to extract useful information, and when that information is used to supplement the structured data that is already available, the sample size can be increased sufficiently to see treatment effects that were not previously statistically detectable.

Also, Thelwall (2020) discusses *COVID-19 tweeting in English: Gender differences* and comes to the conclusion that females are more likely to tweet about the virus in the context of family, social distancing and healthcare, whereas males are more likely to tweet about sports cancellations, the global spread of the virus and political reactions. Thus, women seem to be taking a disproportionate share of the responsibility for directly keeping the population safe. In addition, Zhang (2020) works on *Linguistic diversity in a time of crisis: Language challenges of the COVID-19 pandemic*. He makes readers realize that to have an impact, linguists need to be less afraid to get our theoretical hands dirty and there will be need to engage with diverse social actors in a variety of networks to be better prepared for the next round of multilingual crisis communication. This paper seems different, in that it discusses the syntactico-pragmatic evaluation of Nigerian COVID-19 expressions. But before moving to the analysis per sa, the method employed in carrying out the research is imperative.

METHODOLOGY

As this paper deals with language, the expressions from the Government, the health workers and Nigerians individuals, made during COVID-19 pandemic, serve as secondary data. Three expressions each are selected from the various expressions made by the different parties. And each of these expressions is subjected into syntactic and pragmatic examination for a better outcome. The next item of the paper explains how the analysis goes.

ANALYSIS

Below are the different types of sentences according to structured used by Nigerian government, the health worker and the Nigerian individuals for proper analysis.

a) **From the Government**

Address of Mr. President on 27th April, 2020:

i. *The health system and economics of many nations continue to struggle as a result of the Coronavirus pandemic.*
ii. *Nigeria continues to adapt to these new global realities on a daily basis.*
iii. *Over 10,000 healthcare workers have been trained.*
iv. *We have also procured insurance cover for 5,000 frontline health workers.*
v. *This is our collective loss and we share your grief.*

Syntactic evaluation

The above sentences from the speech of Mr. President on COVID-19 pandemic issue have arrays of functional and structural sentence classification.
The sentences functionally are declarative sentences. This is because of the fact that the sentences originated from the government. And government always issues directives, being the head of a nation. Mr. President gives current and relevant information, shows the next line of action in a bid to combat the novel Coronavirus, and enjoy the general populace to cooperate effectively in order to put an end to the pandemic.

Pragmatic Relevance

The linguistic context of the sentences above shows that the speaker is a superior fellow that supervises, directs and oversees the affair of a people, most especially at the time of critical needs.

b) **From the Health Workers**

The directives given by the health workers in the Nation news paper on Wednesday 8th April, 2020:

i. *Nigerians should stop the spread of COVID-19.*
ii. *Wash your hands regularly with soap and water.*
iii. *Always use hand sanitizers.*
iv. *Cover your mouth and nose when coughing or sneezing*
v. *Avoid close contact and stay at home* (p.8)

Syntactic Evaluation

Only the first sentence in the above statements is declarative. The remaining four are imperative in nature, meaning they are used to give directive or command. Being the health personnel that oversee a good and healthy-driving society, directives have to be given for the people to be guided and to be possibly prepared for and prevented from any possible outbreak of the Coronavirus. In the expression, the health workers use declarative statement so as to familiarize Nigerians to the directives they intend to make.

Pragmatic Relevance

Health workers in any nation are known to be issuers of directives and guidelines for better living. The linguistic context from the above sentences depicts that of professionalism, for it is not legal or modern for anybody or group to issue out directives like this without an official professional justification, most often when the society is galloping of COVID-19 which has resulted into an unwarranted pandemic.

c) **From the Nigerian individual**

Statements made by Wabba in the Nation news paper on 5th April, 2020:

i. *Health workers should be supported.*
ii. *They should be given preventive kits like face masks, hand gloves, sanitizers, etc.*
iii. *They must not be allowed to over stretch themselves.*

iv. *We posit that shorter shift regimen would be of utmost advantages at this time.*

v. *No stone should be left unturned in combating this clear and existential danger.*

(p.22)

Syntactic Evaluation

All the above sentences are declarations, i.e, they belong to declarative sentences. They are used by the writer to express ordinary statements of intention. This is so because the user is not unaware of the deadly pandemic. And that to show his personal and national concern about the notorious COVID-19, he comes up with the expressions. The functionality of the expressions rests much on health workers' consideration as they are the custodians of the remedies to the burning pandemic. He concludes his statement by sorting for the cooperation of all and sundry towards finding a lasting solution to the prevailing pandemic.

Pragmatic Relevance

The linguistic context shows a kind of concern, support and cooperation. So, the context is friendly towards targeting quick and possible solution to the unwanted pandemic.

ANALYTICAL EVALUATION

From the analysis, one can deduce the fact that there are neither the interrogative sentences none exclamatory sentences in the gathered data. This is so because the situation at hand transcend that of interrogation and expression of emotional feelings, but that of putting words into action par sa. Also the three categories of stakeholders (Government, Health worker and individual) that have come up with varied statements in a bid to proffer lasting solution to the COVID-19 pandemic work in unison.

This is testified to by the samples of the statements gathered from the three angles. In fact, all tend to abruptly arrest the bad situation by all means. This attempt might not have been envisaged or exhibited if language has not been given a cardinal role to play in curbing the pandemic.

CONCLUSION

As it is generally believed, the case of COVID-19 has gone beyond ordinary, but notorious in nature, for the world at large keeps talking about, not only because it is the only worldwide disease, but due to its fast and devastating result in the body of the affected. On this note, its yet-to-stop negative effect on our political, social, economic, cultural, religious and educational life cannot be over-emphasized, because without the sound health, all other activities paralyze.

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CULTURAL AND RELIGIOUS LANGUAGE USE: INSTRUMENTS FOR CULTAILING PANDEMICS

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Abstract

Language, being a learned, shared and arbitrary system of vocal symbols through which human beings in the same speech community communicate and hence interact, is generally attached to culture, for one is the product of the other. That is why both are symmetry. Apart from the affinity of language to culture, religious activities like preaching, prayer, admonitions and other different categories of worship can only be effectively conducted via language. It is because of these unique qualities of language that this paper takes a critical look at the indispensability of language use along cultural and religious lines, most especially in Yoruba context. Few popular Yoruba poems and various verses of Quran and Bible are semantically examined in order to fix out their relevance in ameliorating the pandemic condition that the world is battling with presently. The paper concludes that the use of language along culture and religion will not only put an end to this notorious pandemic, but will resolve other unwanted health crisis in our society.

Keywords: *Language, Religion, Culture, Health and Pandemic*.

INTRODUCTION

In the olden and the present traditional and modern African societies, proverbs and wise sayings are generally adopted as the quintessence in the passage and communication of ideas and ethics relating to good health, among both the old and the young. In fact, a situation is best explained where a speaker encapsulates his thoughts in a suitable and appropriate proverb and wise saying to represent the burning occurrences.

Language is not only the driver of these proverbs and wise sayings, but the instrument of cultural and religious promotion and advancement. That is why some people believe it is the only inexcusable tool that maintain, retain and sustain both cultural and religious teachings. Even at this time of pandemic, the efficacy of language use along cultural and religious lines can never be overestimated, for both culture (i.e Yoruba culture) and religions have a way of resolving some cases of pandemic if full annexed. That forms the crux of this paper; the cultural and religious use of language to curtail pandemic.

CONCEPTUAL EXPLANATION OF TERMS

For a better understanding of the topic, some key words have to be operationalized. What is **language**? Okesipe and Okolo (2013) aver that 'language is a system of sigh and symbols through which a speech community communicates'. Kristianse (2003), in his own definition of language says 'language is a marker of identity, including dress, dance, song, property and manners'. But for the purpose of this paper, Yoruba language is our concern. **Religion** is the belief which sets what is essential in all adoration of God in human morality... Religion is the law in us, in so far as it obtains emphasis from a law given and judge over us. It is a morality, directed to the recognition of God. In this modern time, two religions are mostly recognized; Christianity and Islam.

Culture means a set of shared attitudes, values, goals, and practices that characterize an institution or organization or a corporate. It is a set of values, conventions or social practices associated with a particular field, activity, or societal characteristics. **It serves as** the integrated pattern of human knowledge, belief, and behavior that depends upon the capacity for learning and transmitting knowledge to succeeding generations. **Health** means a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. While **Pandemic** represents an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people. This has to do with the health condition of people. For the purpose of this paper, there are lots by which Yoruba culture and both religions can do to put an abrupt stop to the pandemic that has eaten deep into the fabric of our entire life globally. This is very possible as many frantic efforts have been made to resolve the incidences of the pandemic, but to no avail. The possibility is higher that cultural and religious use of language can proffer a better solution to the notorious pandemic. The analysis below gives us a hitch to the solution of the pandemic. But before the analysis, the method adopted in the paper needs to be exposed so as to ensure a smooth tackling of the problem.

METHOD OF THE ANALYSIS

This paper got data from secondary source; the popular Yoruba poems and sayings from Quran and Bible. Thereafter, semantic interpretation was applied to critically know the import of these writings on the pandemic. To recap, the verses from the Quran and Bible, and the Yoruba cultural poems are analyzed as below.

ANALYSIS

From Yoruba

i. *Imototo lo le segun arun gbogbo*
Imototo ile, imototo ara
Imototo lo le segun arun gbogbo

It is cleanliness that can combat all ailments
Cleanliness of the house, cleanliness of the bodybd
It is cleanliness that can combat all ailments.

ii. *Imototo b'ori arun mole, b'oye se n bori oru*
Arun iwosi tinu egbin l'awa
Ina ni now aso onida

Cleanliness suppressed ailments as harmatan suppressed hot
Bad ailments arouse from the dirt.
Lice enter the dress of a dirty person.

Semantic Explanation

As it is generally acceptable because of the pandemic that every aspect of our life must be clean, these Yoruba poems of cleanness would be of great advantages and supportive.

From Quran and with Analysis

All Muslims are routinely expected to clean himself/herself with water after visiting the toilet. Quranic injunctions (especially Chapter IV, Verse 43 and Chapter V, verse 7) demand that every Muslim must be in a state of good hygiene or complete cleanliness before observing any prayer (salat). God wishes us to be clean and pure at prayer and at other times, (Quran page 242). In particular, every Muslim must:

(i) Clean up the anus and genitals with water after urinating or passing excreta and before performing ablution in preparation for prayer.

(ii) Have a bath ("Janaba") after sexual intercourse and before performing ablution in preparation for prayer.

(iii) Performing ablution by washing the key parts of the body (arm, face, nose, mouth, ears and legs) with water before observing any prayer. The purpose of the Islamic injunction regarding cleanliness is to ensure that one is in a clean physical state of the body before communicating with Allah in prayer. Allah is considered pure, holy and clean and will only listen to clean persons. A verse of the holy Quran emphasizes the point when it states: "Cleanliness

is next to Godliness".

From Bible with Analysis

The Bible also emphasizes good sanitation and hygiene for all Christians. Deuteronomy Chapter 23, Verses 10, 11, 13 & 14 state: ‘ I f there be among you any man, that is not clean by reason of uncleanness that chance him by night, then shall he go abroad out of the camp, he shall not come within the camp".

"But it shall be, when evening cometh on, he shall wash himself with water: and when the sun is down, he shall cometh into the camp again ". "And thou shall have a paddle upon thy weapon; and it shall be, when thou wilt ease thyself abroad, thou shall dig therewith, and shalt turn back and cover that which cometh from thee "."For the LORD thy God walketh in the midst of thy camp, to deliver thee and to give up thine enemies before thee; therefore shall thy camp be holy; that he see no unclean thing in thee, and turn away from thee ".

CONCLUSION

The culture and religion, particularly if annexed analytically and cross-culturally, is a repository of knowledge about human-environment interaction. It is a major source of folk science and preventative environmental health and sanitation practices, which need to be preserved and conserved for their continued relevance. The healthy relationships of our religions with the natural, biological and human environment are more reliable than many modern ones.

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SCHOOL LIBRARIANS AS CHANGE AGENTS: STRATEGIES FOR EFFECTIVE RESOURCE SHARING USING THE POWER OF DIGITAL TOOLS FOR CREATING CHANGE

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Abstract

The resources and services which library and librarians offer create opportunities for learning, literacy support and education as they help shape new ideas and perspectives central to a creative and innovative society. Yet, libraries as major sources of information sharing are under utilized despite advances in science and technology. Against this trend, this study investigated how the school librarian acts as a change agent for effective integration of technology in the school curriculum. Participant of the study were 13 librarians drawn from 4 tertiary institutions in Anambra State whose ages ranged from 39 to 57 years with age of 46.50 years and standard deviation of 3.80yrs. The participants were selected using multi stage sampling technique which utilized purposive for selecting the tertiary institutions and simple randomization for the actual librarians. Anchored on Rogers's Diffusion theory, the study explored qualitative design which guided research questions on how to improve technology practices in a junior high school. Thematic analysis was used to analyze qualitative data which revealed 7 themes viz: learning, resources, cross-curricular, attitudes, collaboration, assessment and time management. It is recommended that school librarians be prioritized as change agents in the society and be regularly trained and retrained to impact more positively to the society.

Key Words: Change agents, Creative change, Digital tools, Learning, Library, Librarians, Resource sharing,

Introduction

As gateways to knowledge and culture, libraries play a fundamental role in human society. The resources and services they offer create opportunities for learning, literacy support and education, and help shape the new ideas and perspectives that are central to a creative and innovative society. The importance of information for the development of any nation can never be over emphasized. This is because the amount of information possessed by any society or nation determines the level of development (Mia, 2020) in that nation and libraries are social institutions that ensure that the members of a society are well informed. According to Afolabi and Abidoye (2012), libraries are institutions that propagate the culture, objectives and intellectual leanings of their parent institutions. Libraries generally are non-profit organization that serves the interest of the community that owns it; as a result, libraries are of different types depending on the kind of group it serves. However, libraries such as public and national libraries serve the interest of the general public and other libraries respectively. A Public library is a library that is accessible by the general public and is generally funded from public sources such as taxes. Public libraries are now acknowledged to be an indispensable part of community life as promoters of literacy, providers of all ranges of reading for all ages, and center for community information services (Lee, 2020).

Despite its utility, library resource sharing may not be said have been maximized given the roles which digital tools can play at this age. Today, most schools have technology equipment and access to the internet but sadly their libraries do not have as much impacts as those required of such technologies. It is a puzzling and one could ask what the hindering factors are? It is expected that library technologies would allow teachers and students to use internet tools for writing, sharing and creating videos and photographs, programming and so much more. Teachers and students may find free web programs online library or information source that can be used to create thoughtful, student-centered products for free or for a small cost (Ertmer, et al., 2012). Therefore, effective technology integration still remains a problem regarding 21st century resource sharing. Some of the challenges according to Russell and colleagues (2007) were associated with the discomfort arising from using technology tools in online resource sharing. Thus, these challenges being experienced present opportunities for the library personnel or librarians to bring forth strategies for change by using digital tools which can help improve resource sharing experience for instance some online applications such as Google G-Suite are offered for free (Google, 2017) as an online resource or library. The integration of digital tools by school librarians is adjudged beneficial change process. A reason for this is due to the nature of these online tools. This allows for access to digital collaboration and community (Rheingold, 2012). Educators, students and private individuals can create products and share them via Web 2.0 applications. This sharing enhances learning in the long run. In this instance, librarians may collaborate with teachers, students and the public to enhance knowledge sharing through gathering in professional learning communities, attending grade-level meetings, and meeting one to one with library users.

Considering the place of information sharing in the socio-economic development of a nation this study explored how intensive instruction by librarians as a form of education and sensitization can be used as digital tools to increase technological literacy in students and teachers. It is expected that with more students and teachers being able to use most of the digital tools, information and resource sharing will improve and reach wider audience which in turn will orchestrate positive impacts on the society.

Given their usefulness in impacting societal development, a number of questions were posed to guide this study:

a) How is a school librarian a change agent for improving library technology practices among students?
b) What are strategies that allow the school librarian to act as an agent of change for meaningful technology integration among students and teachers?

Review

Library and National Development

One of the institutions that are responsible for the acquisition and dissemination of information to the community of users is the library. Libraries are critically important in combating the challenges of national integration and development (Onoyeyan & Adesina, 2014); primarily, they provide both historical resource and current information on diverse issues which affect a nation, her people and their environment (Ambali, 2019). Libraries by this role are important tools towards sustaining national integration and national development is through the dissemination of right information through the right channel to the right person. This is because for any nation to be united and to be developed, it needs to have and provide relevant, updated and adequate information on food security, democracy, health, education, ethnic equality, gender equality among others. Thus, the librarian or the library personnel have an important role to play as change agent especially regarding keeping pace with the nature and speed of technological advancement which enhance the way libraries are used and the how resources which libraries have are shared and utilized (Arora, & Sharma, 2016).

In Nigeria, like other developing nations, ICT provision and implementation in libraries is poor and thus affect the utility of the libraries. For instance, Osuchukwu, et al., (2017) emphasized that the level of use of ICT in learning is critical in development of any society. Today's learning has emphasized its importance as basis for 21st century knowledge acquisition. Osuchukwu, et al., (2017) investigated the availability and utilization of ICT facilities in Madonna University using descriptive survey design and found that the ICT section has resources and facilities that are available which the students utilized to certain extent although there are issues as some ICT facilities are not available, thereby not utilized by the students. The authors identified other challenges as inadequate assistance from staff, epileptic power supply and irregular internet connectivity among others. In the instance of the current study, the library personnel or the librarians could possibly use their position to change the narratives as change agents by helping library users internalize the use of ICT and other digital equipments which enhance the use of the libraries and improve on knowledge sharing and education.

Generally, libraries are a storehouse of knowledge that is responsible for the acquisition, processing, preservation and makes the resources available to the users that will enable the nation to sustain unity and development (Igbinovia & Osuchukwu, 2018). According to Bello and Ezeri (2020) the role of the library in national integration and development is to provide information service to support the educational, recreation, cultural, economic and technological endeavors of members in their respective communities. Based on this, it can be deduced that libraries are not exempted in achieving national integration and development through their information services and practice. Therefore, librarians and library personnel have a role to play as change agents in repositioning, restructuring of services and operations and education users on how to maximize utility of the libraries towards these goals that can help in national integration and national development.

Specifically, academic libraries, public libraries and national libraries have become a dynamic center for research. These libraries are central to the provision of information resources that empowers individuals such as students, lecturers, researchers among others to meet their information needs. In other words, libraries played vital roles in the integration and development of a nation through the provision of information resources. Most importantly, the importance of information in national integration and development cannot be overestimated. This is because the information is a data value in planning, decision making and evaluation of any program (Ajiboye & Tella, 2007) and librarians can bring about the best use of libraries by educating, supporting and guiding the users to make best of the library.

According to Afolabi and Abidoye (2012) library users now prefer services which they can be access remotely or online and in order to satisfy their users many libraries have started embracing the recent developments in information technology to help them for effective library services; although, there is the challenges of how to use those technologies and this where the librarians come handy as change agents trying to impact users to impact the world. Also, with the advent of ICT, there is now a proliferation of information, such that information is scattered in many areas and libraries are no longer seen as the primary source of information. Public libraries and other libraries generally have evolved since the advent of information and communication technology (ICT), which made information available and accessible from several sources and from any location. Because of ICTs, public libraries in the developed world now offer remote services, where members of the community can access the library resources from the comfort of their homes or offices. This was noted by Tiwari (2006) who stressed that rapid advances in information processing, storage and communications technologies have revolutionized the role of worldwide libraries in disseminating information services to users. It is the role of librarians as change agents to help students, teachers and other users to the effective of libraries.

Librarian as Change Agents

According to Butler (2015), the librarian's roles are vital for helping students to learn. The word "roles" is intended to be plural, in that the school librarian has many roles to play in influencing users' behaviour towards effective resource sharing. Not only are roles numerous but so are the ways in which these educators are addressed. School librarians may be labeled school library media specialists, library information specialists, and library directors, just to mention a few titles (Butler, 2015). However, regardless of the number of titles this position has, the job is the same. The school librarian is in the school to help students learn, to support other educators, and to offer expertise on print and technological resources. Collaborating with other educators, the school librarian provides access to materials for the school community beyond the textbook and basic library materials (Hopkins, 1998). Alas, school librarian jobs are being cut due to budget woes in every nation. However, the school librarian position is far from being a luxury. Librarians engage in collaboration for the sake of student learning by teaming up with other teachers. School library educators have the expertise to teach the 21st-century student the skills necessary for competing in today's world (Dow, 2013). School librarians can be leaders involved in curricular activities such as committees and teacher collaboration meetings, as role models embracing change for the sake of student learning (Branch & Oberg, 2001). In fact, Znnuda and Harada (2008) proposed that school librarians should be considered learning specialists in light of the rich knowledge they possess on curriculum, and learning, an example being that since school librarians' jobs also span across building the school library collection, knowledge about the curriculum is essential.

In addition, Scholastic (2016) contended that the concept of school librarian as instructional consultant who are to guide teachers and students alike and by so doing become change agents. Scholastic (2016) found that showing improvement in student achievement as well as positive collaborative efforts between the school librarian and teachers maximize learning. Overall, the school librarian brings expertise in literacy, technology and professionalism (Scholastic, 2016). This positive impact comes in spite of whether the community is wealthy or poor (Lance & Hofschire, 2012).

Oberg (2010) contended that the charge for school librarians is to be a change agent not only for the school library but the school as a whole. Many authors have emphasized that change is constant; therefore to flow with change is to be impactful! The school librarians work with all students, educators, and administrators throughout the building, as well as across the communities and thus perceive the society better than either the teachers or the students. Also school librarians involve themselves in collaborative efforts as problem solvers, mentors, and co-teachers. Since they are not in a supervisory role, school librarians are able to view classroom situations objectively, assisting classroom teachers needing a sounding board. To be effective change agents, school librarians must remember to consider the people being affected by the changes being made. Being a proactive leader and promoting how the school library supports student learning are also essential elements for school librarians to possess (Hughes-Hassell & Harada, 2007).

Johnston (2012) stated that school librarians are vital to making contributions as technology integration leaders. Johnston's study (2012) found that this attribute is enabling as a factor; if the school librarian had a relationship with a supportive school management it helped the librarian to facilitate technology integration activities. Consequently, a supportive school management or climate is one which encourages professional development, facilitates funding for the library, and encourages the librarian to take a leadership role in the school (Johnston, 2012).

Framework

The theoretical frameworks for conceptualizing and understanding the impacts of librarians as change agents in school and community environment may be found in Rogers's Diffusion of Innovations (2003). Diffusion of Innovation theory propounded that an innovation is communicated and assimilated through certain channels over time among members in a social system. Therefore, using digital technology such as Web 2.0 technologies as new trends to enhance resource sharing and information dissemination or on improved methods of using the library holds a possibility of exposing these innovations (Web 2.0 technologies) to other people and hence getting them to assimilate it. Even more, technology channels is becoming an integral part of everyday communication and sharing of message and resources from one to another and between locations. For librarians to utilize these channels as a way to impact their immediate environment, organization and society; there is the need for the librarians to fully understand the challenges which users are faced or which are the source and cause of worry or usage anxiety. They are thus to carry out a careful planning into how to help the users of digital technology especially the ones that enhance better sharing of resources and information especially regarding the element of time and how it take for the technology to be assimilated and human factors which may result in adoption or rejection of such technologies. Thus, the librarian is doing a great service to his or her organization and society which he or she helps library users for instance, how to find contents of their curriculum on the library and other resources which are connected to it.

Method

Design - The design of the study is qualitative research which according to Creswell (2003) in Wimmer and Dominick (2014) helps to collect direct but structured opinions from participants. The study analyzed data with Pearson correlation statistics and thematic analysis of qualitative data. The observation schedule was also analyzed using descriptive statistics.

Sample/sampling technique - Participant of the study were 13 librarians drawn from 4 tertiary institutions in Anambra State whose ages ranged from 39 to 57 years with age of 46.50 years and standard deviation of 3.80yrs. The participants were selected using multi-stage sampling technique which utilized purposive sampling technique for selecting the tertiary institutions and simple randomization for the actual librarians.
Instruments for data collection – Structured interview with an interview guide served as the instrument for data collection.

Procedure - At the inception of this study, the researchers foremost sought research declaration and permission from the relevant authorities to embark on the study at the approval of the institutions. Interview guide was prepared to guide the questioning and conduct of the participants during the interview. Guides to identify when a participant has given opinion on an issue were equally stated clearly.

Results

After analysis of qualitative data, the following results were obtained from the field work:
Table 1: Analysis of participants' interview on the awareness of librarians as change agents and digital strategies which may enhance change among institutions and community of library users

Observed Factor	Themes	Frequency	%	Remarks
Awareness of Librarians as Change Agents	Yes	9	69.2	Most Librarians are aware of their positive contributions as an integral part of social change especially regarding resource sharing and information dissemination
	No	4	30.8	

How is a Librarian a Change Agent	Teaching Guiding Sorting Supervising Referencing Outsourcing	8 11 7 9 7 10	61.5 84.6 53.8 69.2 53.8 76.9	Mostly, librarians become change agents by guiding library users, the school and the public on how best to make use of library. They also become a change agent by supervising, teaching and outsourcing materials for users
Digital Strategies as a Change Agent	Online Repositories Library Apps Search Engines Social Media	9 6 11 12	69.2 46.1 84.6 92.3	Digital strategies which can best be deployed to impact change by librarians are; social media, proper use of search engines, and use of online repositories

Data in Table 1 is indicative that 9 librarians (69.2%) were aware that librarians can be change agents whereas 4 weren't aware the position of librarians in instituting changes in the society. As regards how librarians can institute change, 8(61.5%) opined that contribution towards teaching is very relevant as much as guiding library users and sorting resources for easy access at 84.6% and 53% respectively for 11 and 7 respondents. Furthermore, 9(69.2%) emphasized that supervising the users and creating reference points (53.8%) is ideal on how to be a change agent while 10(76.9%) argued that helping user in further search for a library resource such as outsourcing a materials is also one of the ways in which a librarian can be a change agent. As regards digital strategies to be used as a change agent, almost all respondents (12) at 92.3% opined that deployment of the social media utility represents the greatest use of digital strategies as change mechanism. Effective use of search engines (84.6%) as supplementary library sources was also prominent theme which was as valuable as being connected online on social media which represents the gateway of today's information communication technology. Equally, 9 (69.2%) participants indicated that assisting users to connect to various institutions' online repositories can help on variety of resourcing and information sharing and processing. Effective use of library applications was also opined by 6(46.1%) interviewees as digital strategies towards influencing change on the users, institutional members and the society at large.

Discussion

Library remain the major resource center in the human society and librarians have a role in facilitating seamless resource sharing and information exchange across various classes of people at the institutional level and the societal level. Given their positions as trainer gate keepers to knowledge and resource, they can become effective change agents to the society by positively influencing institutional goal actualization and by helping library users maximize their resourcing and resource sharing capacity. In this premise, this study evaluated school librarians as change agents and strategies for effective resource sharing using the power of digital tools for creating change. After qualitative data analysis, findings reveal that greater population of institutions' librarians have become aware about their roles as change agents in the society (Katayoon & Abrizah, 2017) although, such roles are still bedeviled by bureaucratic bottlenecks and lack proper understanding and policy regarding the expansive roles of the librarians and how they may be properly utilized to bring about change in the society with the knowledge and resource at their disposal.

The finding in line with that of Bello and Ezeri (2020) identified that the use of ICT digital tools which can be maximized by librarians to bring about changes in the use the library especially in the way in which curriculum is managed (Lanning, 2020) and its influence on societal development at large (Ambali, 2019). Many aspect library tasks were identified as specific areas which can be used to bring about change in the human society as a result of the impact they may have as users. Teaching was identified as a way in which library can impact positively to the students given their large wealth of knowledge and experience from the library (Wishkoski, et al., 2019). In Nigeria, Nwankwo, et al., (2017) found that mentoring of young librarians in South East Nigeria which aimed at teaching librarians for education students improved research and scholarly publications. Critically, the study found that, guiding user and providing mentorship especially to students remains the greatest service librarians can render as this deepens users knowledge and understanding of resourcing sharing and information sorting in a typical library scenario. For instance, Bagshaw and Yorke-Barber (2018) identified guidance as a staff development tool for librarians with an enriching value for change. Other roles such as outsourcing, sorting and supervising are also consequential roles for change agents.

As regards, digital strategies which librarians can deploy as change agents, the study found that social media is by far the largest digitial tool which can be utilized by librarians as change agents; for instance, Quadri and Adebayo (2016) found that social media use by librarians is the most significant tool for information dissemination in three federal university libraries in Southwest Nigeria. Also, Uche and Udo-Anyanwu (2019) found that the awareness and utilization of social media by tertiary institutions' librarians in Abia and Amo states, Nigeria is high with positive impacts on students and other users of institutions' libraries.

On online repositories, Utulu and Ngwenyama (2019) found that the librarians' cognitive frames on institutional repository innovation and implementation can be influenced positively if the librarians see themselves as change agents. Also, Kampa and Patra (2020) found that librarians can bring about students and general public awareness and usage of open source digital repository software. The same could be said of search engines and library application which is consistent with the fact that the deployment of ICT brings positive impacts on librarians' duties and users' satisfaction (Ahmed and Rehman, 2016).

Implication of the Study

Librarians have enamours role to play whether they are institutions' librarians or public librarians in educating the public, resource sharing and information exchange. The roles of librarians can bring about changes in our society especially regarding attitudinal changes. Digital tools can enhance the efficiency, effectiveness and efficacy of work done by librarians by providing greater options and librarians can capitalize on such tools to deliver more service which can impact the society. Librarians may deploy their services as change agent in teaching aid, guiding, supervising, sorting, outsourcing and referencing as well as use social media, online repositories and library applications to render these services more effectively.

Recommendation

It is recommended that stakeholders see librarians as agents of change and strive to improve their training in order to position them to contribute to national development. Institutions especially at tertiary level should strive to integrate librarians in curriculum planning and teaching in order to help students more proactively especially resource sharing.

Conclusion

Library is seen by many as the gateway to knowledge, however, many institutions are yet to live up the importance hence; less attention is paid to library, information management and to the librarians. Librarians if properly positioned especially with enabling digital tools can become change agents helping students, teachers and the general public to take advantage of value chain therein in information science and management through effective resource sharing and information dissemination. This unique value which librarians can directly add to the education sector can stimulate growth in education sector and overall national development.

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THEORETICAL BASIS IN THE USE OF ACADEMIC LIBRARIES AS KNOWLEDGE SERVICE CENTERS IN NATIONAL INTEGRATION AND DEVELOPMENT IN NIGERIA

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Abstract

Social, economic and political structure embodies a nation and thus no nation may do without having stability in the three fronts. For any nation to thrive, she must have a strategic and sustainable plan for human and material resource development and management. Against this backdrop, this study explored theoretical basis in the use of academic libraries as knowledge centers in national integration and development. The focus was how the utilization of academic libraries will help bridge the knowledge gap among the peculiarities of nation building, the people and the type of knowledge investment required to create a functional solution to her physical environmental and how a balance may be created from such paradigm.

Key Words: Change agents, Creative change, Digital tools, Learning, Library, Librarians, Resource sharing,

Introduction

Nigeria is poorly ranked 152 of 157 countries in the World Bank's 2018 Human Capital Index (World Bank, 2020). As a developing nation, she is burdened by mismanagement of her human and material resources for the development of her citizens and nation at large. As it is, poor management of her resources for nation growth and development is her greatest challenge (Aluko & Aluko, 2012) considering the abundance of resource free flowing from her nation. While it may be said that Nigeria has made some progress in socio-economic terms in recent years, her human capital development remains weak due to under-investment. Sadly, massive developmental challenges including the need to reduce the dependency on oil and diversification of the economy, insufficient infrastructure, and build strong and effective institutions, as well as governance issues and public financial management systems remain her greatest undoing (World Bank, 2020). In terms of integration and cohesion, the North-South divide has widened in recent years due to the Boko Haram insurgency and a lack of economic development in the northern part of the country with recent government riddled with nepotism and clannishness. Inequality in terms of income and opportunities has been growing rapidly and has adversely affected poverty reduction. Large pockets of Nigeria's population still live in poverty, without adequate access to basic amenities such as shelter, water and good sanitary provision. Unemployment has hit all time high with the increase of regional inequality, social and political unrest in the country. These in no small measures have created social, economic and economic displacement thus unburdening the nation at large.

Social, economic and political structure embodies a nation and thus no nation may do without having stability in the three fronts. For any nation to thrive, she must have a strategic and sustainable plan for human and material resource development and management. The two (human and material development) well depend on how a nation strive to develop new ideas, improve on them and advance their understanding of utilizing scarce resources. Creation and management of ideas is something that since time immemorial depended on the need for the conquest of the human environment (Ivonne, et al., 2009) which can be informal (such as personal experience or knowledge passed down) and formal acquisition (regarding to formalized process of acquiring knowledge as in formal education).

Anchored on theoretical paradigms, the current study in consideration of these developmental challenges facing the Nigerian nation which beckon for an endearing solution has prioritized deepening of national knowledge and effective dissemination and sharing of knowledge catalyzed by efficient library system as knowledge hub as effective tool for bringing about a holistic solution. Thus, in this study, there is theoretical exploration on the effectiveness of libraries as knowledge service centers in the actualizing sustainable national development and integration guided by the following objectives:

a) To examine the role of academic library in the context of national economic development of Nigeria.
b) To examine problems militating against the performances of Academic library for Nigeria economics development.

Review

Human development

Human development is the process characterized by the variation of the material conditions that most influence the possibilities of satisfying needs and desires and to explore and realize the physical and psychic, biological and cultural, individual, economic and socio-political potentials of each citizen of a nation and by large the nation (UNDP, 2020). Human development seeks to understand how and why the people of all ages and circumstances change or remain the same over time in actual progress in human development. The United Nations Development Programme (UNDP) defined human development as "the process of enlarging people's choices," choices allowing them to "live a long and healthy life, to be educated, to enjoy a decent standard of living," as well as "political freedom, other guaranteed human rights and various ingredients of self-respect.

Development concerns expanding the choices people have, to live lives that they value, and improving the human condition so that people have the chance to lead full lives. Thus, human development is about much more than economic growth, which is only a means of enlarging people's choices. Fundamental to enlarging these choices is building human capabilities - the range of things that people can do or be in life. Capabilities are "the substantive freedoms [a person] enjoys to lead the kind of life [they have] reason to value." Human development disperses the concentration of the distribution of goods and services underprivileged people need and center its ideas on human decisions. By investing in people, we enable growth and empower people to pursue many different life paths, thus developing human capabilities. The most basic capabilities for human development are to lead long and healthy lives, be knowledgeable (i.e., educated), have access to resources and social services needed for a decent standard of living, and be able to participate in the life of the community. Without these, many choices are not available, and many opportunities in life remain inaccessible.

National Integration

National integration is a positive aspect of any nation that reduces socio-cultural and economic differences or inequalities and strengthens national unity and solidarity, which is not imposed by any authority while national development refers to a state of maturity which characterizes a nation state (Lukpata, 2013). The author further explained that, this maturity results from the interplay of modern political, economic and social forces and processes which transform diverse people, shaping a common geographical area, from acceptance and allegiance to and participation in a transitional policy to the acceptance and creations of and participation in a modern nation-state. In other words, Lawal and Oluwatoying (2011) described national development as the time when the country is able to provide qualitative life for her citizenry. This means that both national integration and development are critical and essential factors for the sustenance and growth of any nation. Before the amalgamation, Nigeria as a nation was occupied by people of different socio-cultural backgrounds, different ethnic and religious backgrounds, and had achieved greater national unity and development. Over the years, Nigeria had been facing the new challenges of national integration and development with the militancy of the unemployed youth in Jos, Kaduna, Borno, Yobe, Kastina, Niger-Delta and other cities. Some of the treats caused by this militancy group include kidnappings, destruction of oil pipelines, bomb blast among others. One of the factors responsible for these challenges in Nigeria is believed to be the issue of ethnicity (Sanusi, 1990) of different ethnic groups with different social, cultural, political and religious backgrounds. This has made it difficult to become to be truly integrated and developed as nation. In the light of this, many people predicted that as long as Nigeria continues to grapple with these challenges, the problem of nation building, national integration and development will remain a topical issue. In spite of the efforts of the government in pursuing national integration and development, Nigeria still fares poorly in oneness and development indices (Igbuzor, 2006). In order to combat the challenges of national integration and development, Onoyeyan and Adesina (2014) affirmed that one of the important tools needed to sustain national integration and national development is knowledge. This is because for any nation to be united and to be developed, it needs to have and provide relevant, updated and adequate knowledge on food security, democracy, health, education, ethnic equality, gender equality among other. One of the institutions that is responsible for the acquisition and dissemination of information to the community of users is library.

Generally, libraries are store house of knowledge that are responsible for the acquisition, processing, preservation and make the resources available to the users who will enable the nation to sustain unity and development. In addition, the role of the library in national integration and development is to provide information service to support the educational, recreation, cultural, economic and technological endeavours of members in their respective communities. Based on this, it can be deduced that libraries are not exempted in achieving national integration and development through their services and information delivery. Most importantly, for libraries to achieve this, they need to restructure and redefined their service towards the Millennium Development Goals (MDGs).

The Role of Academic Library in National Development

According to Yacom (2011), academic libraries are institutions that are established to take care of the information need of students, lecturers, researchers and other community of scholar. In the words of Wolpert (1999), "academic libraries are cost effective information service and provider of knowledge products to a resident community of scholars." The approach to cost effective is one of the major problems militating against the performances of Academic library in Nigeria. (Akintunde 2004) was of the viewed that libraries in many tertiary institutions have either accreditation or failed them because libraries are regarded as tools for Academic excellence. The academic institutions play a major role in the manpower development of any nation providing the high, as well as middle level manpower for the acceleration of social, economic and political advancement of a nation.

The history of Academic library development in Nigeria dates back to pre-independence time when the University of Ibadan and its library were established in 1948. As mentioned by Omeluzor and Ogo (2018) since independence in 1960, there has been an unrelenting upsurge in the establishment of educational institutions at all levels, especially university education since then successive Nigerian governments have continued to invest strongly in higher education. It must be noted that Academic libraries, being integral academic parts of the universities and others higher institute of learning in Nigeria, emerged simultaneously with their parent institutions, which makes the total number of higher institutions in the country to equal the number of Academic libraries available in Nigeria.

i) According to Okiy (2007), quoting Edoka (2000) that the general functions of Academic libraries are:

ii) To provide; information materials required for the academic programmes of the parent institution,

iii) Research information resources in consonance with the needs of faculty and research students,

iv) Information resources for recreation and personal self development of users,

v) Study accommodation in a useful variety of locations,

vi) Protection and security for these materials,

vii) Specialized information service to appropriate segments of the wider community, and

viii) To co-operate with other libraries at appropriate levels for improved information services.

The economic development of a nation can be determined by the quality of human resource produced through the quality of education that a nation offered to her citizens. Therefore knowledge revolution is now the new economic order with the recognition that knowledge and intellect is the critical important ingredient in the economic equation either at the state, local or national level. The performance of human knowledge in a nation building is collaborated with the general functions of academic library in any nation.

Academic library as indispensable of national development; Aluko and Aluko (2012) noted that the ability of governments to develop effective policies and plans depends on their capacity to interpret information relevant to the country's economic, social, cultural, and financial situation. According to him, a strong national information centres such as Academic libraries and Information infrastructure allows access to information at all sectors and provides the basis for competent planning and decision-making. Such academic libraries however, require sound policies to provide the necessary framework for the development of information and communication systems and services to meet developmental needs. Human knowledge is invariably enriched by information; hence, the collective intellectual abilities of a nation that is; human capital, which will also depend on access to information through well equipped academy library.

The Millennium Development Goals (MDGs) is an international initiative. This initiative has eight goals that revealed the eagerness by governments globally to reduce poverty and hunger and to tackle poor quality education, ill-health, gender inequality, environmental degradation and empowerment for peoples of the world. These goals respond to the world's most unity and development challenge (Onoyeyan & Adesina, 2014). Therefore, libraries of all types need to reposition and restructure their services and operations towards these goals that will help Nigeria and other Africa countries to sustain national integration and national development. It is against this background that this paper will discuss how library can reposition their services and operation towards the sustenance of national integration and national development in Nigeria. Objective of the Paper The main objective of this paper is to discuss repositioning of library services for national integration and national development in Nigeria.

Roles of Libraries in the Provision of Information for National Integration and National Development Libraries of all types serve as one of the tools for national integration and developed a nation. Specifically, academic libraries, public libraries and national libraries have become a dynamic centre for research. These libraries are central to the provision of information resources that empowers individuals such as students, lecturers, researchers among others to meet their information needs. In other words, libraries played vital roles in the integration and development of a nation through the provision of information resources. Most importantly, the importance of information in the national integration and development cannot be overestimate. This is because information is a fact that provides answers to queries and some kind of resolve to an uncertainty that can cause changes in human perspective as regard to any state of affairs or happenings in the country (Laaro et al., 2018). In other words, information is a data value in planning, decision making and evaluation of any programme (Ajiboye & Tella, 2007). The authors explained further that data that have been subjected to some processing functions capable of answering user's query be it recorded, summarized, or simply collected that would help in decision making. Therefore, for any nation to be united or in oneness and develop, it needs to have and provide relevant and adequate information. In order to achieve this, library will play important roles. Achitabwino (2007) averred that libraries play a greater role in national integration and development through the support they offer to the people by supplying them with relevant information in multiple formats. From the inception, libraries had served as fundamental to community integration and development as they provide access to information and works of imagination in a variety of formats. In order to fulfill their roles in the integration and development of the nation, libraries go beyond formal education; they encourage and sustain literacy, through the provision of necessary information resources and services that will bring people of divert background together. In the same vein, the information professional (librarians) also play important roles in the sustenance of national integration and development.

Academic Library as a Developmental Tool in Nigeria The Academic library serve as a tool for developed nation so also for a developing country, namely a tool for intellectuals' freedom and economic development; a gate-way to political, economic and social happiness and survival. Freedom in its various dimensions means the absence of ignorance of situations. The acquisition of knowledge needed to dispel ignorance derives from studying. The Academic library brings invisible college in contact with the entrepreneur in the fulfilment of its function as a repository for information and human resourses. It has also become over the years a dynamic centre for research for development of the various categories of libraries such as Academic, Public, Special, School, College and National. The role of the Academic Library in the developing countries in particular calls for examination, and this is one of the major objectives this paper is examining. Academic library is central to the provision of information resources that empowers the educational institutions to produce highly resourceful people to impact positively on national development. It is a nation which is conscious of the importance of libraries and information that is drive towards the accelerated development of a nation that can survive and thrive in the comity of nations of this age. Libraries are at the centre of the academic excellence of all educational institutions providing all the relevant information resources necessary for teaching, learning and research functions. The academic health intellectual vitality and effectiveness of the educational institutions in producing high quality graduates into the labours market depending largely on the quality of information resources available in their libraries to support research activities. The amount and exact nature of the services provided by these libraries to contribute towards the national's economic development vary depending on the library itself and the services rendered.

These can be as following:

i) City Business Directory e.g. (The Major 5,000 Companies in Nigeria) - Academic library began its services with economic development by housing with the compilation of the city's business directory.

ii) Information Alert service for Businesses - applying information relevant to businesses, for example, highlights problems that have already been solved in other businesses and that would be of general interest to the nation. F

iii) Information about the Nation e.g. (Osun State Annual and Investment Digest): A guide containing relevant information on the city, such as restaurants, banks, hospitals, chemists' and laundries, etc. This type of information has many users: new residents, visitors and entrepreneurs themselves who use the information to analyse markets and new business opportunities. iv.

iv) Job and Career Information e.g. (Information Communication Technology Firms such as MTN and Glo): Information which helps the unemployed or people looking for new job opportunities. Academic library served as repository for annual business reports, books on job interviews or on how to write a curriculum vitae, etc.

v) Book and Journal lists: The library could select books and journals to assist business people and researchers to be successful in their businesses and area of their research works.

vi) Advice service for businesses: The library could promote talks, meetings between business people and business specialists, as well as having professional specialised librarians to attend to the users. vii. And other services that the library may identify as being necessary for its users such as information on health.

Problems Militating Against the Performances of Academic Library in Nigeria Economics Development

The primary role of the Academic library is to acquire, process, preserve, and disseminate recorded information. It is therefore the responsibility of the library to enlighten the users and other members of the community it serves by presenting them with factual information that will guide their actions and help make good steps that will promote economic development. Unfortunately, at present, the greatest problem to information provision by libraries to promote human resource and socio-economic issues are high illiteracy rate and lacked of reading culture. Other barriers include inadequate trained personnel in librarianship that is provision of grants for training of personnel to attend seminars, workshops and conferences, lack of resources, financial constraints, inadequate library services, poor distribution network of libraries, lack of viable data bases for research works and publishing industry that can publish and provide survey and reports. There is no area of library operations to which the computer has not been applied with tremendous gains. At this juncture, one can ask how much of these technological devices are in use in Nigerian libraries? In the past decades, whatever has been done in terms of modern technological applications or automation has not gone deeply enough to make an appreciable impact.

RECOMMENDATIONS

The greatest resource for development is the human resource hence no nation can develop in isolation of her human resources without a standard library especially Academic library. The level and quality of occupational participation and productivity of a populace are important contributory factors to the level of economic and over all development of any nation. It is therefore pertinent that Academic libraries should:

- Be equipped by employing high calibre people who are graduates so they can give quality contributions to national development in spheres of life, ii.

- There is need for Nigerian government to take information as tools that aid the enhancement of economic development and this can be achieved by making use of research works that emanating mostly from universities and research institutes that were kept in the Academic library,

- The Local, State and Federal government should collaborate in funding Academic library and make it more responsive to researchers' needs in the country,

- There should be a well collaboration with Librarians, Information Scientists, Researchers and Extension Agents to educate farmers on the use of library as a sources of information at the village level so that the horizon of farmers' knowledge could be broadened, and therefore break the reluctance of farmers to accept agricultural innovations. This will also accelerate the agricultural transformation agenda of the present government in Nigeria, and academic librarians should seek partnerships with community health centres, non private organizations, academic institutions, other libraries, for adequate funding and information resource provision.

Conclusion

The world is now geared towards industrialization. However, industries can hardly develop without relevant information on prospects and challenges. Therefore a need for professionally managed Academic Library should put in place if total quality is to be achieved, because apart from making the information that enables decision making timely available, library also contributes significantly to economic development of Nigeria. Academic libraries as reservoir of information are the most reliable information reference centres where users can seek information for professional skills and nation building. Unfortunately, at present age, the greatest problems militating against information provision by Academic Library to promote economic growth of Nigeria are lack of reading culture, inadequate funding and high level of illiteracy. Above all academic library can provide information on improving productivity, hygiene, information on business activities and promote democracy and social-economic issues only, if the three tiers of Nigeria government knowing fully that no nation can prospers without reliable information and no information can be properly managed and disseminated without functional Academic Library, and qualified Librarians and Information scientists.

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THE EFFECT OF FINANCIAL MARKET PERFORMANCE ON ECONOMIC GROWTH IN NIGERIA (1999 - 2019)

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Abstract

The study was carried out to investigate the effect of financial market performance on economic growth of Nigeria. The study adopted a quantitative and ex-post facto research design using secondary data collected from the Central Bank of Nigeria bulletin covering a period of 30 years (1999-2019). The collected data was analyzed using ordinary least square estimator and regression analysis as well as Unit root test. The analysis was achieved using E-view statistics package. From the findings, it was revealed that Treasury bill has a significant effect on Gross Domestic Product ($p<0.000$), Government bond was found to be insignificant ($p>0.5952$), Interest rate was also found to be statistically insignificant ($p> 0.1089$) while Market capitalization was found to be statistically significant ($p<0.005$). As a result of the findings, the study concluded that financial market performance has a significant effect on the economic growth of Nigeria for the year under review. Based on the findings, the study recommended among other things that policy makers should ensure an improvement in the market capitalization by encouraging foreign direct investment participation in the market.

Keywords: Stock exchange, government bond, interest rate, GDP, economic growth

Introduction

In a modern economy, financial market is distinguishable from financial institution based on their various roles; however, they are complementary when they are corresponding to growth because both serve as props for economic sustenance (Onwe, 2013). Logically, financial market creates wealth from which savings accrue and form revenue sources for other sectors (CBN, 2017). Businesses, individuals, and governments often need to raise capital to meet their needs. On the other hand, some individuals and firms have incomes that are greater than their current expenditures, so they have funds available to invest in the market. Individuals and organizations with surplus funds are saving today in order to accumulate funds for future use (Hassan, Babafemi & Jakade, 2016).

A household might save to pay for future expenses such as their children's education or their retirement, while a business might save to fund future investments. Those with surplus funds expect to earn a positive return on their investments. People and organizations who need money today borrow to fund their current expenditures. They understand that there is a cost to this capital, and this cost is essentially the return that the investors with surplus funds expect to earn on those funds. People and organizations wanting to borrow money are brought together with those having surplus funds in the financial markets.

Anigbogu and Nduka (2014) explained that financial market provides the bridge through which the savings of surplus units may be transformed into medium and long-term investments in the deficits units. It is reported that financial market performs critical functions, which promote economic growth and prospects of the economy. The idea behind the financial market phenomenon necessitates the role played in a nation's financial system. Financial market is one of the components of financial system that facilitate the provision of financial services in the country.

Financial markets have experienced many changes during the last two decades (Maduka & Onwuka, 2013). Technological advances in computers and telecommunications, along with the globalization of banking and commerce, which has increased competition throughout the world. The market is far more complex than few years ago and they have also created problems for policy makers (Anigbogu & Nduka, 2014). The current realities existing in most of the Exchanges in Africa today leave some significant gap in the debate on the impact of financial market development on economic growth.

In the case of Nigeria, the market indicators have declined very rapidly as a result of the global recession that affected the financial system (Amadeo, 2013). The activities of investors engaging in capital flight and profit taking on the stock market could impact on the economy overtime with instability of the market. Fluctuating in the market capitalization, unstable movement of market indicators such as value of traded share, low all share index, high inflation rate, low patronage of treasury bills and treasury certificate coupled with other significant factors that have contributed to the business cycle contraction witnessed in 2016 alongside weak market returns (Adebisi & Arikpo, 2017).

It is against this bedrock that this study is embarked upon to investigate the effect of the financial market on the Economic growth of Nigeria from 1990-2019.

Specifically, the study seeks to:

i. examine the effect of treasury bills on gross domestic product in Nigeria.
ii. ascertain the impact of government bonds on gross domestic product in Nigeria.
iii. evaluate the relationship between interest rate and gross domestic product in Nigeria.
iv. analyse the relationship between market capitalization and gross domestic product in Nigeria.

Literature Review

Concept of Financial Market

The financial market in any economy of the world plays an important role as an engine of economic development and growth. The market provides linguistic that services the needs of the economy, facilitates the mobilization of surplus fund from the surplus to the deficit sector of the economy and from the domestic and foreign sources and optimally allocates such mobilized resources to the deficit sector of the economy for productive investment. The buoyant capital flows among the nation boundaries have raised the existing strength of the financial market. One major aspect of the financial market that triggers investment is the stock market. The stock market enhances investment opportunities of the investors by providing avenues for the sale of securities when the need for cash/liquidity arises and enables investors to alter their choice of asset portfolio (Nwosa, 2015). From the business point of view, the stock market provides access to long term finance at a reduced cost and enable firms to undertake certain very-long term investments which seldom occur due to savers unwillingness to tie-up their investment for a long time (Nwosa, 2015; Adenuga, 2011).

The Nigerian Stock Exchange Market

The Nigerian Stock Exchange (2001) as reported by Onwe (2013) defines a stock market as a place where you can buy and sell shares, stocks, bonds, etc. Those who engage in buying and selling small number of shares are called small investors while corporate organizations which buy and sell large number of stocks are referred to as large or institutional investors. It is a market where large and small investors alike buy and sell through the stockbrokers, the stocks and shares of companies and government agencies.

The SEC had stated that this will provide a benchmark for other issuers of Sukuk like state governments. Premium Board Meanwhile, in line with its commitment of promoting Africa's biggest companies the NSE within the year launched a new listing platform – Premium Board and its associated Premium Board Index – featuring companies that meet the Exchange's most stringent listing criteria of capitalization, governance and liquidity. Three companies – Dangote Cement Plc, FBN Holdings Plc, and Zenith International Bank Plc, met the criteria and therefore qualified for the pilot phase. Its platform and also quoted the Nigerian Breweries Commercial Paper and N8.15 billion. In all, there is no doubt that with full implementation of the Capital Market Master Plan, the market will eventually emerge as one of the world's deepest, most liquid and largest in the world.

Capital Market and Economic Growth in Nigeria

Economic growth is the process by which national income or output is increased (Ewah, Esang & Bassey, 2009). An economy is said to be growing if there is a sustained increase in the actual output of goods and services per head. The rate of economic growth therefore measures increase in real national income, during a given period of time, usually a year. The higher level of economic growth, domestic stock markets tend to become more active and efficient relative to domestic financial institutions.

The relationship between economic growth and financial markets is dynamic, such that the latter, at one stage influences the former, while at another stage, the former may influence the latter. Thus, finance is not exogenous. At an early stage of development, entrepreneurs mainly depend on their savings as investment funds. As the economy develops, financial markets emerge to facilitate investments. Further growth in the economy sees the development of markets for tradable securities.

Okereke (2000) posits that the cheap source of funds from the capital market remain a critical element in the sustainable development of the economy. She enumerated the advantages of capital market financing to include no short repayment period as funds are held for medium and long term period or in perpetuity, funds to state and local government without pressures and ample time to repay loans. Nzotta and Okereke (2009) empirically analyze the impact of the Nigerian capital market on her socio-economic development from 1981 to 2008. Using the ordinary least square it was found that the capital market indices have not impact significantly on the GDP. To position the market for growth, the study recommends that the government is therefore advised to put up measures to stem up investors' confidence and activities in the market so that it could contribute significantly to the Nigerian socio-economic development.

Capital Asset Pricing Model (CAPM)

Pronounced as though it were spelled "cap-m", this model was originally developed in 1952 by Harry Markowitz and fine-tuned over a decade later by others, including William Sharpe. The capital asset pricing model (CAPM) describes the relationship between risk and expected return, and it serves as a model for the pricing of risky securities. CAPM says that the expected return of a security or a portfolio equals the rate on a risk-free security plus a risk premium. If this expected return does not meet or beat our required return, the investment should not be undertaken. The commonly used formula to describe the CAPM relationship is as follows: required or expected return = RF Rate + (Market Return –RF Rate) Beta. It is important to remember that high-beta shares usually give the highest returns. Over a long period of time, however, high beta shares are the worst performers during market declines (bear markets). While you might receive high returns from high beta shares, there is no guarantee that the CAPM return is realized. This theory is important to the basis of the research topic. Every investor is rational in thinking and will definitively want to averse risk that may likely drive away their capital. So for an investor to be diligent in their dealing, they must ensure that all CAPM assumptions are met.

The Loanable Funds Theory

The theory was formulated by the Swedish economist Knut Wicksell in the 1900s. According to him, the level of interest rates is determined by the supply and demand of loanable funds available in an economy's credit market. The term loanable funds simply refer to the sums of money offered for lending and demanded by consumers or investors during a given period. The interest rate in the model is determined by the interaction between potential borrowers and potential savers. This theory suggests that investment and savings in the economy determine the level of long-term interest rates. Short-term interest rates, however, are determined by an economy's financial and monetary conditions. Given the importance of loanable funds and that the major suppliers of loanable funds are commercial banks, the key role of this financial intermediary in the determination of interest rates is vivid. The central bank is implementing specific monetary policy, therefore it influences the supply of loanable funds from commercial banks and thereby changes the level of interest rates. As central bank increases (decreases) the supply of credit available from commercial banks, it decreases (increases) the level of interest rates.

Empirical Reviews

The study of Adebisi and Arikpo (2017**)** examined the relationship between financial market performance and foreign portfolio investment in Nigeria. The data for the study were source from the CBN statistical bulletin for the period 1984 to 2015. The exploratory design was combined with the ex-post facto research design; the data collection method was desk survey. The study used the Autoregressive Distributive Lag (ARDL) technique for data analysis. Findings from the analyses showed that financial market performance has no long run causal relationship with foreign portfolio investment in Nigeria. Also, stock market performance and stock market liquidity have no short run causal relationship with foreign portfolio investment in Nigeria. Lastly, total new issue has a short run causal relationship with foreign portfolio investment in Nigeria. The study on the basis of these findings recommends that stock market regulators should through conscious enlightenment campaigns encourage more domestic participation in the market to enhance the market performance, deepening and growth as this will strengthen its long run causality with FPI.

Also, Hassan, Babafemi and Jakada (2016) examines the impact of financial market development on economic growth in Nigeria using annual time series data covering the period of 1981-2014. The study employed the Vector Error Correction Model (VECM) as the econometric methodology. The empirical results show that overall there is a positive effect of financial market development on economic growth in Nigeria. Almost, all the financial markets, namely, stock, capital and money market have been found to have a significant positive impact with the exception of only foreign exchange market having a negative impact on economic growth. On the basis of the findings of the study, it was recommended that there is a need for a comprehensive financial reform to overhaul the entire Nigerian financial system so as to boost business and investment activities in the country.

Umar, Ismail and Sulong (2015) studied the impact of the stock market development on foreign direct investment using autoregressive distributed lag (ARDL) in the presence of structural breaks (dummies) in Nigeria. The study utilized annual time series data from 1970 to 2013. The data were generated from World Bank and Central Bank of Nigeria (CBN). The result suggests that the foreign direct investment (FDI) has a significant positive long-run impact on the value of the total stock transaction, but has a negative and significant effect on the rate of stock returns. However, the relationship between FDI and market capitalization ratio is not statistically significant. The study recommended that operations in the market should be open and transparent and market abuse should be totally removed.

Methodology

In order to achieve the aim of the study, both quantitative and ex-post facto research design was adopted. The choice of these methods of research design was due to the fact that extensive use of raw data was made on exchange rate and balance of payment as it will be analyzed in chapter four of this project work. Also, the ex-post facto research design was employed because the researcher has no intention of manipulating already made data. The population of this study is the Nigeria financial market. The samples of this study are money market and capital market. The data used for this study are annual times series from 1999 to 2019. They are sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin (2019). Variables such as Treasury bill, treasury certificate, government bonds and equities are all gathered from Central Bank of Nigeria Statistical Bulletin.
The study made use of computer software 'E-views' version 9.0 to analyse the data. The research rely on Ordinary Least Square Estimator (OLS) and various regression techniques in evaluating the correlation between the selected variables. Unit root test and Regression were analysed in the study.

Model Specification

This study examines the effect of financial market performance on economic growth in Nigeria (1990-2019). Secondary source of data from the Central Bank of Nigeria (CBN) statistical bulletin (2019) was used in the study and the time series data covered the period of 30 years ranging from 1990 -2019.
This model employed some variables identified from previous studies
GDP = f (TB, GB, INT,MCAP) …………………………………………….(1)
An Econometric Function

GDP =β0+β1 TB +β2 GB +β3 INT+ β4MCAP+ µ--------Equ(2)

Where;
GDP= Gross Domestic Product
TB = Treasury Bills
GB = Government Bonds
INT= Interest rate
MCAP= Market Capitalization
β0=Constant term
β1- β4=Coefficients of explanatory variables .
µ=Error term

Data Presentation and Results

Table 1: Unit Root Test at First Differenced

Group unit root test: Summary
Series: GDP, TB, GB, INT, MCAP
Date: 02/24/19 Time: 23:18
Sample: 1990 2019
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 6
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.79282	0.0001	5	131
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.87978	0.0000	5	131
ADF - Fisher Chi-square	66.8319	0.0000	5	131
PP - Fisher Chi-square	83.2369	0.0000	5	139

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Unit root test

The top of the output indicates the type of test, exogenous variables and test equation options. The lower part of the summary output gives the main test results, organized both by null hypothesis as well as the maintained hypothesis concerning the type of unit root process. All of the results indicate the presence of a unit root at level, as the LLC, IPS, and both Fisher tests fail to reject the null of a unit root. However, GDP, TB, GB, INT and MCAP are all stationary at first difference. This means that all the variables have no unit root.

Table 2: Regression Result

Dependent Variable: GDP
Method: Least Squares
Date: 02/24/19 Time: 23:19
Sample (adjusted): 1990 2019
Included observations: 29 after adjustments

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
TB	24.32593	2.511038	9.687598	0.0000
GB	1.667652	3.096757	0.538516	0.5952
INT	-523.9250	314.6570	-1.665067	0.1089
MCAP	1.239871	0.407364	3.043641	0.0056
C	4706.359	4993.274	0.942540	0.3553

R-squared	0.976274	Mean dependent var	24984.69
Adjusted R-squared	0.972320	S.D. dependent var	32815.83
S.E. of regression	5459.705	Akaike info criterion	20.20376
Sum squared resid	7.15E+08	Schwarz criterion	20.43950
Log likelihood	-287.9546	Hannan-Quinn criter.	20.27759
F-statistic	246.8870	Durbin-Watson stat	0.981326
Prob(F-statistic)	0.000000		

Regression

Goodness of Data Fit. Data must be fitted reasonable well. That is value of R^2 should be reasonable high at least more than 60 percent. The higher the R^2 better the fitted data. In this model we observed that R^2 is 0.976274 which is quite good. Because 98percent is more than 60percent, which means that the model is nicely fitted. The adjusted R^2 which is 0.969760 (97%) could be further explained that exchange rate, treasury bills, government bonds, interest rate and market capitalization are good variables to explain economic growth while the remaining 3percent are factors or variables that were not included in the model but been capture by error term which are capable of influencing the dependent variable.

Coefficient of variables

The sign of the coefficients should follow economic theory or expectation, experiences of others or intuition. The column labeled "Coefficient" depicts the estimated coefficients. The least squares regression coefficients b are computed by the standard OLS formula.
For the simple linear models considered here, the coefficient measures the marginal contribution of the independent variable to the dependent variable, holding all other variables fixed. The other coefficients are interpreted as the slope of the relation between the corresponding independent variable and the dependent variable, assuming all other variables do not change.

GDP = 4706.359 + 24.32593TB + 1.667652GB -523.9250INT + 1.239871 MCAP

The value of constant is **4706.359**; this means that gross domestic product will be increasing at **4706.359 units** while other variables remain constant. The coefficient of Treasury bill is **24.32593,** which means that for every unit increase in Treasury bill, there will be the same unit increase in gross domestic product. The coefficient of government bond is **1.667652,** this connotes that for every unit increase in government bond there will be the same unit increase in gross domestic product. The coefficient of interest rate is **-523.9250,** which means that for every unit increase interest rate, there will be the same unit decrease in gross domestic product. The coefficient of market capitalization is **1.239871;** this means that for every unit increase in market capitalization, there will be the same unit increase gross domestic product.

F-statistics: This test the joint significance of the variables employed. Independent variables should be jointly significant to explain dependent variable. This can be checked using F-test. If the p-value of F statistic is less than 5 percent (0.05) we can reject the null and accept alternative hypothesis. If otherwise, we can do the inverse.
From the result in table 2, p value is (0.000000) which is less than 5percent level of significance. Hence we reject the null hypothesis (Ho) that the overall estimate has a good fit which implies that our independent variables are simultaneously significant, which means that financial market has a significant effect on economic growth in Nigeria.

Test of Hypotheses

Decision rule using T- test: If the p-value of t statistics is less than 5 percent (0.05) we can reject the null and accept alternative hypothesis. If otherwise, we do the inverse.

Hypothesis One:

H_0: Treasury bills have no significant effect on Gross Domestic Product (GDP) in Nigeria.
H_1: Treasury bills have significant effect on Gross Domestic Product (GDP) in Nigeria.

From the result in table 2, the p-value of Treasury bill is 0.0000 which is less than 0.05 percent level of significance. Therefore, the study rejects the null hypothesis and accepts the alternative hypothesis. Based on this, the study concludes that Treasury bill has a significant relationship with Gross Domestic Product in Nigeria.

Hypothesis Two

H_0: Government bonds have no impacts on Gross Domestic Product (GDP) in Nigeria.
H_1: Government bonds have significant impact on Gross Domestic Product (GDP) in Nigeria.

From the result shown in table 2, the p-value of Government bond is 0.5952 which is greater than 0.05 percent level of significance. Therefore, the study accepts the null hypothesis and rejects the alternative hypothesis. Based on this, the study concludes that Government bond has no significant relationship with Gross Domestic Product in Nigeria.

Hypothesis Three

H_0: There is no significant relationship between interest rate and Gross Domestic Product (GDP) in Nigeria
H_1: There is significant relationship between interest rate and Gross Domestic Product (GDP) in Nigeria

From the result displayed in table 2, the p-value of Interest rate is 0.1089 which is greater than 0.05 percent level of significance. Therefore, the study accepts the null hypothesis and rejects the alternative hypothesis. Based on this, the study concludes that Interest rate has no significant relationship with Gross Domestic Product in Nigeria

Hypothesis Four

H_0: There is no significant relationship between market capitalization and Gross Domestic Product (GDP) in Nigeria.

H_1: There is significant relationship between market capitalization and Gross Domestic Product (GDP) in Nigeria.

From the information in table 2, the p-value of Market capitalization is 0.0056 which is less than 0.05 percent level of significance. Therefore, the study rejects the null hypothesis and accepts the alternative hypothesis. Based on this, the study concludes that Market capitalization has a significant relationship with Gross Domestic Product in Nigeria

Discussion of findings

The study embarked on the investigation of the relationship that exists between financial market and economic growth in Nigeria. Data relating to treasury bill, government bonds, interest rates, market capitalization and gross domestic product were collected for a period of 30 years (1990-2019) to test the stated hypotheses. Unit root test was conducted on the data and the variables were found to be stationary. Regression result revealed that Treasury bill is statistically significant ($p<0.000$), Government bond is statistically insignificant ($p>0.5952$), Interest rates was also found to be statistically insignificant ($p>0.1089$) while Market capitalization was found to be statistically significant ($p<0.0056$). The implication of these results is that only Treasury bill and Market capitalization are capable of influencing economic growth in Nigeria which was proxied by Gross Domestic Product (GDP) according to the result of the study.

Conclusion

This study examined the effect of financial market on economic growth in Nigeria. It covers the period of 30 years. The result of the data analysis revealed that Treasury bill has a positive effect on gross domestic product and was found to be statistically significant ($t=9.687$, $p<0.000$), Government bond was found to exhibit a positive effect on gross domestic product but is statistically insignificant ($t=0.5385$, $p>0.5952$), Interest rate has a negative effect on gross domestic product and is also statistically insignificant ($t=-1.665$, $p>0.108$) while Market capitalization was found to be positively related to gross domestic product and statistically significant ($t=3.043$, $p<0.005$). Based on the findings the study concluded that financial market has a significant effect on economic growth in Nigeria.
The findings of this study is in line with the findings of Hassan, Babafemi and Sulong (2015). However, the findings of this study is not in tandem from the findings of Adebisi and Arikpo (2017); Umar, Ismail and Sulong (2015).

Recommendations

Based on these findings, the study recommends the followings:

- Those policy makers should ensure improvement in the market capitalization, by encouraging foreign direct investment participation in the market.

- Moreover, there is a need to invigorate and strengthen the financial market; more companies should be encouraged to get listed on the floor of the market.

- Small and medium entrepreneurs should be allowed to access the market for investible funds given their close affinity with the grass root funds mobilization ability.

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E-LEARNING AS THE MECHANISM FOR CHANGE IN THE ADVENT OF PANDEMIC: A STUDY OF THE FEDERAL POLYTECHNIC ILARO

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Abstract

E-learning has become the mandatory component of all educational institutions like schools, colleges, and universities in and around the world due to the pandemic crisis of COVID-19. This deadly situation has flipped out the offline teaching process. The purpose of E-learning is to provide an effective teaching method that brings out the best in students. However, the acceptance of this initiative is on the low side, as several students faced challenges in coping. This study thus drive its data via the administration of 300 questionnaires to randomly selected respondents, frequencies and percentage distributions were the analytical techniques adopted. Several factors serve as hindrance to the full implementation and sustainability of E-learning across the country. Factors such as poor browsing network, little or no idea of E-learning by the users, efficient browsing gadgets, among others. To this effect, solutions such as; making emergency preparedness plans for unexpected problems, strengthening students' active learning ability outside of class, dividing the teaching content into smaller units to help students focus, combining online learning and offline self-learning effectively, among others were proffered.

Keywords: *E-Learning, Pandemic, Covid-19, Education, Students.*

1.0 Introduction

The purpose of education is to mold a person to be perfect. Education provides the pathway to reach their destiny. Education helps in inculcating social responsibilities as well. The main core of education is to learn. Learning is a process of acquiring knowledge or skills through study, experience, or being taught (Sathishkumar, Radha, Mahalakshmi, Saravanakumar, 2020). They stated further that any freak accident that happens in the world will always leave its impact on education. And so the epidemic of COVID 19 has its footprints on education. The outbreak of this dangerous virus across the globe has forced educational institutions to shut down to control the spread of this virus. This happening made the teaching professionals think of alternative methods of teaching during this lockdown. And thus it paves the way towards web-based learning or e-learning or online learning. In today's scenario learning has stepped into the digital world. In which teaching professionals and students are virtually connected. E-learning is quite simple to understand and implement. The use of a desktop, laptop, or smartphones and the internet forms a major component of this learning methodology. E-learning provides rapid growth and proved to be the best in all sectors, especially in education during this lockdown (Sathishkumar, *et al.*, 2020).

With merits of E-learning clearly obvious, the factors that affect its sustainability and functionality should not be neglected. In a developing country like Nigeria, E-learning is more or less a dream for people from the rural region where network and access to browsing gadget is a serious uphill task.

As of March 13, 61 countries in Africa, Asia, Europe, the Middle East, North America, and South America have announced or implemented school and university closures and most of universities have enforced localized closures (UNESCO, 2020).

This study will focus on the merits of E-learning and the level of its acceptance among its users, the challenges they faced and likely solutions to the challenges.

1.1 Statement of the Problem

During this pandemic period, E-learning became a global tool, effectively working for several developed countries all around the world. Users of E-learning in developed countries enjoy numerous amenities and facilities which aids its effective usage. E-learning is always depending on a strong internet connection with the high band. It is not succeeded always because of a lack of connectivity and an acute power shortage. E-learning is even worse in rural areas compared to urban due to lack of infrastructure that online courses require, and thus fail to attend with their virtual classes.

1.2 Objectives of the Study

1. To know the trend of using E-learning resources among students.

2. To identify the interest and attitude of students towards using E-learning resources.

3. To suggest prospects in using E-learning resources by students.

1.3 Significance of the Study

This study will help to find out the students' attitudes towards E-learning during COVID – 19 Pandemic. This study was done for the students who are studying in various colleges and universities and even schools to gain additional information regarding the contribution of e-learning during this pandemic. It can be a learning paradigm in educational institutions to enhance the student's knowledge and skills through digital technologies. Government and Educational Department has to provide better infrastructure for E-learning for the betterment of students.

1.4 Scope of the Study

The scope of this study shall be limited to Federal Polytechnic, Ilaro, Ogun State and the study shall entail the information gathered from the selected institution.

2.0 Literature Review

2.1 E-Learning

Hosting of a website to provide easy access to course related information over the internet can be seen as the origin of the current e-learning systems. It evolved through content that was provided on the web in the form of lecture notes and other learning material such as lab exercises. This reduced the need for long classroom sessions to deliver knowledge and also offered the students the flexibility to learn at their own pace. Now we could see several learning methods being used as part of online teaching over the Internet (Ganesan, 2002).

In e-learning systems students are able to communicate with their teachers through email and discussion groups. In this situation students do not get immediate response from their teachers and sometimes may also not get what they want within the required time. However some systems offer online discussions among students, teachers and other participants via chats, videoconferencing and groupware. Here students are able to get immediate response to their questions despite not being physically present (Gihan, 2003).

He stated further that online assessment is a key component of an e-learning system and it is used to evaluate student's learning progress. Quizzes in the form of multiple-choice questions are part of this and it has the capability not only to give feedback for the student responses but also to monitor student's learning progress and achievement levels.

Various information in the form of course overview, contents, objectives, notes, slides, exercises, workbooks, references, worked examples, model and past papers with solutions, links to external resources, student prepared material and their solutions are provided to the learners through these websites. Special interactive sessions with multimedia are also part of these systems (Gihan, 2003).

2.2 Merits of E-Learning

- ✓ **Improvement of Student's Self-study Skill:** Today's learner's expectation is very different from the past after globalization education has become more associated with digital and mobile paced. Students have wanted learning materials that are accessible through online mode in mobile phones and computers. The main reason for e-learning is that the students can learn at their comfort and requirement.

- ✓ **Satisfaction Level of the Students on the Online Mock Test:** Student assessment is one of the important methods of the evaluation process in the education system. Various methods are being adopted to understand the students learning capacity. The online way of learning a mock test is a prompt method which is a highly acceptable one. It is even more important during the quarantine time. Moreover, the mock test is a more effective and systematic method to extract student's abilities and understand their respective lessons. The Federal Polytechnic Ilaro recently used the same method for Higher National Diploma Screening, and it was a success.

- ✓ **E-Learning was very useful at Quarantine Time:** During this time of medical emergency, many education institutions are some simple measures have taken to learn during the quarantine time. Students are motivated and provided a link to helpful material for their upcoming semester examination. Colleges are encouraged to be planned towards e-learning.

- ✓ **It Makes Knowledge Wider:** E-learning provides maximum benefits from minimum requirements. It aids students learning processes. Online courses are becoming an important component for enhancing the student's skills.

- ✓ **Preference for Learning Environment:** Learning is a process of acquiring knowledge, enhancing the skills, helps in improvement of their career. In this pandemic situation, there is no way of teaching in the classroom. All educational institutions are forwarded to the e-learning environment.

- ✓ **Contribution of E-Learning bring a Social Change:** In the contemporary education system is urging to adopt new technology for every field. All the developed and developing nations are more concentrated on research and development; as a result, technology is a part of every curriculum at all levels. The present learners are highly motivated by international exposures. Technological innovations are highly influential in this society. Technology allows us to learn all and it is provides an opportunity to utilize the technology without any discrimination.

2.3 Challenges Faced by E-Learning

- ✓ E-learning is always depending on a strong internet connection with the high bandwidth.
- ✓ It is not succeeded always because of a lack of connectivity.
- ✓ E-learning is even worse in rural areas compared to urban due to lack of infrastructure that online courses require, and thus fail to attend with their virtual classes.
- ✓ Lack of technical IT knowledge by students: Efficient usage of browsing devices is a headache for several people. Some students and learned people cannot even handle an Android properly not to talk of efficient usage of Laptop.
- ✓ Erratic power supply

2.4 Solutions to Challenges Faced by E-Learning

- ✓ **Organizing IT Seminar for Students and Academic Staff:** Information Technology (IT) trainings should be organized for students and Academic Staff alike in order to elevate the low level of IT know-how of E-learning users. The training should include emphasis on the essentiality of E-learning to educational and human development, the essence of E-learning compared with just going on Instagram to watch unproductive videos or Facebook, Twitter, WhatsApp, among others.

- ✓ **Provision of ICT Amenities for Students:** A procedure should be put in place so as to manage the "no Phone, no Laptop, etc" challenges faced by students.

- ✓ **Improvement of Network Facility:** E-learning is highly dependable on a strong internet connection with the high band. Government should work towards upgrade and improvement in the area of network coverage.

- ✓ **Making Emergency Preparedness Plans for Unexpected Problems:** Since all the courses were switched to online education mode, the computer servers may not be able to host such a large scale of new users, the online education platform may often shut down because of overload. In order to solve all kinds of unexpected issues timely, faculty need to prepare Plan B or even Plan C before classes start and inform students in advance.

- ✓ **Strengthening Students' Active Learning Ability Outside of Class:** Compared with traditional in-class lectures, department have less control over online teaching, and students are more likely to "skip the class". Therefore, the progress of online teaching and its learning effectiveness largely depend on students' high-level active learning outside of class. To this end, department should use various methods to moderately modify students' homework and reading requirements to strengthen students' active learning outside of class.

3.0 Methodology

The research design adopted for this study was a descriptive survey design. 300 well-structured questionnaire entitled E-learning as the Mechanism for Change in the Advent of Pandemic was used to gather information from randomly selected students of the Federal Polytechnic Ilaro. A total number of 280 (93.3%) respondents responded to the questionnaire items. The questionnaires were administered and collected using research assistants. Results of findings were analyzed using frequency table and percentages. The questionnaire was based on three factors, "Agree, Disagree, Undecided" – ADU. The result analysis is done based on the output of those aforementioned parameters.

4.0 Result and Findings

Table 1: Frequency rate of the merit of E-learning as the Mechanism for Change in the Advent of Pandemic

S/N	*Options*	*U*		*D*		*A*	
1	Satisfaction level of the students on the online mock test	*38*	*13.6%*	*30*	*10.7%*	*212*	*75.7%*
2	E-Learning was very useful at Quarantine Time	*40*	*14.3%*	*24*	*8.6%*	*216*	*77.1%*
3	It makes knowledge wider	*9*	*3.2%*	*5*	*1.8%*	*266*	*95%*
4	Improvement of student's self-study skill	*5*	*1.8%*	*3*	*1.1%*	*272*	*97.1%*
5	Contribution of E-learning bring a social change	*5*	*1.8%*	*3*	*1.1%*	*272*	*97.1%*

Table 1 above shows the frequency rate of the merit of E-learning as the Mechanism for Change in the Advent of Pandemic. The data reveals that 75.7% of the respondents agreed with satisfactory level of the students' online mock test. A significant 77.1% of the respondents also opined that E-learning was very useful at quarantine time and 95% of the respondents also believed that E-learning makes knowledge wider. 97.1% of the respondents opined that E-learning brings about improvement of student's self-study skill, and also contribution of E-learning brings a social change. The advantages, impacts, improvement, and facelift brought to education by E-learning is numerous and impeccable. It can be simply stated that E-learning is the future of knowledge acquisition.

Table 2: Frequency rate of the challenges faced by E-learning

S/N	***Options***	***U***		***D***		***A***	
1	E-learning is even worse in rural areas compared to urban due to lack of infrastructure	*6*	*2.1%*	*24*	*8.6%*	*250*	*89.3%*
2	It is not succeeded always because of a lack of connectivity	*7*	*2.5%*	*8*	*2.9%*	*265*	*94.6%*
3	Erratic power supply	*5*	*1.8%*	*3*	*1.1%*	*272*	*97.1%*
4	Insufficient bandwidth	*5*	*1.8%*	*5*	*1.8%*	*270*	*96.4%*
5	Lack of technical IT knowledge by students	*7*	*2.5%*	*3*	*1.1%*	*270*	*96.4%*

The data from Table 2 above shows that 89.3% of the respondents believes that E-learning is even worse in rural areas compared to urban due to lack of infrastructure. Constant change of software and hardware is an issue that is yet to be addressed as 94.6% of the respondents believed E-learning is not succeeded always because of a lack of connectivity. 97.1% of the respondents opined that erratic power supply is still a major difficulty towards smooth operation of e-library and ICT. Insufficient bandwidth and lack of technical IT knowledge by library staff remain unresolved and needs proper consideration as 96.4% of the respondents stated that both challenges should be addressed. However, this study proffered solutions to the challenges stated above.

5.0 Conclusion and Recommendations

5.1 Conclusion

E-learning seems to be the forthcoming trend. It has been extending widespread. The online method of learning is best suited for everyone. Depending on their availability and comfort, many people choose to learn at a convenient time. This enables the learner to access updated content whenever they want it. Due to the wide set of benefits, it gives to students. The findings of the study reflect the impact of E-learning, students' interest in using E-learning resources, and their performance. However, common factors affecting developing countries should be looked into and carefully addressed as E-learning pose as the weapon to counter emergence period such as the recent COVID-19 crisis. Last, solutions such as; making emergency preparedness plans for unexpected problems, strengthening students' active learning ability outside of class, dividing the teaching content into smaller units to help students focus, combining online learning and offline self-learning effectively, among others were proffered.

5.2 Recommendations

The followings are recommended:
i.

- There should be a high level of awareness of students towards E-learning so as to aid complacency during emergence period.
- Information Technology (IT) trainings should be organized for students and Academic Staff alike in order to elevate the low level of IT know-how of E-learning users.
- A procedure should be put in place so as to manage the “no Phone, no Laptop, etc” challenges faced by students.
- E-learning is highly dependable on a strong internet connection with the high band. Government should work towards upgrade and improvement in the area of network coverage.

- Issue of power supply is so pressing, tackling it will really uplift many sectors in this nation including E-learning.

- Network provide should be mandated to provide improved bandwidth in order to aid fast and efficient E-learning.

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ANALYSIS OF CLAD BEAD WIDTH RESPONSE ON MILD STEEL METAL GEOMETRY

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Abstract

The research showed the statistical analysis of clad bead width on mild steel metal geometry. The statistical analysis was performed using response surface method of statistics. The analysis of variance (ANOVA) shows that the Model F-value of 8.95 which implies that the model is significant. There is only a 0.23% chance that an F-value this large could occur due to noise. Probability values of less than 0.0500 indicate model terms are significant. The lack of fit for F-value of 1.05 implies the lack of fit is not significant relative to the pure error. There is a 51.67% chance that a Lack of Fit for F-value this large could occur due to noise. Non-significant lack of fit is good and makes the model more fit. The coefficient of determination of the parameters (R-squared) is 0.9249. The predicted R-Squared of 0.9249 is close to the adjusted R-Squared of 0.8215; however, the difference is not more than 0.2 which is of reasonable agreement. Adequate Precision measures the signal to noise ratio of 10.757, which indicates an adequate signal in the data. The fraction of design space plot, perturbation plot, normal probability plot and the cook's distance plot show less residuals and more fitness of the data which is good in making the parameters very efficient and more effective in modeling the process. The research achieved reasonable and appropriate statistical results which portray the parameters in the system. Finally, the results are recommended for understanding the influence of the parameters in clad height of reinforcement on mild steel cladding weld metals geometry.

Key words: Cladding; bead width; significant; Response Surface Method; Statistical analysis; Analysis of variance; Mild Steel

INTRODUCTION

Amandeep et al (2008), Weld cladding is a process for producing surfaces with good corrosion resistant properties by means of laying of stainless steels on low-carbon steel components with an objective of achieving maximum economy and enhanced life. The aim of the work presented here was to investigate the effect of auxiliary preheating of the solid filler wire in mechanized gas metal arc welding (GMAW) process (by using a specially designed torch to preheat the filler wire independently, before its emergence from the torch) on the quality of the as-welded single layer stainless steel overlays. External preheating of the filler wire resulted in greater contribution of arc energy by resistive heating due to which significant drop in the main welding current values and hence low dilution levels were observed. Metallurgical aspects of the as welded overlays such as chemistry, ferrite content, and modes of solidification were studied to evaluate their suitability for service and it was found that claddings obtained through the preheating arrangement, besides higher ferrite content, possessed higher content of chromium, nickel, and molybdenum and lower content of carbon as compared to conventional GMAW claddings, thereby giving overlays with superior mechanical and corrosion resistance properties. The findings of this study not only establish the technical superiority of the new process, but also, owing to its productivity-enhanced features, justify its use for low-cost surfacing applications Palani &Murugan (2007) discussed the influence of welding process parameters on the content of delta ferrite in the claddings of AISI 317L, deposited onto IS: 2062 structural steel plate by the flux cored arc welding (FCAW) process. Measurement of delta ferrite within the cladding often gives important insight into the future mechanical and corrosion resistant behavior of the clad structures. To predict and control the amount of residual ferrite, regression models were developed in terms of process parameters, using the data obtained from experiments. The experiments were conducted by using a central composite rotatable design of experiments. The study revealed that the cladding process parameters have influence over the formation of delta ferrite. Shirmohammadi et al (2007), presents an age based nonlinear optimization model to determine the optimal preventive maintenance schedule for a single component system. Sreeraj, and Kannan (2015), improve the corrosion-resistant properties of carbon steel, usually cladding process is used. It is a process of depositing a thick layer of corrosion-resistant material over carbon steel plate. Most of the engineering applications require high strength and corrosion resistant materials for long-term reliability and performance. Cladding these properties can be achieved with minimum cost. The main problem faced in cladding is the selection of optimum combinations of process parameters for achieving quality clad and hence good clad bead geometry. This paper highlights an experimental study to predict various input process parameters to get optimum dilution in stainless steel cladding of low carbon structural steel plates using Gas Metal Arc Welding (GMAW). Experiments were conducted based on central composite rotatable design with full replication technique, and mathematical models were developed using multiple regression method. The developed models have been checked for adequacy and significance. Using Artificial Neural Network (ANN) the parameters were predicted, and percentage of error was calculated between predicted and actual values. The direct and interaction effects of process parameters on clad bead geometry are presented in graphical form. Sreeraj et al (2013), shows that cladding is a surface modification process in which a specially designed alloy is surface welded in order to enhance corrosion resistant properties. Common cladding techniques include Gas Tungsten Arc Welding (GTAW), submerged arc welding (SAW) and gas metal arc welding (GMAW). Because of high reliability, easiness in operation, high penetration good surface finish and high productivity gas metal arc welding became a natural choice for fabrication industries. This paper presents central composite rotatable design with full replication techniques to predict four critical dimensions of bead geometry. The second order regression method was developed to study the correlations. The developed models have been checked for adequacy and significance. The main and interaction effects of process variables and bead geometry were presented in graphical form. Using fmincon function the process parameters were optimized.

Review of Literature

Most of the solids used are technical materials consisting of crystalline solids in which the atoms or ions are arranged in a repetitive geometric pattern called a lattice structure. The only exception is glass materials that combine super cooled liquid and polymers that are aggregates of large organic molecules (Cary and Helzer, 2005). The use of compressed gases and flames in many welding processes poses a risk of explosion and fire. Some common precautions include limiting the amount of oxygen in the air and keeping combustible materials away from the workplace (James and John, 2008). Tungsten electrodes are often used in lighting, but they do not bind to quartz glass, so tungsten is often moistened with molten borosilicate glass, which binds to tungsten and quartz. However, care must be taken to ensure that all materials have similar thermal expansion coefficients to prevent cracking when the object cools and when it is heated again. Frequently, special alloys are used for this purpose, ensuring that the coefficients of expansion coincide and, sometimes, fine metallic coatings are applied to a metal to create a good bond with the glass (Bernard, 1921; David et al, 2003).

Statistics Analysis

Statistics is the study of the collection, organization, analysis, interpretation and presentation of data (Dodge, 2006). It deals with all aspects of the data, including the planning of data collection in terms of the design of surveys and experiments (Dodge, 2006). The word statistical, when referring to scientific discipline, is unique, as in statistics is an art (Statistics, 2016). This should not be confused with the word statistical, referring to an amount calculated from a set of data (Statistics, 2016). A higher probability density is found the closer the expected average value approaches in a normal distribution. The statistics used in the evaluation of standardized tests are shown. Scales include standard deviations, cumulative percentages, percentile equivalents, Z scores, T scores, standard nines, and percentages in standard nines. Statistics are alternatively described as a mathematical body of science that pertains to the collection, analysis, interpretation or explanation and presentation of data (Moses, 1986) or as a branch of mathematics (Hays, 1973) related to the collection and interpretation of data. Due to their empirical roots and their focus on applications, statistics are generally considered a different mathematical science and not a branch of mathematics (Moore, 1992; Chance, 2005). Some tasks that a statistician may involve are less mathematical; For example, make sure that the data collection is done in a way that generates valid conclusions, codifies the data or reports the results in a comprehensible way for those who should use them. Statisticians improve the quality of data by developing specific experiment designs and sample surveys. The statistics themselves also provide tools for the prediction and forecasting of the use of data and statistical models. The statistics apply to a wide variety of academic disciplines, including natural and social sciences, government and business. Statistical consultants can help organizations and companies that do not have relevant internal expertise for their particular questions. Statistical methods can summarize or describe a data collection. This is called descriptive statistics.

This is particularly useful for communicating the results of experiments and investigations. In addition, the data patterns can be modeled in a way that takes into account the randomness and uncertainty in the observations. These models can be used to extract inferences about the process or population under study, a practice called inferential statistics. Inference is a vital element of scientific advance, since it provides a way to draw conclusions from data that are subject to random variations. To test the propositions that are being investigated further, the conclusions are also tested, as part of the scientific method. The descriptive statistics and the analysis of new data tend to provide more information about the truth of the proposition. The statistics applied include descriptive statistics and the application of inferential statistics (Anderson, 1994). Theoretical statistics refer both to the logical arguments that underlie the justification of statistical inference approaches and to mathematical statistics. Mathematical statistics includes not only the manipulation of the probability distributions necessary to obtain results related to estimation and inference methods, but also several aspects of computational statistics and the design of experiments. The statistics are closely related to the theory of probability, with which they are often grouped. The difference is, approximately, that the theory of probability begins from the given parameters of a total population to deduce the probabilities that belong to the samples. However, the statistical inference moves in the opposite direction by inductively inferring the samples to the parameters of a larger or total population. Statistics have many links to machine learning and data mining.

Gladys et al (2017) expressed that in many mixed process experiments, restricted randomization occurs and split plot designs are commonly used to handle these situations. The study used the optimization criteria to compare the efficiency of the designs constructed and the fraction of the spatial design plots were used to evaluate the prediction properties of the two designs. The optimal I-design of divided plots was preferred since it had the capacity of better prediction properties and precision in the measurement of the coefficients. Shamsad and Saeid (2014), proposed a step-by-step statistical approach that can be used to obtain an optimal dosage of concrete mixtures using the data obtained through a statistically planned experimental program. The statistical model developed was used to show how the optimization of concrete mixtures can be carried out with different possible options. Liem (2018) shows that the factors in a mixing experiment are the ingredients or components of a mixture, and the response is a function of the proportion of each ingredient. These proportional amounts of each ingredient are typically measured by weight, volume or molar ratio. The design, execution and analysis of mixed experiments require different approaches to those used for factorial experiments. Eutimio et al (2013) shows that most of the statistical tools currently applied in the area of bioprocesses were discussed and classified. The three main categories were: fair comparison of results, mathematical models for poorly studied systems and taking advantage of a large volume of data to improve robustness and efficiency. For each statistical technique, an example of the literature was discussed to demonstrate its usefulness in bioprocess problems. However, a graph was constructed to guide researchers to select the correct statistical technique according to the specific problem of bioprocessing. Achebo (2012), investigating the forces responsible for the detachment of molten metal droplets formed at the tip of an electrode, which imminently and eventually fall into the welding bath during the welding process.

Methodology

The method adopted is the application of statistical tool to portray the data and to understand the behavior of the data statistically. Twenty (20) experimental runs were conducted to ascertain the design and to explore the system more effectively. The application of response surface method with the use of central composite design tool was adopted to statistically analyze the data. The design model developed for the system is a cubic polynomial nonlinear model. The result shows that the data is fit and good for analysis and to model.

Clad Bead Width Modeling, Analysis and Prediction

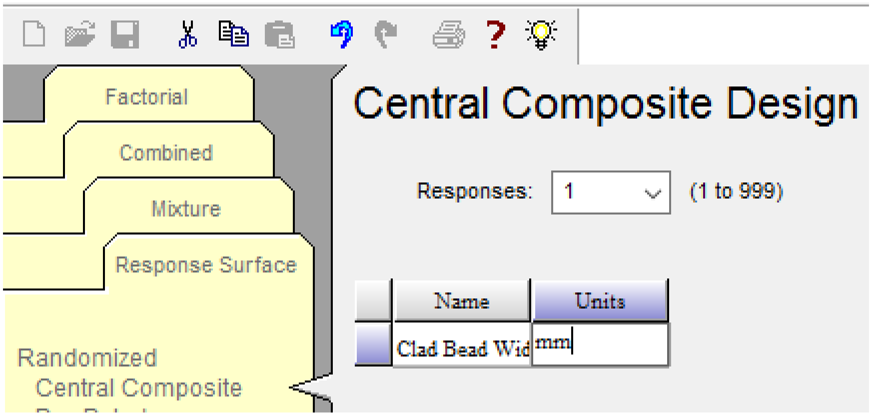

Fig 1 Clad Bead Width Modeling

The application of response surface method using central composite design was made to understand the need and influence of the welding process factors in the system.

Table 1 Design Summary for the Factors

Factor	Name	Units	Type	Subtype	Mini	Maxi	Coded	Values	Mean	Std. Dev.
A	Gas Flow Rate	mm/s	Numeric	Continuous	10	16	-1.000=10	1.000=16	13	2.38416
B	Welding Speed	m/s	Numeric	Continuous	90	145	-1.000=90	1.000=145	116.125	22.7034
C	Welding Voltage	V	Numeric	Continuous	18	24	-1.000=18	1.000=24	20.7	2.55672
D	Welding Current	Amp	Numeric	Continuous	180	240	-1.000=180	1.000=240	208.5	24.7673

The table above shows the design summary for the welding process factors and its statistical influence in the system. It shows the minimum and the maximum values used for the experiment. It reveals the mean and the standard deviation of the choose values.

Table 2 Design Summary for the Response Variable

Response	Name	Units	Obs	Analysis	Minimum	Maximum	Mean	Std. Dev.	Ratio	Trans	Model
R1	Clad Bead Width	mm	20	Polynomial	5.8	16.2	10.926	2.73539	2.7931	None	RCubic

Table two (2) above shows the design summary for the response variable and its statistical influence in the system. It shows the minimum and the maximum values for the experiment. It reveals the mean and the standard deviation of the experimental results gotten from the experiment. The model developed for the response is a cubic polynomial model.

Table 3: ANOVA for Clad Bead Width Response Surface Reduced to Cubic model

Source	Sum of Squares	df	Mean Square	F- Value	p-value (Prob > F)	
Model	131.48	11	11.95	8.95	0.0023	significant
A-Gas Flow Rate	*15.42*	*1*	*15.42*	*11.55*	*0.0094*	
B-Welding Speed	*13.40*	*1*	*13.40*	*10.04*	*0.0132*	
C-Welding VOltage	*30.95*	*1*	*30.95*	*23.18*	*0.0013*	
D-Welding Current	*12.19*	*1*	*12.19*	*9.13*	*0.0165*	
BC	*3.98*	*1*	*3.98*	*2.98*	*0.1226*	
BD	*0.67*	*1*	*0.67*	*0.50*	*0.4991*	
CD	*1.68*	*1*	*1.68*	*1.25*	*0.2951*	
A^2	*17.41*	*1*	*17.41*	*13.04*	*0.0069*	
D^2	*0.92*	*1*	*0.92*	*0.69*	*0.4308*	
BCD	*4.75*	*1*	*4.75*	*3.56*	*0.0959*	
CD^2	*22.21*	*1*	*22.21*	*16.63*	*0.0035*	
Residual	10.68	8	1.34			
Lack of Fit	*6.80*	*5*	*1.36*	*1.05*	*0.5167*	*not significant*
Pure Error	*3.88*	*3*	*1.29*			
Cor Total	142.16	19				

The table above represents the analysis of variance (ANOVA) for the model and the factors in the system. The Model F-value of 8.95 implies the model is significant. There is only a 0.23% chance that an F-value this large could occur due to noise. Values of Probability less than 0.0500 indicate model terms are significant. In this case A, B, C, D, A^2, CD^2 are significant model terms. Values greater than 0.1000 indicate the model terms are not significant. If there are many insignificant model terms, model reduction may improve your model. The analysis of variance revealed the significant of the model developed with the significant value of 0.0023. The "Lack of Fit F-value" of 1.05 implies the Lack of Fit is not significant relative to the pure error. There is a 51.67% chance that a lack of fit F-value this large could occur due to noise. Non-significant lack of fit is good and it makes the model to be fit and more appropriate. However, the residuals in the model have insignificant lack of fit with a value of 0.5167. The pure error in the system shows a mean square of 1.29, this means that the error in the system is very minimal and can be significant to the modeling of the system.

Table 4 Model Summary

Std. Dev.	1.16	R-Squared	0.9249
Mean	10.93	Adj R-Squared	0.8215
C.V. %	10.58	Pred R-Squared	0.0952
PRESS	128.63	Adeq Precision	10.757
-2 Log Likelihood	44.22	BIC	80.17
		AICc	112.79

Table 4 above shows the model summary of the statistical model developed. The standard deviation and mean of the model is 1.16 and 10.93 respectively. The confidence value around the mean is 10.58 percent. The table shows the standard deviation, mean, confident value, probability error sum of square, R-Square, adjusted R-Square, Predicted R-Square, adequate R-Square, Bayesian information criterion and Akaike information criterion. The predicted R-Squared of 0.9249 is not as close to the adjusted R-Squared of 0.8215 as one might normally expect; that's the difference is more than 0.2. This may indicate a large block effect or a possible problem with your model and/or data. Things to consider are model reduction, response transformation, outliers, etc. All empirical models should be tested by doing confirmation runs. Adequate Precision measures the signal to noise ratio. A ratio greater than 4 is desirable. Your ratio of 10.757 indicates an adequate signal. This model can be used to navigate the design space. The higher the BIC and AICc the better the model; from the model summary table, the BIC and AICc values are 80.17 and 112.79 respectively, which represent that the model is fit and adequate. However, BIC and AICc that is greater than 10 are fit and adequate.

Table 5 Coefficient Estimation Table

Factor	Coefficient Estimate	df	Standard Error	95% CI Low	95% CI High	VIF
Intercept	9.37	1	0.93	7.22	11.52	
A-Gas Flow Rate	-1.77	1	0.52	-2.97	-0.57	2.43
B-Welding Speed	-1.82	1	0.57	-3.15	-0.50	3.21
C-Welding Voltage	-4.27	1	0.89	-6.32	-2.22	8.13
D-Welding Current	1.38	1	0.46	0.33	2.44	2.03
BC	1.19	1	0.69	-0.40	2.78	3.20
BD	0.45	1	0.64	-1.02	1.92	2.73
CD	-0.63	1	0.56	-1.93	0.67	2.13
A^2	3.36	1	0.93	1.21	5.50	3.11
D^2	-0.66	1	0.80	-2.50	1.18	2.17
BCD	1.45	1	0.77	-0.32	3.22	2.30
CD^2	4.86	1	1.19	2.11	7.60	9.50

The table above shows the coefficient estimation of the welding input process factors which expressed that the model developed is a nonlinear model. The table also revealed the standard error in the coefficient. In addition it expressed the confidence intervals in the coefficient estimation. The standard errors of the estimated coefficients hovers towards the zero mean. This shows that the error in the estimated coefficient is negligible. Furthermore, it conforms to insignificant of the errors lack of fit in the model. The results of the confidence interval show that the lower and the upper levels for confidence interval is ninety five percent (95%) estimate of the coefficient for the model.

Final Equation in Terms of Coded Factors:
Clad Bead Width = +9.37 - 1.77*A - 1.82*B - 4.27*C + 1.38*D + 1.19*BC + 0.45*BD - 0.63*CD + 3.36*A^2 - 0.66*D^2 + 1.45*BCD + 4.86*CD^2

The equation in terms of coded factors can be used to make predictions about the response for given levels of each factor. By default, the high levels of the factors are coded as +1 and the low levels of the factors are coded as -1. The coded equation is useful for identifying the relative impact of the factors by comparing the factor coefficients. The coded factors A, B, C and D represents gas flow rate, welding speed, welding voltage and welding current respectively. The model can be applied to predict the response variable.

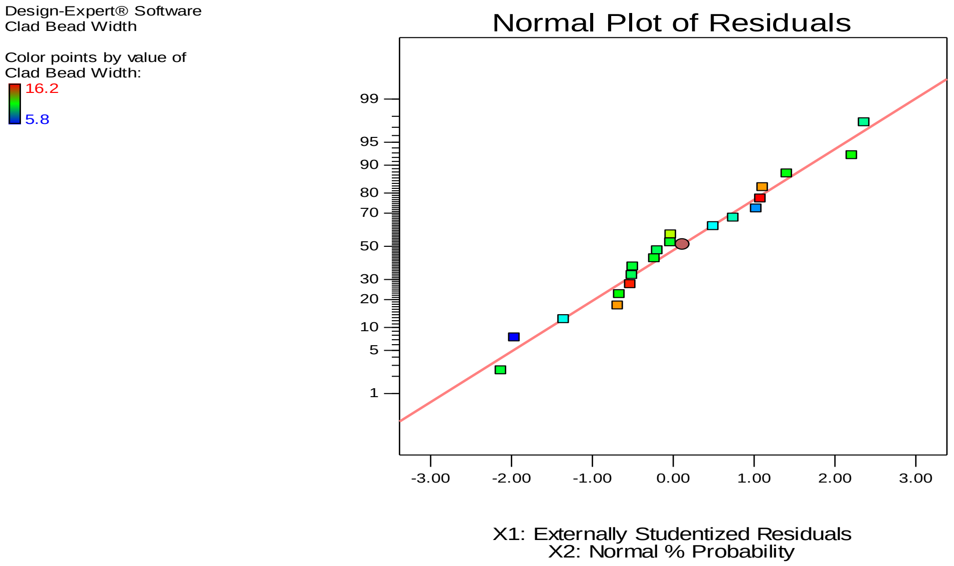

Fig. 2Normal Probability Plot

Normal probability plot of the studentized residuals is to check for normality of residuals in the data used to model the system. The plot shows that the number of experimental runs around the mean tends towards zero error in the experiment conducted. This shows that the results are achievable with less error in the system.

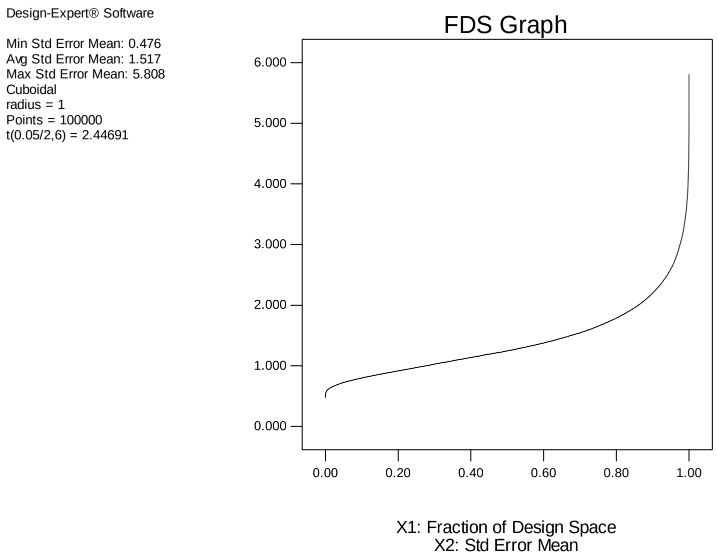

Fig. 3Fraction of Design Space Graph

The fraction of design space of the welding input process factors are desirable especially towards the pick of the factors used in the system. The graph is within the design limits needed for effective desirability. The design space of the model and its diagnostic plot is adequate to model the system.

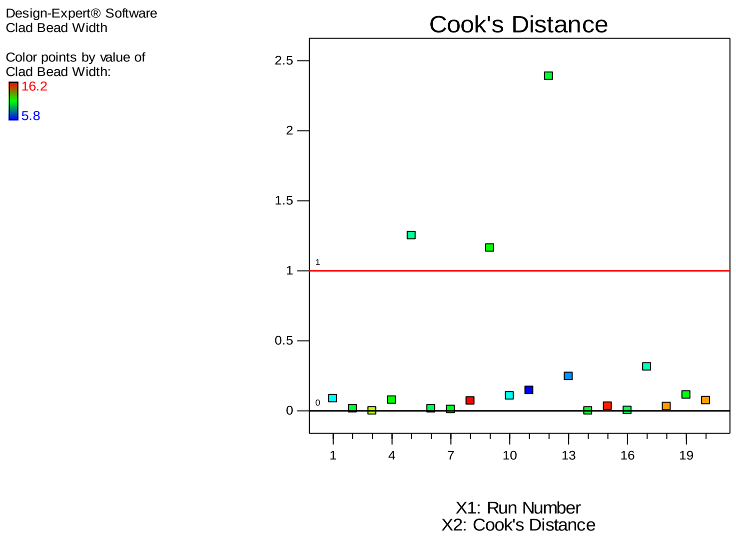

Fig. 4 Cook Distance Plot

Cook's distance plot looks for outliers that are influential values among the experimental trials in the system. The outliers are values that are above 1 or below 0. The numbers of outliers in the system are negligible and the levels of influence of the outliers are not strong but insignificance.

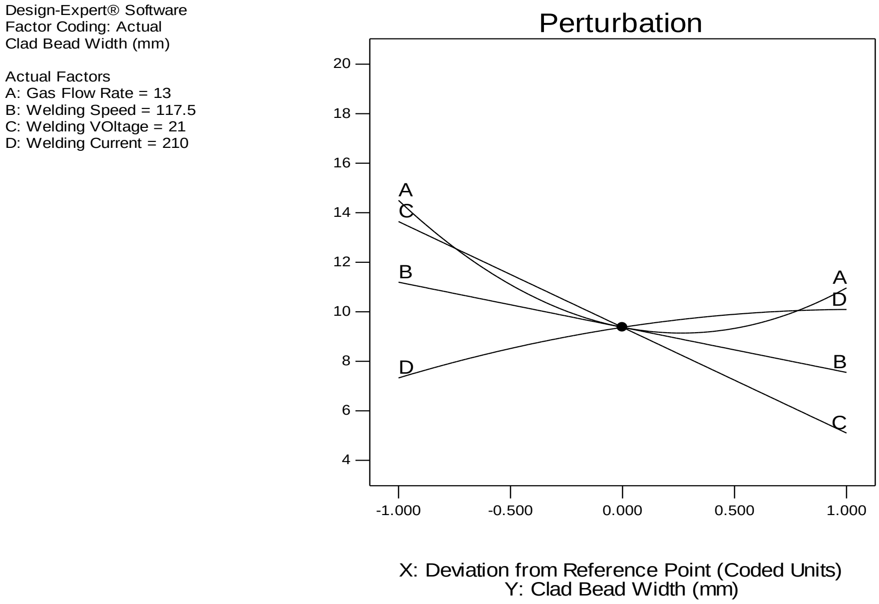

Fig. 5 Perturbation Plot

The perturbation plot shows the influence of the welding input process factors used in the system. It expressed the negative and the positive influence of the process factors in the system. The plot shows that gas flow rate (that's factor A) is more influential both negative and positive influence.

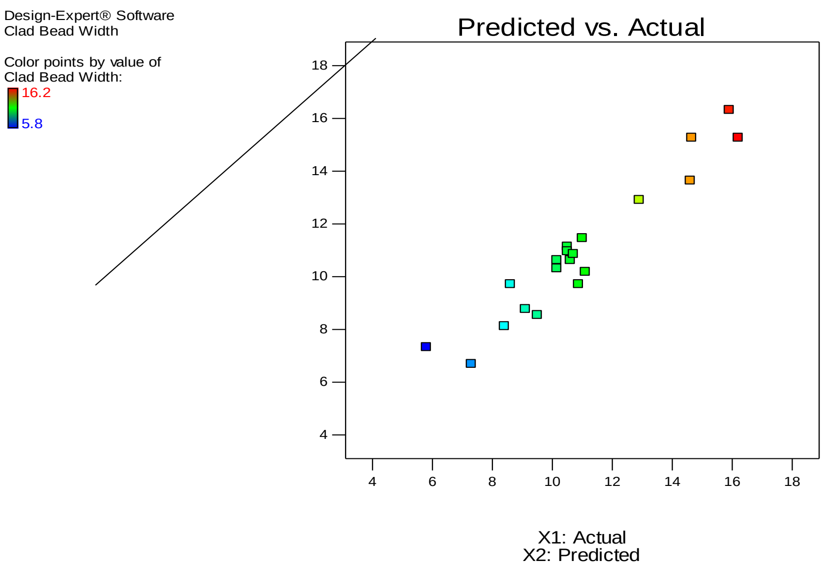

Fig. 6 Actual Versus Predicted Values Plot

The actual values versus predicted values plot is to check for errors in the values and to understand the rate at which the error occurs. The result shows that there's less error between the predicted and the actual values in the experimental trials.

Conclusion

The research expressed the statistical goodness of fit and the adequacy of the experimental data used for the trials. The application of various statistical tools like descriptive statistics, analysis of Variance, coefficient estimation analysis, model summary, normality plot, perturbation plot and cook's distance were implored to evaluate and to explore the experimental data statistically. The statistical results show that the experimental data are fit to model and to analyze. It further expressed that there's less error in the experimental trials and the model developed is significant. The results portray the data statistically to understand the data and the experimental trials conducted for the system.

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AUTOMATED POULTRY FEEDING AND DRINKING MACHINE USING MICROCONTROLLER

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Abstract

In the early years, poultry farming in the tropics has led to a high cost on farmers due to the manual feeding pattern. This in turn gives a low return on yields and profit. The set back of manual feeding and drinking pattern in the poultry farming are as a result of contamination of the poultry feed and water and wastage. Also the monitoring of the birds and administration of the feed using manual pattern feeding are stressful and tedious and this help to bring about the automated microcontroller poultry feeding and drinking machine that helps in reducing the stress and fatigue involved in the manual pattern and this system can perform more effective operation compare to the manual pattern of feeding the birds. The system consist of relay, sensor, water tank, feed silo, power supply and Arduino microcontroller which is the main controller of the system. With the aid of the microcontroller automated poultry feeding and drinking machine, the birds will be taking clean and good water as they feed on uncontaminated poultry feed. The result after successful performance evaluation of the system showed that the system can be used by farmers to easily administer feed and water to poultry bird as all forms of contamination due to human dirt and uncleanliness have been reduced to the barest minimum. The use of the automated system will also guarantee high return on yield and profit.

Keywords: Arduino Microcontroller. Sensors, Relays, Water Tank, Birds etc

1.0 INTRODUCTION

Poultry farming is still carried out manually in the tropics at an exorbitant cost with low return on investment despite the benefits of Precision Farming to livestock management. Poultry is the rearing of a group of birds such as domestic chickens, geese, turkeys and guinea fowls for the primary purpose of egg and meat production (Olaniyi, Salami, Adewumi and Ajibola, 2014).
The poultry industry contributes greatly to the development of the Nigerian economy as it serves as a major source of egg and meat which have a high nutritional value in the supply of protein. There are mainly four management systems employed in the rearing of poultry birds which are the Free Range system, Battery Cage system, Deep Litter system and Perchery houses (Afolami, Aladejebi and Okojie, 2013).

The cost of production in poultry farming is aggravated due to the challenge of manual pattern of feeding. 75% of the cost of production in poultry management could be traced to the expenses on feeding. Wastage of feed, improper administration of feed, unfavorable weather in the poultry, stressful manual labour , disease outbreak, fatigue are all effects of the manual system of feeding. These factors make the cost of production in poultry to be highly capital intensive and unfortunately, people are discouraged from venturing into poultry business due to these factors. Moreover, job such as picking of eggs lay by matured layers, medication of sick birds and overhauling of the litter material interferes with feeding. Thereby, making the pressure that the farmers experiences to increase as the number of birds increases Adedinsewo, O. (2004).
In Arulogun et al, (2010) a mobile intelligent poultry feed dispensing system was developed. The system was able to move, detect and avoid obstructions and dispense solid feed to poultry birds. But some of the limitations of this system were that it could not dispense liquid feed and the solid feed was not only unhygienically dispensed, dispensed was too large for the chicks to feed on.

The flaws mentioned above prompted the development of technologies that could tackle and solve some of the flaws in the most current system of feeding poultry in the tropics; intervention of the development of feed dispensing system that could supply water to birds at appropriate time intervals, the researchers developed a system of this nature. The operation of this proposed system was contingent of computer system to function. In addition, the system could not sense obstruction while operating. Also in the year 2006, a similar system was proposed by the operation of this system depends on its position (could only move in horizontal and vertical direction axis). Limitation of dependence on the control program written on computer systems was associated with the proposed system whereby, parallel port is the medium through which control program delivers operation to the system. Unfortunately, cross talk, high initial cost of the computer process control, high maintenance and declination in the level of performance in long distance parallel transmission are problems that could be attributed to the computer parallel port Arulogun, et al (2010).

Solution to some of the limitations in the existing literatures led to the development of a mobile intelligent poultry feed dispensing system. The principle of implementing a microcontroller as the process controller instead of the program written on the computer system was adopted in this system. The system proposed dispenses feed on the pen' floor as it operate. Therefore, unhygienic method of feed dispensing and wastage of feed is associated with the model. Besides, large number of birds could not be fed uniformly with this model Odunsi, A. (2010).
Nevertheless, only feed is catered for in this model. Water is still expected to be manually dispensed for the birds, which could still be attributed to over human involvement in the feeding system of birds. These limitations highlighted above necessitate for the emergence of a system that would be capable of dispensing both the liquid feed (water) and solid feed (grains) simultaneously into the respective feeding trough in a hygienic manner. The design of a system of this nature is proposed in this research paper ChuenChien Lee, (2004).

2.0 LITERATURE REVIEW

Rearing of a collective group of birds such as turkeys, guinea fowls, quails, ostriches, geese and domestic chickens is referred to as poultry. Egg and meat production are the primary purpose of keeping these birds. Other purpose includes pillow production through the industrial processing of the birds' feather and production of confectioneries .The primary production of meat and egg in poultry management is indispensable which makes poultry industry one of the main sources of protein for human consumption. Effective management of poultry nutrition would definitely result to a tremendous production. Whereas, feeding of birds is driven manually in the tropic. (Olaniyi, Salami, Adewumi and Ajibola, 2014).

The poultry industry contributes greatly to the development of the Nigerian economy as it serves as a major source of egg and meat which have a high nutritional value in the supply of protein. There are mainly four management systems employed in the rearing of poultry birds which are the Free Range system, Battery Cage system, Deep Litter system and Perchery houses (Afolami, Aladejebi and Okojie, 2013).

To maintain healthy birds, keep fresh feed available at all times. Limit the amount of feed in feeders to the extent necessary to avoid waste. It is a good practice to fill hanging feeders only three-fourths full, and trough feeders only two-thirds full. For efficient feeding, keep the lip of the feeder pan in a hanging tube-type feeder at the level of the birds' backs. Store feed carefully, in a dry, rat- and mouse-proof place, where it will not be subject to damage from moisture or losses from rodents. A large galvanized garbage can with a tight lid makes an excellent storage container for your feed.BRIONES, Nicomedes (2010).

Timing and Motion Sensors is also a considerations for energy efficient lighting systems include the use of timers, programmed to turn lights on/off to meet daily livestock needs and motion sensors in personnel areas such as hallways and entrance ways. Recent innovations include: A controller that will gradually turn light intensity up and down to simulate the sun. These controllers allow an operator to do this many times in a day. A controller that uses a photocell to change the light intensity as required from each row of lights. This is useful where a barn has translucent sidewall openings and canthus use the natural light as required and save substantial energy.Hussien, S.Y.S., Jaafar, H.I., Selamat, N.A., Daud, F.S. and Abidin, A.F.Z. (2014). Poultry farms and processing plants vary in function, size, layout and degree of mechanization. Lighting needs vary with production type and task. The amount and length of time light is required by the birds is different from what the worker requirements. Poultry farming is still carried out manually in the tropics at an exorbitant cost with low return on investment despite the benefits of Precision Farming to livestock management. Poultry is the rearing of a group of birds such as domestic chickens, geese, turkeys and guinea fowls for the primary purpose of egg and meat production (Olaniyi, Salami, Adewumi and Ajibola, 2014).

A properly designed, energy efficient light system will enhance productivity, and save maintenance and electrical operating costs. So review the lighting in your poultry operation and consider if changes are needed for better energy efficiency and cost savings. Using dimmers can also reduce energy costs. By making these changes, along with other improvements, your poultry operation lighting system will be more energy efficient. This can lead to improved farm productivity and increased revenue, while lowering energy costs .Arulogun et al, (2010).

Small scale and semi-commercial animal production is seen as a vital link in reducing poverty and hunger in developing countries. Worldwide there are different agencies involved in improving poultry production for communities in developing countries. Australian researchers are actively involved in projects that can assist poor communities and families by enhancing their poultry production capabilities. (Bai, Q. 2010.)

In addition, Adewumi, (2014) designed and developed an intelligent poultry liquid feed dispensing system using fuzzy logic to address the limitations of Arulogun et al, (2010). Although the system was able to detect the level of the feed and dispense the feed if the level was low, it had limitations such as the inability of dispensing solid feed, immobility and the absence of a mechanism to prevent contamination.

Poultry keeping is making an important contribution to the livelihoods of the most vulnerable rural households in developing countries. Chickens, ducks, geese, guinea fowl all provide a source of income, improve nutrition and help meet family and social obligations. Poultry raised on family farms also make a significant contribution, along with the commercial sector, to meeting the rapidly growing demand for poultry products in many developing countries. In a mobile intelligent poultry feed dispensing system was developed. The system was able to move, detect and avoid obstructions and dispense solid feed to poultry birds. But some of the limitations of this system were that it could not dispense liquid feed and the solid feed was not only unhygienically dispensed, dispensed was too large for the chicks to feed on. Arulogun et al, (2010)

Energy-efficient lighting options present farmers with new opportunities to reduce electricity costs and help manage farms sustainability. Cost-effective energy-efficient lighting can be used to improve productivity and safety, and reduce operating costs. To conserve energy and keep poultry healthy, use timers to switch lights on and off. Supplemental lighting is normally used by alternative egg producers to maintain productivity, and sometimes for alternative broiler production in northern climates. Small layer flocks housed during late spring through mid-summer with daily access to the outdoors do not require supplemental light. Supplemental lighting is necessary for pullets to maintain production during late fall and winters as days shorten. Thangavelusamy, D. and Ponnusamy, L. (2014).

3.0. METHODOLGY

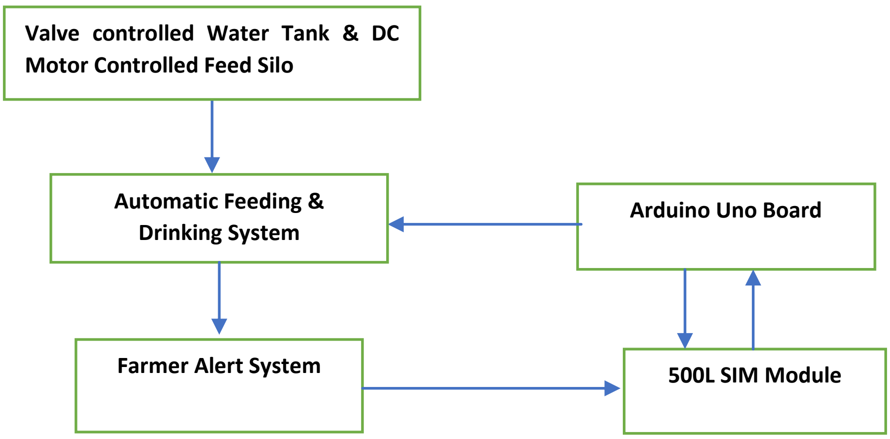

Fig. 3.0: System Overall Block Diagram

The design and construction of the Automatic Poultry Feeding and Drinking System was carried out using available materials locally and imported. The construction of the circuit was carried out on a perforated Vero board after series of testing were made using a breadboard in the laboratory. The design methods or stages shown in fig. 3.0. was used in the research work Components were arranged in such a manner to achieve compactness

- Transistor and resistor were carefully tested before mounting to avoid damaging them and ensure proper functionality.
- Proper polarity of components were maintained while mounting.
- Long interconnections were avoided to maximize stray capacitances.

- Proper soldering at various joints were done to avoid cracked joints, excessive heat that could damage components was avoided.
- The leads of components were cleaned with a piece of memory papers and bent at the correct distance from the components body and inserted properly in its place in the boards.
- All polarized capacitors were carefully inserted in place and soldered to avoid damage to the component and the entire circuit.

3.1. WORKING OPERATION OF THE MACHINE

The automatic feeding and drinking machine for poultry is a simple machine that automatically dispense feed and water to poultry birds based on preset time. Fig 3.1shows the block diagram of the system.
At the center of the system is the Arduino Uno Board that controls and coordinate the working of the system. It sends the required signals to other components of the system based on the system programming which is done using the C++ programming language. The Arduino is powered using a rechargeable DC Power source. Connected to the Arduino are the relay switches that opens automatically to control the water valve and the DC motor that drives the feed silo. These relays starts when all conditions are met based on the system program. To display values and to show the initialization process and 6 by 12 inch LCD Display is connected via the Arduino. A Matrix Keypad is attached to input values into the system. To keep track of the feed time and the clock time a DS3231 Real Time Clock (RTC) is used. The DS3231 RTC keeps track of the current time and via the Arduino, the current time is compared with the feed time set within the system program to determine when to feed the time. Once the feed time equals the clock time the relay switches starts and the water valve and DC Motor starts automatically. The complete Circuit Diagram of the system is shown in fig: 3.2.

The operation of the machine starts by initialization of the preset values in the system. After full machine initialization the machine confirms if the feed level in the reservoir and the water level in the reservoir meets the preset values of 15cm and 17cm respectively. If these values are equal to the preset the machine continues to verify if the feed time is equal to clock time. Feed time is the time programmed in the machine for the birds to be served their feed while clock time is the normal time based on the West African Time (WAT) zone. If the feed time equals clock time the machine automatically starts the feeding process by dispensing feeds into the birds feeding turf. If the returned value at any point of the check is less than the pre-set value or does not equal the expected answer, the system sends an SMS to the farmer who in turn evaluates the results and starts the initialization process again. Fig 3.3 shows the flow chart that represents the operation of the automatic feeding and drinking system.

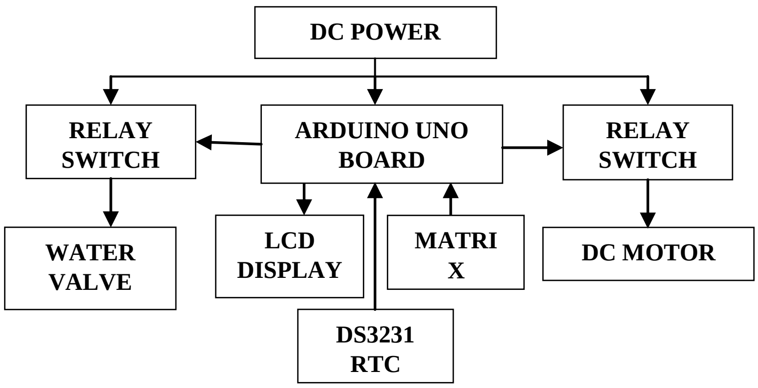

Fig 3.1: Block Diagram of the Automatic Feeding and Drinking System in Poultry

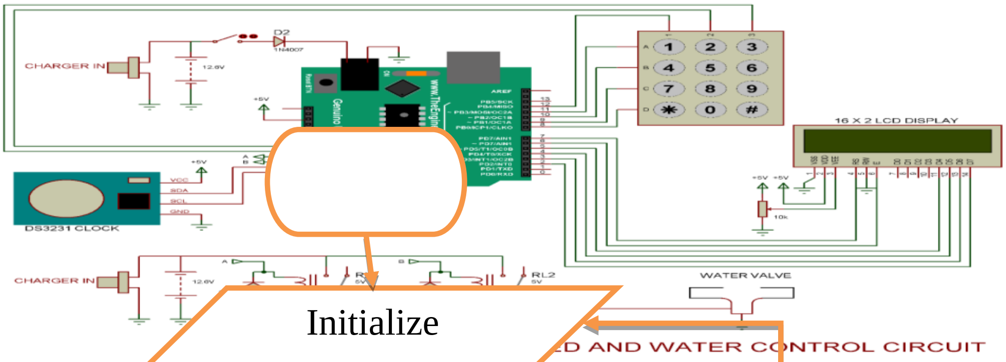

Figure 3.2. Complete System Circuit Diagram

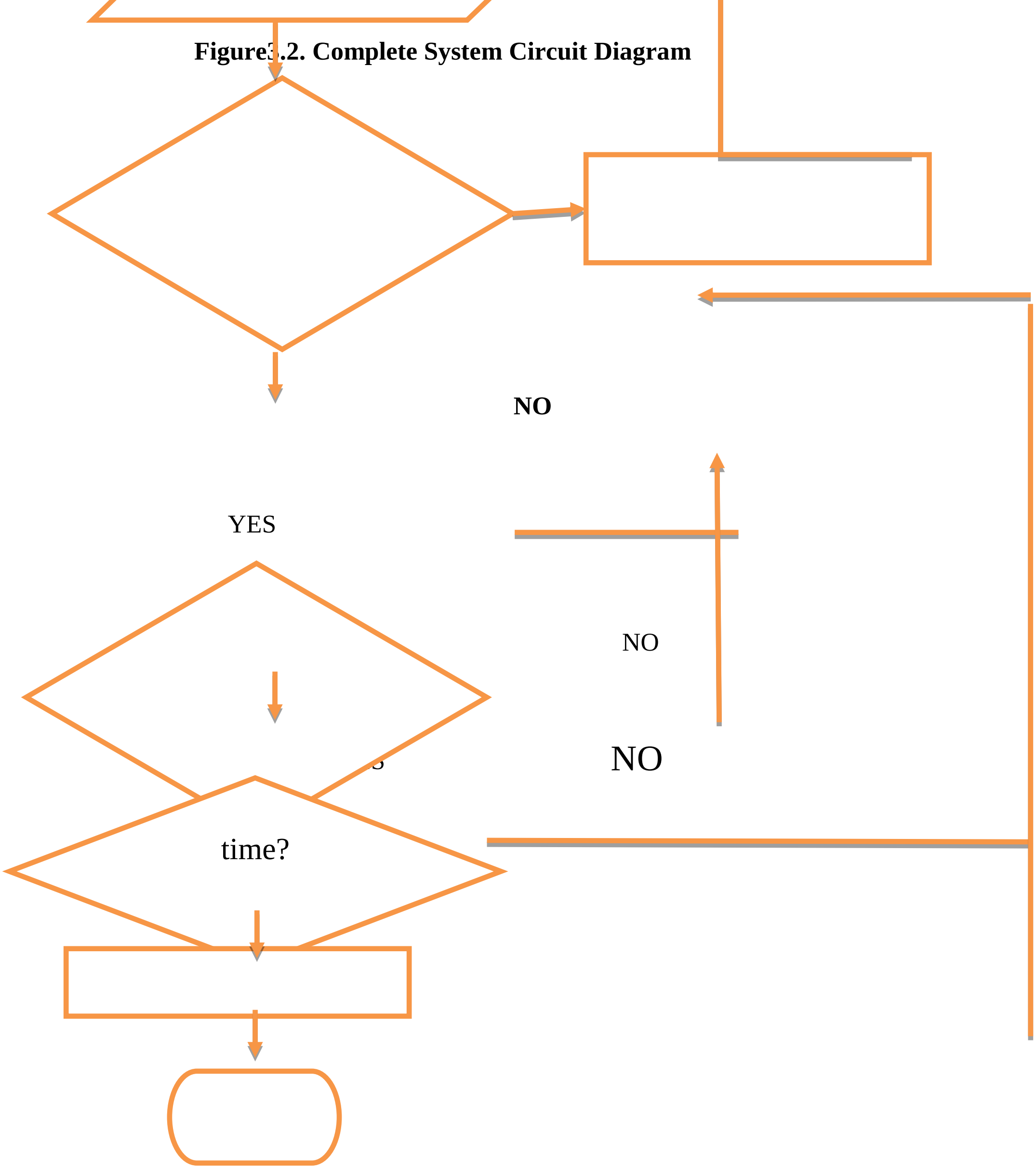

Figure 3.3: The System Flow Chat

To notify the farmer of any error during initialization and of at any stage during use the system is incorporated with an Alert System whose Block Diagram is shown in fig 3.4.
At the center of the Alert system is the Arduino Uno Board powered by a rechargeable DC Power Supply. Connected to the Arduino is a 500L SIM module that receives error message from the main feeding and drinking system and sends same message to the Arduino and the Arduino sends the corrected settings back to the main system via the SIM module. However, the SIM module is powered by a DC converter that is converted from the main power supply using a DC to DC converter. Connected to the Arduino is the Feed Level Sensor and Water Level Sensor in order to compare the expected level with the level received via the SMS module. The Alert System Circuit Diagram is shown in Fig: 3.5.

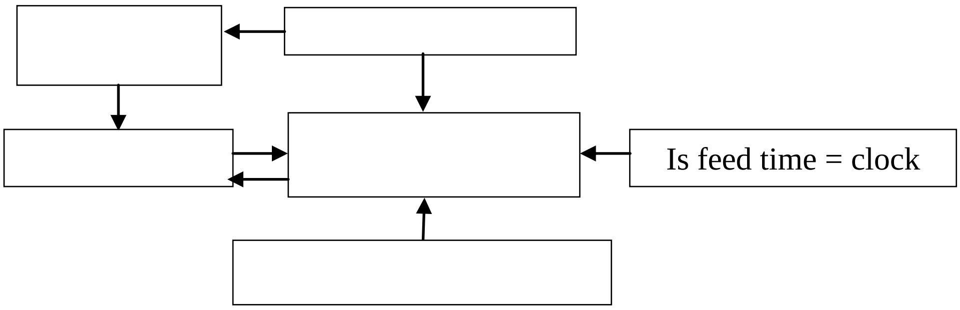

Figure 3.4. Alert System Block Diagram

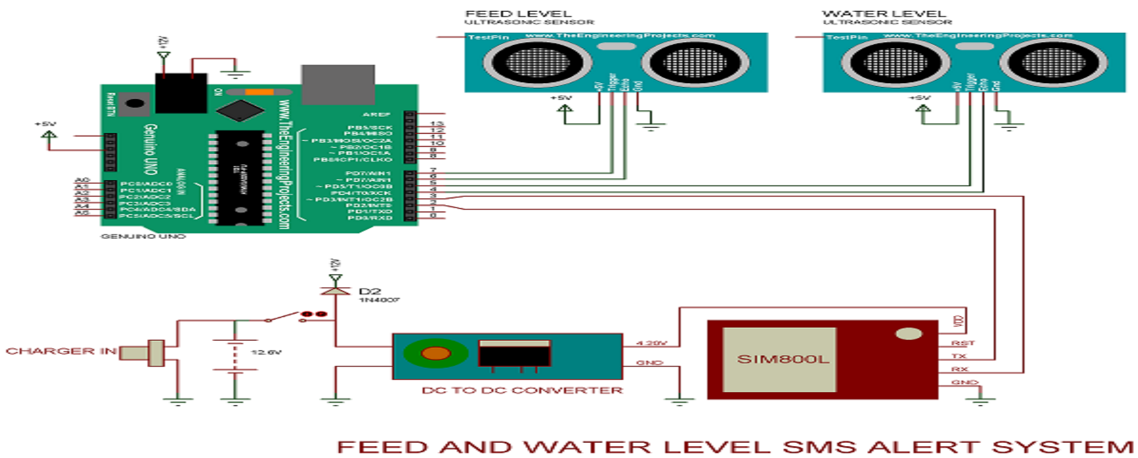

Figure 3.5. Alert System Circuit Diagram

4.0. CONCLUSION

The embedded system is innovative for chicken farming, which changes a traditional farm to a “Smart Farm” or “Intelligent Farm”. The intelligent system can reduce cost, time, and labor. It is highly user friendly to the farmers. This ideal system will improve the human food requirements by improving quality and quantity of chicken. When subjected to use, the system is expected to reduce feed and water wastage by a minimum of 75% and increase yield by at least 40% due to the improved quality of feed and water that is free from contamination. This system will also help in decreasing environment pollution and improving health of poultry labor and chicken consumer.

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ASSESSMENT OF PUBLIC RECEIPT OF GOVERNMENT SPONSORED COVID 19 PALLIATIVES AMONG PEOPLE IN IBARAPA CENTRAL LOCAL GOVERNMENT AREAS OF OYO STATE

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Introduction

Pandemic is a world which has its origin in the ancient Greek language. In its original usage, the word aetiologically means "all", "together" or sometimes "people". Its common synonym in the Greek language is "epidemic". This explains why in common parlance, the word "pandemic" is used to describe any epidemic or disease which has spread across a large region, or into different continents across the world within a short period of time. Generally, disease spread of this nature affects substantial number of people globally and disrupts individual and institutional activities. The human history has been bedevilled with a number of pandemics; and from the 19th century, this includes: Encephalitis lethargica pandemic (1915 – 1926), influenza pandemic (1918 – 1920), HIV pandemic (1981 till present) and the Nigerian Yellow Fever (1986), the Nigerian Cholera (2001) among others. The most fatal pandemic in recorded history was the Black Death (also known as The Plague), which killed an estimated 75–200 million people in the 14th century (Aberth, 2010; Deleo & Heinnebusch, 2005). Current pandemics include HIV/AIDS, Ebola, Samoa Measles, Lassa fever, and Corona virus – popularly known as CoViD19 which has shut down the global economy in the last seven months.

Corona virus was firstly identified in the city of Wuhan, Hubei province, China, in late December 2019 (WHO, 2019); and since this epochal discovery, the virus has caused a cluster of cases of an acute respiratory disease, which is referred to as corona virus disease 2019otherwise known as CoViD 19. On December 31, 2019, the China Health Authority alerted the World Health Organization (WHO) to several cases of pneumonia of unknown aetiology in Wuhan City in Hubei Province in central China. The cases had been reported since December 8, 2019, and many patients who worked at or lived around the local Huanan Seafood Wholesale Market although other early cases had no exposure to this market (Luh and Tang, 2020). On January 7, a novel corona virus, originally abbreviated as 2019-nCoV by WHO, was identified from the throat swab sample of a patient (Hui, Madani, Ntoumi, Kock and Dar, 2020). This pathogen was later renamed as severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) by the Corona Virus Study Group (Gorbalenya, 2020) and the disease was named corona virus disease 2019 (COVID-19) by the WHO. As of January 30, 7736 confirmed and 12,167 suspected cases had been reported in China and 82 confirmed cases had been detected in 18 other countries (Burki, 2020). In the same day, WHO declared the SARS-CoV-2 outbreak as a Public Health Emergency of International Concern (PHEIC) (Burki, 2020). This declaration was not alarming as the virus in no time found its way into other continents including Africa.

According to media reports, more than 200 countries and territories have been affected by COVID-19, with major outbreaks occurring in central China, Iran (Worldometre, 2020),Western Europe and the United States (*Stawicki, et al. 2020).* On 11 March 2020, the World Health Organization characterized the spread of COVID-19 as a pandemic (WHO, 2019). As of 11 September 2020, the number of people infected with COVID-19 has reached 28,351,973 worldwide, of whom 20,357,351 have recovered. The death toll is 914,256]

(Worldometre, 2020). It is believed that these figures are understated as testing, in many countries, did not commence in the initial stages of the outbreak and many people who could have been infected with the virus had no or only mild symptoms and had no access to testing facilities. Also, people seem to hold that the number of recoveries is understated as tests are normally required before cases are officially recognised as recovered, and deaths may be attributed to underlying medical conditions.

Various countries in Africa have taken measures to detect and cope with the pandemic. According to Lancet Magazine Volume 395, Egypt, Algeria, South Africa and Nigeria are countries in Africa with highest importation risk; however, out of these named countries, Nigeria has the lowest facility to respond to the outbreak and this makes it one of the countries with highest vulnerability level in the continent (Gilvert, 2020) and in the world. The first confirmed case of Covid 19 in Nigeria was announced on 27th of February 2020, when an Italian citizen in Lagos tested positive for the virus (NCDC, 2020). On 9 March 2020, a second case of the virus was reported in Ewekoro, Ogun State. The case involved a Nigerian who had contact with the infected Italian (Premium Times, March 09, 2020).On 31 January, 2020 and emulating reactions of different governments on the Covid pandemic, the federal government of Nigeria set up a Coronavirus Preparedness Group to mitigate the impact of the virus if it eventually spreads to the country (This Day, January 31, 2020). In awareness of the high risk of importation of this virus and its constraint medical facilities to combat the outbreak, Nigeria government declared a number of measures. These measures as stated by () involve rapid identification of suspected case, and then followed by patient's transfer and isolation, rapid diagnosis, tracing and follow-up of potential contacts. Despite these measures, the virus not only escalated in number of victims but has indeed accounted for death of many citizens including prominent politicians in the country. As at mid-September, 2020, statistics of Corona virus in the country stands at 56,256 cases with few deaths, many recoveries and some still active cases (NCDC, 2020).

Table 1: Confirmed COVID-19 cases in Nigeria

State	**Cases**	**Active**	**Recovered**	**Deaths**
Abia	**828**	49	771	8
Adamawa	**230**	35	180	15
Akwa Ibom	**286**	27	251	8
Anambra	**231**	30	182	19
Bauchi	**679**	17	648	14
Bayelsa	**393**	5	367	21
Benue	**467**	57	401	9
Borno	**741**	2	703	36
Cross River	**83**	2	73	8
Delta	**1,791**	113	1,629	49
Ebonyi	**1,034**	7	997	30
Edo	**2,610**	90	2,420	100
Ekiti	**300**	40	255	5
Enugu	**1,223**	114	1,088	21
FCT	**5,447**	3,709	1,664	74
Gombe	**746**	80	643	23
Imo	**546**	322	212	12
Jigawa	**322**	3	308	11
Kaduna	**2,279**	85	2,161	33
Kano	**1,732**	52	1,626	54
Katsina	**840**	359	457	24
Kebbi	**93**	1	84	8
Kogi	**5**	–	3	2
Kwara	**992**	173	794	25
Lagos	**18,611**	3,162	15,245	204
Nasarawa	**446**	136	298	12
Niger	**244**	16	216	12
Ogun	**1,739**	36	1,675	28
Ondo	**1,584**	59	1,490	35
Osun	**804**	25	762	17
Oyo	**3,221**	1,106	2,076	39
Plateau	**3,098**	1,057	2,010	31

Table 1: Confirmed COVID-19 cases in Nigeria

State	Cases	Active	Recovered	Deaths
Rivers	**2,207**	32	2,116	59
Sokoto	**159**	–	142	17
Taraba	**95**	16	73	6
Yobe	**72**	5	59	8
Zamfara	**78**	–	73	5
Total	**56,256**	**11,022**	**44,152**	**1,082**

Source: National Centre for Disease Control (as at 14th September, 2020; 2:10pm)

While statistics presented above is undoubtedly dreadful and call for unrelenting cautions from both the Nigerian governments and the citizens, many Nigerians still doubt the official reports on the pandemic with the belief that the figures are not only alarming but also political and exaggerated. Despite the gullibility of some citizens on the statistics of the corona virus; the Nigerian government, like other governments globally, continues to insist on fatality and high infectivity of the deadly virus. Hence, the government is noted to take series of unprecedented combative measures which include mass orientation on the disease to citizenry, screening of migrants at border points, directive on social distancing, use of nose mask and observance of personal sanitation in public places. The government has also ordered compulsory residential, commercial and institutional lockdown in some high risk states of the federation such as Lagos, Ogun, and Osun, states, while others including Oyo state were on partial lockdown.

The governmental order of lockdown, effective from March 30, 2020, in high risk states and some other cautioning measures in other states was initially planned to last for two weeks. This lockdown was extended in some states while other adopted milder curfew in social gathering. Nigeria, with a poverty index of ...% (), naturally slumped into worse economic adversity as a result. According to PWC (), Nigeria's Small and Medium Enterprises account for 96% of businesses and 84% of employment, posing a severe risk to small businesses. The impact of the epidemic on small businesses is leading to low turnover and laying off staff. Most private organisations, for example, laid off workers and the few that remained have their staff salary slashed (). The media houses are not left out. One of many is the Punch Newspaper that laid off about 40 staff at the end of May because advertisements are not forthcoming as it used to maintain staff overhead cost (). Most hostels that closed counted losses for maintenance while staffs most of whom were breadwinners were laid off since March 2020. This, without, has a great impact on their economic abilities to pay bills and meeting daily family and social needs.

A further implication of this economic downturn is a drastic drop in people's purchasing power as there was limited money in circulation (). In addition, the prices of goods and services skyrocketed. Many essential products like water and food items doubled in price due to panic buying and hoarding as supplies could not meet demands owing the announcement of the lockdown. For example, "a loaf of bread" as reported in online in Kiss FM 99.9 on a programme 'the Fact Nigeria' on June 10, 2020 by Olatokewa Ayoade "which is for the common man, formerly sold between #300 - #350 was sold for #400 - #450. A basket of tomato that was sold for #500 - #600 before the pandemic lockdown rose to #1700 - #1800. Likewise, a kilo of meat increased in cost from #1000 - #1500 on the average. A bag of sachet water that is essential in every home doubled in price from #100 to #150 and #200. Before the coronavirus epidemic, 100 ml of hand sanitizer was sold at 350 Naira but now are sold at triple its initial cost". Ayoade (2020) went further to report that "the cost of transportation also increased. As a result of the social distancing measures, it became mandatory for public vehicles to reduce the number of passengers carried at a time. Due to this requirement, few commercial drivers plying the road increased the fare cost to meet the shortfall of the limited numbers it conveys per time".

Business owners, especially small businesses that normally survive on daily sales, could no longer meet their daily family needs due to the lockdown that led to the closure of shops and businesses that do not provide essential services. Aside from small businesses, some states like Adamawa, in the northern region of Nigeria issued a circular that they will not be able to pay March salary due to small allocation from the government as a result of a downturn in the sale of crude oil (Ayoade, 2020). This sad scenario was also envisaged with other states that did not make public announcements but justified slash in salary of civil servants on the reason that the staffs were locked down at home and could not come to work. The stay at home directive of the governments also affects socioeconomic livelihood especially of the informal workers. This is really problematic as 80% of Nigerians as established the

National Bureau of Statistics (2019) worked in the informal sector. To this extent, Covid 19 pandemic and its attendant coping measures (lockdown, restriction on movement, etc) portend grave consequences for citizens who based their income on daily access such as face-to-face interaction and customers flow to meet basic needs. These challenges are not without negative consequences on low-income, savings and consumption expenditure (Irabor, 2020).

In view of the economic trauma occasioned by Covid 19 pandemic and lockdown, the government reviewed position of various stakeholders on the need to preserve people's livelihood in the midst of the effort to ameliorate household economic hardship. Government at different levels and arms therefore embarked on sponsorship and distribution of palliatives to Nigerian households especially among the vulnerable members of the society using different methods.

Methods adopted by government

- *Hazard allowance and insurance for frontline health workers*

The federal government through President Muhammadu Buhari announced that in keeping with the federal government's promise to improve the welfare of healthcare workers during the pandemic, it has signed a memorandum of understanding on the provision of hazard allowances and other incentives with key health sector professional associations (). The president went further in this report that the federal government has also procured insurance cover for 5,000 frontline health workers. *The governments in a report by …… is noted to announce* that necessary protective equipment would be provided to personnel of all the security agencies against infection by the disease.

- *Incentives to Micro, Small and Medium Scale (MSMES) enterprises*

The government also announced that the monetary and fiscal authorities shall deploy all the necessary provisions needed by businesses and traders to continue production and thus restore jobs. However, as noted by …… government at any level did not clarify whether any additional incentive would be given to businesses apart from those already highlighted in the president's first and second speeches (which are generally in the form of extension of moratorium for government sponsored loans and reduction of tax liability for business that retain their workers despite the lockdown till the end of the year).

- *Direct food/ cash distribution by FGN*

More importantly, the federal government, as well as other governments at all levels, through the presidential speech of …………. noted that the direct distribution and expansion of palliatives to most vulnerable households would commence and last through the pandemic lockdown and urged potential beneficiaries to be patient as the federal government works with the state governments to fine tune the logistical and distribution process to ensure that the palliatives get to them.

Many state governments, including Oyo State, also announced an economic stimulus package for people residing in their states, targeting an average of 200,000 households in the first phase. This according to ……. involves food packs, put together by the agriculture ministry, that are to be distributed to every local government area in the state. It is to reach the most vulnerable communities and households, with priority given to those who rely on daily wages. In a related development, Governor Babajide Sanwo-Olu said: "We are all aware that this is a trying time for our citizens and since the partial drop in economic activities, our government deemed it necessary to reach out to the vulnerable ones in society." These food packs are produced for six-person households and are meant to last for at least 14 days. The governor explained: "We would be giving bags of rice, bags of beans, garri, bread, dry pepper, and we are trying to see if we can add water and some elements of vitamin C."

Despite this laudable initiative and different methods adopted by governments to palliate the economic effects of the lockdown especially among the most vulnerable people in the state, there have been insinuations from many that the government was only paying lip service to distribution of Covid 19 palliatives to the citizens. In view of corruption culture of Nigerians, people seemed to hold the planned government palliative as another means to syphon public treasury as billions of naira have been officially earmarked for the programme. Moreover, ……… argued that given

Nigeria's poor data base, the government may not be able to identify the most vulnerable in the state. The implication of this is that even if the governing politicians execute administration of the palliatives, owing to poor data management of citizens and the notable greed of many politicians who were likely to be entrusted with the administration, the packages might be misappropriated, converted or restrained from reaching the actual vulnerable across local government areas constituting the particular state. Arising from this problem, this work was set to assess public receipt of government sponsored Covid 19 Palliatives among people in Ibarapa Central Local Government areas of Oyo State using the following specific objectives:

1. To identify methods adopted by governments in distribution of Covid 19 palliatives in Ibarapa Central Local Government areas of Oyo State
2. To estimate percentage of people who actually received government sponsored Covid 19 palliatives in Ibarapa Central Local Government areas of Oyo State
3. To ascertain types of Covid 19 palliatives received by people in Ibarapa Central Local Government areas of Oyo State

Methodology

A cross-sectional survey and in-depth interview methods were employed to generate data for this study. The main reason these methods were adopted was to generate both quantitative and qualitative data on the topic under study. In the cross-sectional survey, a total of 267 respondents were interviewed. The subjects of the survey residents of Ibarapa Central Local Government areas of Oyo State which consists of political wards unevenly distributed across the two major towns of the study are – 7 wards in the bigger Igboora town and the rest 3 in Idere town. The population of the areas according the 1996 census stood at 102,979; however, the population has since sprung over the decades with continues increment in net fertility rate and awesome improvement in the number of migrant settlers in the areas owing to the opening of a public polytechnic – Oyo State College of Agriculture and Technology, Igboora since 2006. In 2018 for example, the population was estimated in Wikipedia to around 322,189. The local population is almost made up of Ibarapa people who are in turn a Yoruba ethnic group. Cluster random sampling was used to select 550 participants of the study because researchers were bent to select respondents proportionally across the 10 political wards of the council areas. The two research instruments designed to elicit data from the respondents were a structured questionnaire and a semi-structured in-depth interview guide. The former contained 3 sections. The first section solicited information on respondents' demographic information, the second section asked varieties of questions ascertaining whether or not respondents received government Covid 19 palliatives and from which organ of government. Section C demanded respondents to tick or state the types of government Covid 19 palliatives distributed and received in the study area. In all, the structured questionnaire used in the survey contained 21 questions. The semi-structured interview guide comprised questions on each of the three themes of the structured questionnaire adoted in the cross-sectional study. These questions provided detailed information on the objectives of the study since there was opportunity to probe deeply with further questions. It is important to note that the two research instruments used in the study were pre-tested in order to measure their suitability in collection of reliable and valid data before commencement of the actual field work.

Primary data for this work were collected within 2 months and six days in the 10 wards comprising the Ibarapa Central Local Government areas between May 18th and July 24th 2020. The government lockdown restrictions ensured easy application of the sampling procedure the preferred method of gathering primary data for this study. Despite the initial projection of 550 respondents as sample for the study, the researchers were only able to access and interview 267 respondents; this was a 54.08% access rate. The achieved access was limited owing to certain socio-cultural constraints; nevertheless, the 54% access rate was considered adequate enough for the study.

Univariate and bivariate analyses were carried out on the quantitative data collected. Thus, the final statistical outputs of the study were percentages and Pearson's chi-square. Content analytical method was adopted to analyse qualitative data generated during the in-depth interview session. Thus, some responses from the interview were reported to complement the quantitative data generated from the cross-sectional study.

Results and Discussions

Presentation of major findings of the study is divided into three segments.

Table 2: Respondents Demographic Information (N = 267)

Variables	Number	Percentage
Head of household gender		
Male	76.0	
Female	24.0	
Age group		
18 – 35	00	00.0
36 – 50	265	49.5
50 above	269	50.5
Employment status		
Essential worker	008	03.0
Non-essential worker (public)	017	06.4
Non-essential worker (private)	025	09.4
Self-employed	387	72.5
Not employed	047	08.7
Household size		
≤ 10 residents	329	61.6
11 – 20 residents	172	32.2
≥ 21 residents	033	06.2
Participation in partisan politics		
Yes	084	15.7
No	450	84.2
Awareness of government Covid 19-lockdown palliatives		
Yes	534	100
No	00	-
	534	**100**

Source: Field Survey, 2020

As presented in table 2 above, it is found that most of the respondents were males (76%), adult of not less than 36 years old, self-employed (72.5%) and had not more than 10 people in their household. Further sample demographics presented reveal that while only 15.7% of the respondents were into partisan politics, all of them were aware of government sponsored Covid 19 palliatives during the pandemic lockdown.

The gender and age distribution of these findings affirm the patriarchal structure of household wherein the adult males are not only regarded as household-head but are culturally saddled with responsibility to proffer economic sustenance for the householders; and this responsibility is expected to continue despite Covid 19 lockdown. Moreover, data on occupational distribution establish that most people (72.5%) in the study area were mainly into business or self-employment which involves going out of the household to sell or render services so as to garner money on daily basis for household-economic sustenance. The implication of this is that government-ordered lockdown of non-essential business/employment in the study area would likely affect their household daily income and economic sustenance. A male respondent in the in-depth interview stated that:

> *Things are really tough during this (partial) lockdown. Many people cannot go to shops to fend their daily living. Someone like me too – I sell clothes; but the government lockdown to control the spread of corona virus only allowed people who sell food and drugs into market and even this allowance is only on Thursdays.*

Economic condition of people was also generally reported to be worsened as the lockdown had influenced increment in prices of goods and services; hence the reason for government initiated palliatives during the lockdown order. Expectedly, all of the respondents were aware of the government palliative; although only few of them engaged in party politics (of either PDP or APC).

Table 3: Percentage of people who actually received government palliatives in ICLGA (N = 267)

Variables	Federal Government Palliatives	Oyo State Government Palliatives	Palliatives from Senator	Palliatives from Federal Representative	Palliatives from State Honourable	Local Government Palliatives
Yes	- (0%)	214 (80%)	- (00%)	41 (15.3%)	- (00)	95 (35.7%)
No	267 (100%)	53 (20%)	267 (100%)	226 (84.7%)	267 (100%)	172 (64.3%)
Total	**267 (100%)**	**267 (100%)**	**267 (100%)**	**267 (100%)**	**267 (100%)**	**267 (100%)**
X^2 = 5.124, df = 1, C = 0.127, *p* = < 0.05						

Source: Field Survey, 2020

From table 3 above, it is found that none of the respondents received palliatives from none of the federal government, the senator and state honourables of the constituency for Covid 19 lockdown. The table however revealed that 80% of the respondents received palliatives from Oyo State government, 35.7% received palliatives from Ibarapa Central Local Government, while 15.3% received palliatives from federal representative from the study areas during Covid 19 lockdown. One of the respondent – an APC party faithful had this to say:

> *We did not receive anything (i.e. Covid 19 palliative) from above (i.e. the Federal Government). We initially heard information that Buhari packages are on the way. It was a long hope and wait; and till now (i.e. two months after the lockdown) we have not received anything. However, there's the info(rmation) that the federal (i.e. government) distributed the palliatives in top-north (i.e. the 19 northern states of the federation)*

Buttressing the findings on non-reception of federal government palliatives in the study is a newspaper report of …… wherein it was stated that Oyo State Government rejected and returned the load of rice sent by the Federal Government as Covid 19 palliative for the citizens because the rice was verified to be spoilt and inedible. More importantly, the right percentage (80%) of people who received the State Government palliatives affirmed beyond reasonable doubt that indeed the Oyo State Government distributed its palliatives to the people. …… newspaper of ….. in fact reported that the flagoff of the palliatives distribution began in Igboora – the political capital of the study areas. As a whooping 84% of the respondents who were not into partisan politics confirmed or admitted Oyo State Government administration of Covid 19 lockdown relief materials, the palliatives were largely noted to be distributed without bias to party membership, or other forms of socio-political affiliations.

Table 4: Types of Covid 19 palliatives received by people in ICLGA (N = 534)

Types of Palliatives	Oyo State Government Palliatives (N = 428)*	Palliatives from Federal Representative (N = 110)*	Palliatives from Local Government (N = 191)
Cash	- (00%)	40 (36.4%)	- (00%)
Yam flour	60 (11.2%)	- (00%)	- (00%)
Cassava flour	316 (59.2%)	80 (72.7%)	- (00%)
Rice	332 (62.1%)	68 (61.8%)	103 (53.9%)
Beans	50 (9.3%)	- (00%)	- (00%)
Noodles/spaghetti	410 (76.8%)	- (00%)	- (00%)
Groundnut oil	189 (35.4%)	- (00%)	- (00%)
Nose mask	70 (13.1%)	- (00%)	128 (67%)
Hand sanitizers	- (00%)	- (00%)	128 (67%)
Packed salt	64 (11.9%)	- (00%)	- (00%)
Others	- (00%)	- (00%)	- (00%)

Multiple responses *
Source: Field Survey, 2020

Table 4 showed distribution of responses on the types of government palliatives distributed and received by people during the pandemic lockdown. Specifically, the research found that the State Government distributed yam flour (i.e. *elubo*), cassava flour (i.e. *gaari*), rice, beans, noodles/spaghetti, groundnut oil (i.e. *ororo*), nose mask and packed salt; the federal honourable in the constituency distributed cash, cassava flour and rice; while the Local Government distributed rice, nose mask and hand sanitisers.

76.8% of the respondents received noodles/spaghetti, 62.1% received rice, 59.2% received cassava flour or *gaari* while other items were also received to varying percentages from Oyo State Government palliatives. Many respondents confessed or admitted that they received more than one item as palliatives, hence the multiple responses denoted by * in the table.

72.7% of the respondents received cassava flour or *gaari*, 61.8% received rice and 36.4% received cash as Covid 19 lockdown palliatives from the federal honourable domiciled in the study area. Furthermore, 67% of the respondents received nose mask and hand sanitizers while other 53.9% received rice from Local Government in the study area.

Conclusion

This study found that people in Ibarapa Central Local Government areas received Covid 19 palliatives from Oyo State Government, and to lesser degree from their Local Government Council and the Federal Honourable representing the council areas. Recipients of these palliatives were not necessarily members of particular political parties as it is established that the government made serious attempts to distribute the palliatives among citizens. An examination of the items received revealed that people in the study areas actually received government distributed items which include noodles/spaghetti, rice, *gari*, beans, *elubo*, groundnut oil among others.

On the other hand, people in the study areas did not receive any palliative from the government of the federal republic of Nigeria, this is despite the whooping amount hirmarked by the government () to expend on Covid 19 palliatives across the 36 states and the federal capital territory, Abuja. Also, given a lot of aired pledges and publicity in visual and print media by the federal government, especially as established by the findngs of this research that such palliatives were not distributed in Ibarapa Central Local Government areas and possibly in the entire Oyo State, an academic gap demanding probation on reasons for failure of federal government to distribute Covid 19 palliatives in the study area is a worthy research.

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ESTIMATING THE MODEL PARAMETERS OF THE DISTRIBUTED LAG MODEL OF A CROSS-SECTION DATA USING POLYUNWANA ADMISSION AND GRADUATION DATA

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Abstract

This research makes use of ordinary least square (OLS) method to estimate the parameters of a distributed lag model of a cross-section data using polyunwana admission and graduation data. The purpose is to determine the rate at which polytechnics are maximizing growth through admission and graduation of students. In the work, we modeled changes in graduation caused by a definite change in disposable admission. Data used for this work was secondary data obtained from the records unit of Akanu Ibiam Federal Polytechnic, Unwana. The results of the regression of the polytechnic admission and graduation gave $Y = 51 + 0.323X_i - 0.003X_{i-1}$. *This illustrates that a unit change in admission causes 0.323 changes in the current graduation. Also -0.003 is the lag weight, and the average graduation is 51 graduands per department. The implication of these findings is that changes in the polytechnic admission have a lasting influence on the changes in graduation. The model of the admitted and graduated students of the polytechnic would provide a frame-work in which to compute expected graduations and thus, forecast available chances for admitting new students.*

Key words: Distributed Lag model, Explanatory Variables, Ordinary Least Squares, Regression, and Response Variables.

Introduction

Fisher (1925) was the first to use and discuss the concept of a distributed lag. In a later paper (1937), he stated that the basic problem in applying the theory of distributed lags "is to find the best distribution of lags and the highest possible correlation with the actual statistical series with which we wish to compare it.
Thus, we wish to find the distribution of lag that maximizes the explanation of "effect" by "cause" in a statistical sense. There are unsophisticated, almost mechanical approaches to this problem; and there are more sophisticated approaches involving considerable use of economic theory to develop underlying models of dynamic adjustment that in turn generate the distributed lags observed. There are also both more sophisticated and less sophisticated approaches to estimation (Nerlove, 2018).

It is a natural phenomenon to think of estimating the parameters of a distributed lag data or transfer function models from time series data since it is in time series contexts that such models arise. The present research deals with the estimation of a distributed lag model in a situation where a relevant body of a cross-sectional data not only exists but seems to be more appropriate for this purpose than those the available time series data (Theil and Stern, 2010). The researchers seek to investigate the input and output dynamics relating to polytechnics admission to subsequent graduations. The economic society stated that its main object shall be to promote studies that aim at a unification of the theoretical and empirical quantitative approach to economic problems and that are penetrated by constructive and rigorous thinking similar to that which has come to dominate the natural sciences. There are several aspects of the quantitative approach to economics and no single one of these aspects taken by it should be confounded with economics; thus, econometrics is by no means the same as economic theory, although a considerable portion of this theory has a definitely quantitative character. Nor should econometrics be taken as synonymous with application of mathematics to economics (Jorgenson, 2016). Experience has shown that each of these three view points, that of statistics, economic theory and mathematics, is necessary but not by itself a sufficient condition for a real understanding of the quantitative relations in modern economic life. It is the unification of all three that is powerful and it is the unification that constitutes econometrics. The model of the admitted and graduated students would provide a frame work in which to compute expected graduations and thus forecast available chances for admitting new students.

Researcher analysis will be based on the assumptions that the polytechnic may be represented by a linear function which transforms the input sequence of admissions into the output sequence of graduations That is;

$$D_i = \sum_{i=1} C_i A_i + U_i$$

Where

D_i *is the number of graduates in the department i*

C_i are the fixed constants

A_i the number of admitted students in the department

U_i Is the disturbance term which prevents graduation from been predicted perfectly from the past admission

This study primarily is concerned with the estimation of the model parameters. Thus, $Y_i = \beta_0 + \beta_1 X_i + \beta_2 X_{i-1} + U_i$ may be obtained only after certain assumptions have been made concerning the functional form of the equation and the properties of the variables and errors in the respective equation. The assumption that all the equations are linear is perhaps the most naïve assumption that can be made about the functional form of the model. Riley (2015) concluded, from his study of the meat purchases of the consumer panel, that there appeared to be no strong preference for a logarithmic form over the linear form of equations which he investigated. Therefore, to avoid the additional costs involved in converting the data and logarithms, the assumption will be made that the equations for the model are linear.

Statement of the problem

The rate at which students are admitted into privates, states as well as federal polytechnic is very alarming. The researcher wish to probe into the prevailing rate of admission and graduation of students

Aim and objectives

The primary aim of this research is to estimate the model parameters of the distributed lag model and appropriate conclusion drawn based on the hypothesis set to test; the specific objectives of this research are stated below

- To determine the linear relationship between admission and graduation of students.
- To make recommendations based on the formulated model.

Emperical Review

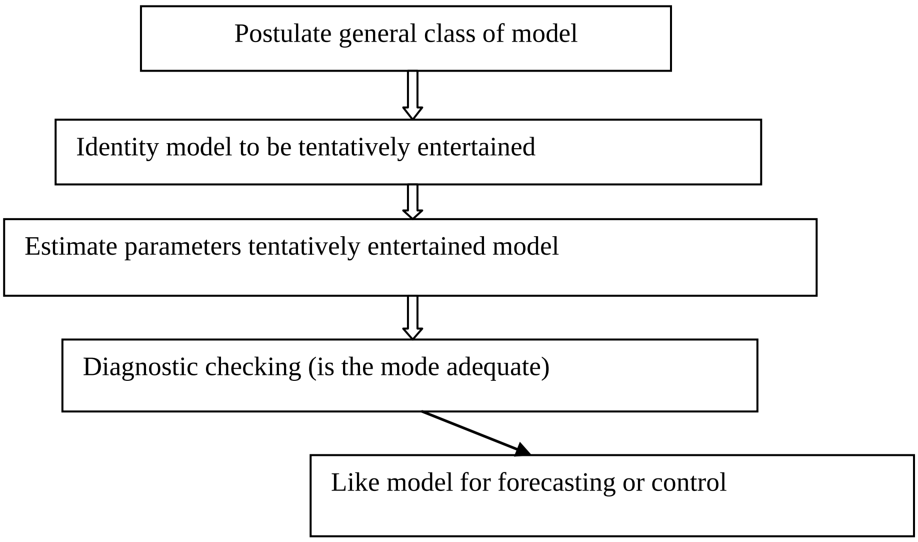
Often when we try to model statistical relationships, we tend to use contemporaneous values. For example, as we want to model changes in graduation because of a change in disposable admission, we may try to run the regression $\Delta Y_i = \beta_0 + \beta_1 X_i + \beta_2 \Delta X_{i-1} + e_i$, where ΔY_i is the percentage change in graduation and ΔX_i is the percentage change in disposable admission, β_0 and β_1 are the regression parameters, and e_i is the random error. The relationships works very well, but it has been documented that students demonstrate "graduation inertia" that is, the graduation habits of students do not change right away in response to an increase in the disposable admission, because graduation expectations are formed by past changes in admission, this class of models is called backward-looking expectations models. The best way to capture graduation inertia is to include in the regression model not only in the current changes in disposable admission but also previous changes. If an independent variable (ΔX_i) appears more than once, with different time lags, then the model is called a distributed lag model is represented as are coefficients, X_{t-i} are the lagged values of the explanation variable and e_i is the independent white noise random error. To demonstrate the distributed lag empirically, with U.S poly graduation data let Y_t be the change in U.S poly graduation in period "t" and X_t be the change in U.S poly disposable admission in period "t". The results of a regression of one lag of U.S poly disposable admission are; $Y_i = 51 + 0.323X_i - 0.003X_{i-1}$ this illustrates that a one percent (1%) change in a disposable admission causes 0.28% of the change in the current graduation. Also a one percent (1%) change in a disposable lagged admission would induce about 0.035% increase in current graduation.

The obvious statistical question then is why estimate the model with only one lag. How many lags are appropriate? This has long been one of the problems with the distributed lag models, even in the early work of Fisher, (/People/social-sciences-and-law/economics-biographies) (1937) in the 1930's. Researchers such as Jan Tinbergen (/People/social-sciences-and-law/economics-biographies/Jan- Tinbergen) (1949) suggest including lags until the coefficients of the lagged variables become insignificant or the signs of the coefficients become erratic. There are several problems with this kind ad-hoc specification. First there is no guidance in terms of the lag length. Second, if the sample size is small, then as the lag length increases statistical inference maybe some what shaky, with fewer degrees of freedom. Finally, successive lags, tends to have high correlations (Multi-collinearity), leading to smaller t-ratios and incorrect inferences. One way to reduce the number of lags and extent of Multi-collinearity is to use LM Koyck's (2017) adaptive expectations model. In this type of model, in addition to the explanatory variable, a lagged dependent variable is included and is represented as $Y_t = \beta_0 + \beta_1 X_t + \beta_2 X_{i-1} + U_t$ where U is the error term. If the dependent variable is random, the lagged dependent variable may also be random, and including a random explanatory variable in the model may produce biased and inconsistent estimates.

Thus, in order to use this model, it is essential to verify that the lagged dependent variable is not correlated with the random errors. In addition, in the above models, serial correlation in errors cannot be tested using normal auto-correlation statistics. One of the assumptions of infinite distributed lag models such as Koyck's is that the coefficients on the lag variables declines geometrically as the lag length increases. If the coefficients do not behave in this manner, then the above lag structure may suitable. In these circumstances, you need a more flexible model that would incorporate a variety of lag structures, such as Shirley Almon's (2005) distributed lag models. To estimate a flexible model such as Almon, we must a prior specify the lag length to verify the changes in the size of the coefficients. If the β's decrease at first and then increase with higher lags, β's can then be approximated by a second degree polynomial because we have one size change. The more turning points, the higher the degree of polynomials.

The illustrations above shows a multiple regression model, together with a few simple innovations structures, as a way of illustrating some general issues related to estimation of dynamic models. The code here is easily modified to observe the effects of changing parameters values, adjusting the innovations variance, using different lag structures and so on. Explanatory distributed lag terms have the ability to reduce estimator bias, though ordinary least square method tends to over-estimate auto-correlation co-efficient at the expense of distributed lag coefficients. Explanatory distributed lag terms can also be added to the models. The general set-up here allows for a great deal of experimentation, as is often required when evaluating models in practice.

Iterative Stages in the Solution of The Model



Summaries of the iterative approach to model building for forecasting and control

1. Form the iteration of the theory and practice a useful model for the purposes at hand is considered.

2. Because this class is extensive to be directly fitted to the data, rough methods for identifying these models are developed. Such methods of identification imploy data and knowledge of the system to suggest as appropriate parsimonious sub-class of models which maybe tentatively entertained. In addition, the identification process can be used to yield rough preliminary estimates of the parameters of the parameters in the model.

3. The tentatively entertained model is fitted to data and its parameters estimated. The rough estimates obtained during the identification can be used as starting values in more refined iterative model for estimating parameters.

4. Diagnostic checks are applied with the object of uncovering the possible cause of lack of fit and diagnosing the cause. If no lack of fit is indicated the model is ready for use. If any inadequacy is found, the iterative cycle of identification estimation and diagnostic checking is repeated until a suitable representation is found.

This study is designed to investigate the applicability of selected distributed lagged models to admission and graduation of students in Akanu Ibiam Federal Polytechnic. More especially, the analysis is directed towards the estimation of the parameters of the relationship for the admission and graduation. An attempt is made to identify lags and seasonal shifts in student demand for graduation. An investigation by Fuller and Martin (1912) in which lag models and annual United Kingdom data were utilized, tended, to reject the null hypothesis of a lag of one point in the students adjustment to change in admission and graduation for selected year. In this study, selected static and dynamic demand equations are estimated by least square using data from the 2017 observations. Klein (2004), Koyck (2017), and Nerlove (2018) have proposed rather complex alternative methods for the estimation of equations containing auto-correlated errors. Compared with the estimation techniques suggested by these autors, a computationally simple procedure, least squares is used to estimate the admission and graduation parameters.

Econometric consideration

The method of least square (L.S.) is perhaps the most widely used estimation techniques in empirical economic analysis. The population of the technique is primarily due to;

- Its computational simplicity.
- The small variances of its estimates.
- The fact that under certain conditions regarding the recursive or identification properties of a system of equations, the structural parameters of the system may be derived either directly or from the transformed coefficients of the equations which maybe estimated by least square.

Data source and analysis

The data used in this research was obtained from the record unit Akanu ibiam Federal Polytechnic Unwana Ebonyi State. collection. This methodology was chosen to pave the researcher with necessary information required. The method of data analysis is ordinary least square method of estimation. The model specification is;

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 X_{i-1} + U_{ij} \quad 0 \le \beta_1 < 1$$

Y_i *is* the response variable (Graduations)

X_i *is* the explanatory variable (Admission)

X_{i-1} *is the lagged random variable*

β_0 *is the intercept to be estimated*

β_1 *is the slope/coefficient of the variable* X_i *also to be estimated*

β_2 *is the lag weight to be estimated also*

Under this method (OLS) is used to estimate the parameters

$Y_i = \beta_0 + \beta_1 X_i + \beta_2 X_{i-1} + U_i \quad i = 1,2,3,\cdots,n$ *And* $\hat{Y}_i = \beta_0 + \beta_1 X_i + \beta_2 X_{i-1}$

So, $U_i = Y_i - \hat{Y}_i$

That is, U_i is the difference between the true regression line Y_i and the estimated regression line $\hat{Y}_i$. The ordinary least square method of estimating β_0, β_1 and β_2 involves minimizing the error sum of squares $\sum U_i^2$ which implies that the β_0, β_1 and β_2 values should be chosen so as to make $\sum U_i^2$ as small as possible. This is achieved by equating the partial derivatives $\sum U_i^2$ with respect to β_0, β_1 and β_2 to zero respectively.

$$U_i = Y_i - \hat{Y}_i$$

$$U_i = Y_i - \beta_0 - \beta_1 X_i - \beta_2 X_{i-1}$$

Taking sum of squares of both sides, we get

$$\sum U_i^2 = \sum (Y_i - \beta_0 - \beta_1 X_i - \beta_2 X_{i-1})^2$$

$$\frac{\partial \sum U_i^2}{\partial \beta_0} = -2\sum (Y_i - \beta_0 - \beta_1 X_i - \beta_2 X_{i-1}) = 0$$

$$\sum Y_i - n\beta_0 - \beta_1 X_i - \beta_2 X_{i-1} = 0$$

$$\sum Y_i = n\beta_0 - \beta_1 X_i - \beta_2 X_{i-1} \cdots\cdots\cdots (1)$$

$$\frac{\partial \sum U_i^2}{\partial \beta_1} = -2\sum (Y_i - \beta_0 - \beta_1 X_i - \beta_2 X_{i-1}) = 0$$

$$\sum X_i Y_i - \beta_0 \sum X_i - \beta_1 \sum X_i^2 - \beta_2 \sum X_i X_{i-1} = 0$$

$$\sum X_i Y_i = \beta_0 \sum X_i - \beta_1 \sum X_i^2 - \beta_2 \sum X_i X_{i-1} \cdots\cdots\cdots\cdots (2)$$

$$\frac{\partial \sum U_i^2}{\partial \beta_2} = -2\sum (Y_i - \beta_0 - \beta_1 X_i - \beta_2 X_{i-1}) = 0$$

$$\sum X_{i-1} Y - \beta_0 \sum X_{i-1} - \beta_1 \sum X_i X_{i-1} - \beta_2 \sum X_{i-1}^2 = 0$$

$$\sum X_{i-1} Y = \beta_0 \sum X_{i-1} + \beta_1 \sum X_i X_{i-1} + \beta_2 \sum X_{i-1}^2 \cdots\cdots\cdots\cdots (3)$$

Thus, equations (1), (2), and (3) is referred to as the normal equations. $\sum Y_i = n\beta_0 - \beta_1 X_i - \beta_2 X_{i-1} \cdots\cdots\cdots (1)$

$$\sum X_i Y_i = \beta_0 \sum X_i - \beta_1 \sum X_i^2 - \beta_2 \sum X_i X_{i-1} \cdots\cdots\cdots\cdots (2)$$

$$\sum X_{i-1} Y = \beta_0 \sum X_{i-1} + \beta_1 \sum X_i X_{i-1} + \beta_2 \sum X_{i-1}^2 \cdots\cdots\cdots\cdots (3)$$

Which in matrix form yields

$$\begin{bmatrix} \sum Y_i \\ \sum X_i Y_i \\ \sum X_{i-1} Y \end{bmatrix} = \begin{bmatrix} n & \sum X_i & \sum X_{i-1} \\ \sum X_i & \sum X_i^2 & \sum X_i X_{i-1} \\ \sum X_{i-1} & \sum X_i X_{i-1} & \sum X^2_{i-1} \end{bmatrix} \begin{bmatrix} \beta_0 \\ \beta_1 \\ \beta_2 \end{bmatrix}$$

Hence,

$$\begin{bmatrix} \beta_0 \\ \beta_1 \\ \beta_2 \end{bmatrix} = \begin{bmatrix} n & \sum X_i & \sum X_{i-1} \\ \sum X_i & \sum X_i^{\,2} & \sum X_i X_{i-1} \\ \sum X_{i-1} & \sum X_i X_{i-1} & \sum X^2_{i-1} \end{bmatrix}^{-1} \begin{bmatrix} \sum Y_i \\ \sum X_i Y_i \\ \sum X_{i-1} Y \end{bmatrix}$$

Justification and statistical analysis of the data

In this section, discussion on the validity of some of the assumptions made was discussed. The validity of the stated assumptions is assessed to determine the amount of confidence that will be repose on the result of the analysis. The assumptions include; linearity, full rank, exogeneity of independent variables, exogenously generated data, normality assumptions.

The most useful aspects of the multiple regression models are its ability to identify the independent effects of a set of variables on a dependent variable.

Assumptions of the classified linear distributed lag model

1. Linearity
2. Exogeneity of independent variables
3. Exogenously generated data
4. Normal distribution

Linearity

$$Y_i = X\beta + e_i$$

The model specifies a linear relationship between Y_i and X_i in matrix form.

Full rank

X Is a $n \times k$ matrix with rank k .

Hence, X has full column rank; the column of X are linearly independent and there are at least k observations.

Exogeneity of independent variables

The disturbance is assumed to have conditional expected value zero at every observation, which we write as $E(e_i) = 0.$

In principle, the mean of each e_i conditioned on all observations on X convey information about the expected value of disturbance.

Exogenously generated data

The ultimate source of data X is unrelated (Statistically and economically) to the source of error e_i .

Normal distribution

It is convenient to assume that the disturbance as "e_i" are normally distributed, with zero mean and constant variance.

$$e_i = \approx \mu\left(0, \sigma^2\right)$$

In view of our description of the source of error e_i , the condition of the central limit theorem will generally apply, at least approximately, and normality.

Analysis and interpretation
Table 1.0

S/N	Departments	Admitted (Xi)	Graduands (Yi)	Lagged (Xi-1)
1	Accounting	608	299	-
2	BAM	735	224	608
3	Marketing	382	239	735
4	OTM	326	169	282
5	Public Admin	756	215	326
6	Civil engineering	371	188	756
7	Elect & Elect. Eng.	409	147	371
8	Mechanical eng. tech.	253	192	409
9	Arcitectural tech.	113	71	253
10	Building technology	120	115	113
11	Estate mgt.	129	102	120
12	Quantity survey	150	103	129
13	Ceramics & glass tech.	71	44	150
14	Computer science	420	229	71
15	Maths & statistics	125	106	420
16	Science lab. tech.	337	268	125
17	Surveying & Geoinfo.	99	43	337
18	Agric. Technology	134	71	99
19	Hort. & land scoping tech.	70	9	134
20	Food technology	145	104	70
21	Hotel mgt & tourism	132	20	145

Obtaining the model for the data

The parameters of the model were determined using ordinary least square method of regression analysis. Secondly, the significance of the regression model was tested using analysis of variance ANOVA. Finally, the standard error estimate of the model and coefficient of determination (R^2) were obtained to check the adequacy of the model. For precision and accuracy, the result was obtained using Spss as below:

Results

Descriptive Statistics

	Mean	Std. Deviation	N
Y	140.8571	84.71971	21
X	280.2381	212.29765	21
Xi-1	269.1905	217.37631	21

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	93492.752	2	46746.376	16.810	.000[b]
	Residual	50055.819	18	2780.879		
	Total	143548.571	20			

a. Dependent Variable: Y

b. Predictors: (Constant), Xi-1, X

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	51.145	21.735		2.353	.030	5.482	96.809
	X	.323	.059	.810	5.469	.000	.199	.447
	Xi-1	-.003	.058	-.008	-.054	.957	-.124	.118

a. Dependent Variable: Y

Discussions of the findings

To demonstrate the distributed lag model empirically with graduation and admission data, let Y_i be graduations and X_i be admitted students. The result of a regression of one lag of disposable admission is $Y_i = 51 + 0.323X_i - 0.003X_{i-1}$.

The coefficients of the above model have some interesting interpretations. The coefficients of the disposable admissions "0.323" implies/shows that a unit change in a disposable admissions would cause 0.323 unit increase in graduation. The intercept 51 implies that no matter what, each department in the polytechnic must graduate 51 students and -0.003 is the lag weight.

Summary

Based on the result of the analysis, the method of ordinary least square (OLS) was used to estimate the slope and the intercept parameters in the population model. We have demonstrated the algebra of the ordinary least square method (OLS), the computation of fitted values and obtaining of changes in the dependent variable (Graduations) for a given change in the independent variable (Admissions). In the model, the dependent variable (Graduations) is related to the independent variable (Admissions), and the lagged independent variable as $Y_i = 51 + 0.323X_i - 0.003X_{i-1}$. Where 51, 0.323, and – 0.003 are the population intercept, slope and lag weight respectively.

Conclusion

This study is focused to estimate the distributed lag model. One of the most popular techniques, which are used for estimating the parameters of the distributed lag model, is proposed by Almon (2005). In Almon technique, the distributed lag model is transformed under the assumptions that the lag coefficients lies on linearity. Since we observed that the error term is homoscedastic, we immediately apply the ordinary least square for the estimation of the model parameters. Since we observed that successive lags tend to have high correlation (multi-collinearity), leading to imprecise estimates, also the sample size is small (n < 30), we decided to lag only one department so we can have a better result. The model $Y_i = 51 + 0.323X_i - 0.003X_{i-1}$ of the admitted and graduated students of the polytechnic would provide a frame work in which to compute expected graduations.

Recommendations

At the end of the statistical analysis; the following recommendations are made based on the available model $Y_i = 51 + 0.323X_i - 0.003X_{i-1}$ of 2017 admitted and the graduated Polyunwana students at all levels.

1. Government should make proper plans for graduated students of the polytechnic, since it is observed from the findings that not less than 30,000 students graduate each year.

2. Since the research is of great benefit to determine the rate at which polytechnic is maximizing growth through admission and graduation of students, it is recommended that polytechnic management should make proper plans for the admitted students.

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MANAGING ELECTRONIC WASTE TO ENSURE GREEN COMPUTING

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Abstract

Rapid urbanization and heavy use of electronic gadgets during the last two decades has led to generation of a huge amount of electronic wastes resulting in soil, water and environmental pollution. Thus, pollution control and environmental safety has been the greater concern of environmental scientist and activist worldwide. Dumping of electronic wastes as one of the by-products of this urbanization process has become a major problem in our society. Because these wastes are not biodegradable, gradual deposition of these e-wastes leads to accumulation of various toxic metals like lead [Pb], cadmium [Cd] etc contaminating the soil and ground water. Ground water in turn affects the plant animal and the living system as a whole causing severe health hazards and disorders. Therefore, proper management of these electronic wastes has become a pressing demand of the time E-waste heir effects and managements of these toxic and hazardous wastes is what this paper discusses so as to make the development process suitable and green.

1.0 INTRODUCTION

In this information and communication technology, the use of electronics and computable resources has grown exponentially. Excessive use of electronic equipments has given rise to a higher number of adversaries such as high energy consumption, accumulation of E-waste, and environmental pollution as well as global warming. Forced with these challenges government agencies including private firms worldwide have started examining ways to protect the environment (Sharma, 2013). In other to address these issues there is a growing global movement to implement more environmental friendly computing (Kiruthiga and Vinoth, 2014 Ray and Bag 2009) has focused on e-waste management as a solution towards green computing and discussed the role of OEMs and the consumers for the green computing movement from global perspective. In the year 2014 nearly 41.8 million metric tons of e-waste call for green technologies for end life disposal.

2.0 What is E-waste?

E-waste (E shortened for electronic) are discarded computers office electronics equipment, entertainment devices electronics. Mobile phones television sets, microwaves, refrigerators etc. includes all electronics which are defined for reuses, resale salvage, recycling or disposal. Others are reusable (working and repairable electronics) and secondary scrap either copper steen or plastics to be commodities and reserve the term “waste” for residue or material dumped by the buyers rather than recycled including residue from reuse and recycling electronics (Hazra J, 2011).

E –waste is one of the fastest growing streams in the world and according to Sharmn S. 2011, these includes items as computers, liquid crystal display (LCD) plasma panels, pruning scanning devices mobile phones as well as used rage of medical and industrial equipment simply discarded as new technology become available. Huge quantities of these wastes are discarded every year and since these wastes contain toxic substances they pose high risk to the environment. In computers cadmium are used in circuits boards lead oxides and cadmium in cathode ray tube monitors mercury in switches and flat screen monitors cadmium in computers polychlorinated biphenyls in older capacitors transformers and batteries. The presence of valuable recyclable components in electronic wastes attracts internal and unorganized sectors towards it but the unsafe and environmental risky practices adapted by them pose great risk to both health and environment (Karla V, 2014).

Problems of E-waste

E – Waste is a problem both at manufacturers end and at users' level. According to LUO G. Wong, 2007 as improved models based on a new technology hit the market more e-waste is generated. Manufacturers also fail to take responsibility for their product once it is sold and then disposal becomes solely the headache of consumers. At present management of these electronic wastes is at poor State while most of them are recycled; the rest ends up in landfills or thrown into lagoons. Karla V. 2004 also gave a report stating 70% of the heavy metals found in landfills come from the electronics discarded contaminating ground water. The wastes burned instead of been buried or dumped lead to unhealthy emission and air pollution.

Conventionally, manufacturing computers include the use of Lead, Cadmium, Mercury and other toxins in general and although computer design has progressed surprisingly fast in terms of performance looking at it from a green perspective the work is yet at its epoch. According to experts from IBM Global technology services 2007 report computer alone contains about 4 to 8 pounds of lead along with other electronics devices it contributes of all lead in landfills.

According to Mark Bramfilt principal program manager at PG and E data center servers use 50 times the energy per square foot as an office flats. Data centers are the main reason behind energy consumption than the hardware. Such as servers, it is predicted that energy cost now about 10% of the average I.T budget, could also rise to 50% on the recent year. Faster processors use more power and their waste heat increases temperatures causing reliability problems such as disk crash, device failure etc. leading to more waste generation. Moreover the biggest threat of air conditioners is the release of CFC (Chlorofluorocarbon which can destroy the Ozone layer (TCO, 2015).

2.1 Waste management

According to Ayesha A. Siddiqui, any substance discarded is regarded as waste. It is valuable raw material located at a wrong place.

Many of the wastes at present used in uneconomic manner or left completely unutilized are causing great hazards to human environment. It can be converted to useful products, by making use of appropriate processing technology. These wastes are of various types and can be categorized as hazardous and non hazardous (Anjum S. and Ayesha, 2013). It is further divided like municipal wastes electronic bio-medical and industrial wastes. Many studies have been carried out in various parts of the world to establish a connection between health and hazardous wastes. Certain chemicals like Mercury, Cyanides, and polychlorinated biphenyls are highly toxic and exposure to these can lead to disease or even death. Some studies have detected excess prevalence of cancer in residence exposed to hazardous wastes (Kimberly M, 2007).

2.2 **E-wastes management by recycling**

To handle the above mentioned issues related to excessive use of electronics equipment and their effect on the environment. Environmental scientist as Ladou J. and Lougrove S, 2008 have emphasized on 3R's (Reduce Recycle and Reuse) process as an alternative to the present E-waste management processes.

For a developing society like ours reduced use of electronics equipment been not a feasible option we therefore have to emphasize on recycling and reuse processes. Used or unwanted electronics equipment electronic should be discarded in a convenient and environmentally responsible manner. Computers should never be discarded in a landfill, they should be recycled through manufacturers programs such as HPS plants partners recycling service or recycling facilities in the community still working computers may be donated to nonprofit agencies.

Recycling methods that may be adopted includes open burning of circuit boards or using acid stripes which are potentially harmful. The IP chips are reuse and the parts that cannot be reused are sent for open dumping to extract metals like copper (Ladou J, 2008). PVC coated cables are openly burnt Nitric acid is also used to remove Gold and platinum. Both open burning and acid baths to occupational exposure to pollutants and endanger the health of nearby communities. This has been linked with various health problems like silicosis, respiratory irritation and pulmonary edema. (Anam Syed, 2015).

2.3 Health risk of E-waste

Recycling of waste carries health risk if proper precautions are not taken. Workers handling waste containing chemical and metals may experience exposure to toxic substances and have severe health issues at the range of physical disorders disabilities etc. (Pranau Pantil, 2016). Therefore the disposal of health care waste and toxic metals waste requires social attention in other to avoid major health hazards.

Dr. Pranau Pantil also said that since open fires burns at relatively low temperatures they release many more pollutants than in a controlled incineration process. Inhalation of open fires emissions can trigger respiration infection such as asthma, coughing, wheezing even chest pain and eye irritations. Open fires burn with a lack of oxygen forming carbon monoxide which poisons the blood when inhaled.

Land filling which is one of the widely used method of waste disposal and as we have the knowledge that the leaks the lead often contains heavy metals and other toxic substances which can contaminate ground water as well as water resources used in homes for households activities, drinking, used in hospitals etc. (Anam Syed, 2013).

2.4 What is green computing?

Green computing can be defined as the efficient use of computing resources. It is the environmentally responsible and eco. Friendly use of computers and their resources (Debnath, 2015)

It can also be defined as the study of designing, manufacturing/engineering using and disposing of computing devices in a way that reduces their environmental impact.

Green computing aims to attain economic viability and improve the way computing devices are used. Green industrial having practice includes the development of environmentally sustainable production practices energy efficient computers and improved disposal and recycling procedures.

Two major issues associated with green computing are: reduction in energy consumption and population control while the former can be achieved by proper use of electronics through the development of energy efficient and less power consuming hardware the later can be achieved through their reduced used proper recycling policies and the use of less toxic in manufacturing the equipments (Gash S.K, 2015)
To promote green computing concept at all possible levels the following four complementary approaches are employed:-

Green use: This means the minimizing of electricity consumption of computers and their peripheral devices and using them in eco friendly manner.

Green disposal: This is the re-opening of an existing computer or approximately disposing of recycling unwanted electronic equipment.

Green-design: This means designing energy efficient computers services, printers, projectors and other digital devices.

Green manufacturing: Minimizing the waste during the manufacturing of computers and other sub-systems to reduce the environmental impact of these activities (energy star program, 2010) .

Solution/the way out

If handled properly electronic wastes can be valuable source of secondary raw materials. The impact of recent legislation such as the waste electrical and electronic equipment directive (WEEE) and the restriction of the use of certain hazardous substances in electrical and electronic equipment directive (ROHs) and of current and future methods for treatment, recycling and friendly society (Ciocoiu N, Burea S. and Tartiu V, 2013).

The time has come when the manufacturers have to give due importance on developing safe electronic equipment making use of biodegradable less toxic and eco friendly materials. Minor changes in our work habit can contribute in larger way to environmental safety.

Listed below are some few but effective steps which can be followed to make computing greener (Energy star program, 2010):

- Printing only what is needed
- Using recycled content paper whenever possible
- Printing on both sides of the paper.
- Using recycled and used ink and toner cartridges how far it is possible.
- Going for good quality efficient energy saving equipment with higher levels.
- Keeping the systems switched off when not in use instead of leaving them in standby mode (for even in that manner computers consume about 10 watts of power).
- Going for new equipment only when they are needed not because a new model is available in the market.
- Purchasing small items with minimum attachment and peripherals.
- Unplugging peripherals such as printers, audio system, scanners, modern etc. if these are not in use.
- Changing the Ups battery optimally instead of keeping it switched on for the whole day.

3.0 CONCLUSION

In conclusion, computers today are integral part of individual lives all around the world together with all electronic devices but unfortunately these devices are toxic to the environment given the materials are used concerned about the hazardous materials ever present in computers even if the importance of various attributes differs and that a more environmentally friendly attitude can be obtained through exposure to educational materials. The challenge is to raise awareness among all actors of different sectors in order to realize the innovation potentials and to shift to eco-innovations that is how designers plan to make life span from manufacturing to recycling:

- Energy-intensive manufacturing of computer parts can be minimized by making manufacturing process more energy efficient.
- Replacing petroleum fill plastics with bio-plastics-plant based polymers which measures less aid and energy to produce in comparism to had hand plastics with a challenge to keep these bio-plastics computers coal so that electronics won’t melt them.
- Landfills can be controlled by making best use of the device by upgrading and repairing in time, making up graduation and repairing processes.
- High power consuming display devices can be replaced with green lights mode of OLEDS or organic light emitting diodes etc.

Computing parts should therefore be recycled separately with an ophon of reuses or resale. Individuals should also be educated how to classify and dispose e-waste separately. Strict laws cab as well be enacted to reduce the catastrophe and pollution of the environment by E-waste (Ladou, and Lauegrove, 2008).

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OFFICE TECHNOLOGY AND MANAGEMENT RESILIENCE AND SUSTAINABILITY IN POST PANDEMIC ERA

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Abstract

This paper is to appraise the resilience of Office Technology and Management Programme as an anchor for production of skillful and creative Office Managers that can stand the test of time in the Post-Pandemic social economic environment. Emphasis will also be laid on the challenges of Office Technology and Management Programme in the midst of Pandemic Era such as Corona Virus – Covid-19 Pandemic.

Keywords: ***Office Technology & Management, Resilience, Sustainability, Pandemic. Era***

INTRODUCTION

Olawole and Abuya (2011) stated that Office Technology and Management is a new academic Programme in some of the Nigeria Polytechnics and in some of the nation's universities. The need to prepare and make the students of secretarial studies competent, skiful and employable in the world of work which is being driven by technology and need to have technology content in the curriculum of the secretarial studies programme in the polytechnics gave birth to Office Technology and Management. This in entire Nations of the world is witness in workplaces as students of secretarial studies known as Office Managers are gainfully employed and are exhibiting their technological knowhow in office routine approaches in all ramifications. Office Technology and Management can be defined as training for application of workplace routine electronically, using human wares to achieve maximum and effective productivity in workplace. Office Technology and Management is also a career programme mainly for training of individuals to acquire modern electronic work place skills for files management, and also management of men, materials and machineries in the Offices, hence these individuals are called Office Managers.

The department offering the Course and the Programme is named (OTM) Office Technology and Management. The Products are called Office Managers, the students potential Office Managers. Their skilful management of records, files, materials, men and machineries to create effective and accurate productive office results lead to the saying "If the Boss is away, there is always a Boss". That refers to the trained Office Managers. Showing that the impact of the Secretary (Office Manager) is so pronounced that the absence of his/her Boss in office will not be felt by staff members, customers, and office work itself. They are Technological knowhow, ICT complaints, able to give ready-made expected results to official expectations in divers practical or theory works. The products of this programme are versatile very demanding in all field of works. From time to time Organizations, and different individuals that are companies owners come to the Department of Office Technology and Management seeking for capable hands to manage their establishment. The students of the Programme Office Technology Management no doubt are expose to jobs opportunities at the exact time, because of their technological knowhow. It is in the light of this expertise that Edafiogbo P (2002). Said that Technology affects every facet of human endeavour and it makes such an impact on the development of a nation that it is in fact indispensable in the quest for enhanced and sustainable national development.

In the world of work, Industries and Organizations are faced with diverse competition. Half baked employees are set back to the organizations and their productivities. The Office Managers are therefore qualified to fit in to any organizational competition and ensure increase in productivity. Application of knowledge of Interpersonal Skills learnt from one of the courses of Office Technology and Management enable them gain the hearts of Organizations' clients and maintain good relationships and enhance rate of turnover of success for the Organization, no wonder Adebisi & Idolor (2015). opined that organized business has sought a business optimization strategy that enables them to serve customers efficiently, develop loyal customer patronage, and keep competition at bay. Knowledge management (KM) is one of such business optimization strategy that identifies, selects, organizes, distils and package information essential to the business of a company in a way that improves employees' performance and corporate competitiveness.

Oloruntoba (2012) state that The most important asset of any nation is its human resources. It is paramount important that such resources are properly and adequately developed. There is bound to poverty when human resources are not developed in the required areas where the contributions can provide among other things, self-reliant skills. Knowledge is power and a motor for self standing and enablement for workplace success. when resources for knowledge is available and accurate , the trainees will have a good entrepreneurship. Office Technology and Management programme therefore plays a very important part by making her products self reliant.

RESILIENCE OF OFFICE TECHNOLOGY AND MANAGEMENT IN THE MIDST OF PANDEMIC

Resilience is a state of facing all difficulties affecting a particular desire, eg. Challenges in the midst of covid 19 pandemic. Before this period, Nigeria had witnessed epidemics like Lassa fever, Hepatitis, Ebola and now Covid 19 pandemic. Some of these Epidemics (diseases) are in the midst of Nigerians under controlled of their victims hence not spreading. Ebola with its shakings then did not pull weight like Corona virus- Covid 19 pandemic which caused worldwide Luck downs, shutdown of International and Local Airports (No entrances or exits for humankinds, goods, and services), borders lockdowns, schools, markets, all activities centers lock downs, above all Churches and Mosques lockdowns. It was said the pandemic is air born sitting on the seat, touching any object that has the carriers or patients touched etc causes the pandemic. Among the remedies for the pandemic are social distances and self isolations from public places etc. economy as a Nation keep surviving the heat thereon. Office Technology and Management faced these challenges, Lockdown affect direct touch and contacts to lecturing staff, non lecturing staff (Office Managers), others and students; hence there are vacuums hungering for both vertical and horizontal communications as usual. Ajayi and Opeke (2017) opined that employees are social beings that need an enabling environment to relate and interact. Social interaction is the process by which people either act towards or respond to other people. I agree with them because it is a big challenge for various classes of associations to automatically force to compulsory isolation. Under normal circumstances most people hate staying indoors, adapting to the isolation state by the lockdown has been a new phase of life for all and sundries. It takes gradual attempt and self disciplines . Ogah I.A. &Ejuwa O.B.(2012). Opine that communication is one of the major activities of all living creatures, whether human or animals. They have the ability to express feelings, thoughts or ideas and to give out information that help them to cope with themselves and the environment in which they live. Physical contacts plays important roles in communication. For instance as student communicate online, there is need for classroom communication for achievement of some percentage of success which online teaching could not provide as the result of challenges at the part of the students and even the lecturees as the case may be.

PANDEMIC: It is a deadly disease that has capacity to spread even worldwide when it is not controlled eg Covid 19 pandemic..There are other pandemics just as they were mentioned above in passing , but this paper is laying emphasis alone on Covif-19 pandemic. This is a wicked virus that took lives of many people across the globe. The virus known as corona which is popularly known as corona virus or covid- 19 pandemic came into Nigeria by March 2020 and started spreading ,and killing many, even as being tackling by Nigeria Government and governed yet were pulling weight till this it's tail end, it is still making noises , but being silencing everywhere by social distancing, wearing of face masks, washing of hands, and all given rules by Government and those in Health caring organizations.

SUSTAINABILITY: This is degree of maintainable rate of success in the midst of pandemic knockouts. Federal Government apportioned and mandated resumptions of Institutional staff with modalities in placed –provisions of hand sanitizers, soaps and water, face masks and social distances establishments. Institutions Management and the

Unions provide some of the above for staff to safe guide them against covid-19 pandemic. The institution entrances are restricted from unnecessary movements, no face masks no entry. In the Department of Office Technology and Management Hand sanitizer has been for very long placed at the first floor of the building for every one that peradventure steps into the premises. All the Office Technology and Management lecturers have been taken their students online as students are at homes. Every course in the Office Technology and Management are not left out in online lecturing in the midst of challenges caused by the pandemic.

ERA

Era means phase, economy, dispensation, stage, section etc. as the case may be. For instance a pandemic era, the midst of pandemic or in the very period of pandemic say corona virus pandemic or otherwise, in the midst of covid-19. Pandemic era is then the critical periods of the virus, where everyone is eager to seek for preventive measure for the virus. At this era , fear of being a victim could be noticed from people all over the globe.

Objective of the study

This paper is to identify the following:

1. Effectiveness of office Technology and management in the midst of covid 19 pandemic
2. Office Managers services' rate of turnover in the midst of covid 19 pandemic
3. Responsiveness of (OTM) students to learning in the midst of covid 19 pandemic
4. Degree of OTM Staff welfare in the midst of covid 19 pendemic

Research Questions

1. How is Office Technology Management affected in the midst of covid 19 pandemic?
2. What is the service rate of turnover of Office Managers in the midst of covid 19 pandemic?
3. What are the responsiveness of OTM students to learning in the midst of covid 19 pandemic?
4. What are the reactions of OTM Staff welfare in the midst of Covid- 19 pandemic?

Office Technology and Management Resiliencies Sustainability in the Post Pandemic Era .

Conception of Post Pandemic Era

Corona virus which is COVID-19 Pandemic exhibits and imposed very hard omens at the positive existence of human lives, setbacks in governance, Education, Industries, Households, Businesses, Associations etc. worldwide as results of global lock downs or Short Down. These setbacks are challenges, sufferings, predicaments, hardships faced by the nations or individual is known as **Resilience**. The struggle to breakthrough in the midst of the Challenges caused by the pandemic, how and what it takes you to manage or to survive is the **sustainability.** Office Technology and Management as mentioned early was to an extent able to sustain some resilience in the midst of COVID 19 Pandemic.

Post Pandemic is end tail of the existence of a virus. It is a period by which it is expected strong plans to prevent re-attack or re-enforcement of the virus in any form or state. It is a state to plan how to build back what were damaged, hindered in the midst of pandemic. It is when to rectify things to their normal places. Yaya H.G (2020). Stated The Gombe State Universal Basic Education Board (SUBEB) has trained head teachers and principals of public primary and junior secondary schools on the COVID-19 preventive protocol ahead of school's reopening stated for Monday, October 5. When you read down the paper , you get where The Executive Chairman of SUBEB, Mr babaji Babadidi said the training was aimed to lay down safety protocol and train school administrators on how to handle their pulpls and students when the schools were reopened. Three things are involved: Planing, Prevention and Restoration. Let us look at Post Pandemic Era (Economy).

Post Pandemic Era then is the tail end of COVID 19 pandemic, just as said earlier , Is when an economy is having three phases for redevelopment : **Planning mood Prevention mood and Restoration mood.** In this case the Nation is making plans to bring back normalcy – Activities on holds because of covid-19 pandemic. As the plans are on, she is also putting in place preventive measures to avoid contaminations and re-attack of the covid-19, and finally building all that are lost or loose at the cause of the covid-19 pandemic. Going through the above, it is made very clear these three moods of redevelopment.

Kehinde-Akinseinde-Jayeo-ba(2020). Stated that Executive Director. Risk Management Division, Access Bank PLC, Dr Gregory Jobome, has called for the adoption of a range of non-traditional Mechanism to raise additional funds for developing aid. When read further you see again emphasis is on development. While giving insight on the scale of financing required for Post-Covid development, providing the perspective of commercial banking, Jombe share thoughts on building synergy between government regulators and commercial banks to strengthen the economy of Nigeria and the financial sector. From the newspapers views the post pandemic means the plans for preventive measures ,preventive measures, and restorations of parts of economy pandemics affected.

Every Setup across the Globe must have to embrace the three phases to .her existence ,Office technology and Management is not left out. The Department of Office Technology and Management has forecasted and analyzed the likely effects of covid-19 on the Office Technology and Management Programme, especially the courses that are practical oriented, in planning ahead of time she puts essential measures in place for both Lecturers of the Programme's Courses and students of the programme to attain successes in the online lecturing of the practical courses, even the theory courses. One of the measure was that lecturers must use a very familiar and affordable media platform to teach his or students online . This is to make sure that everyone both lectures and students could have opportunity to keep on in attendance come what may in the pandemic storms and in Post Pandemic periods.

Office Technology and Management Programme in Post Pandemic

According to Elegbede, A.M .& Awoseyila,F.(2012) The concept of management entails the process of achieving desired results by the use of human efforts and facilitating resources. In the light of what the three Phases of Post Pandemic Era require. In readiness for Schools (Part-Time) Office Technology and Management Programme resumption yesterday 11th of October 2020, the Department has already educated her Lecturers with required information, put in place conducive sitting positions for students observing social distancing, and wearing of face masks. Resources for students learning in the Laboratories like computers were rearranged to enhance students learning, while more resources are being awaited by the Department for more enhancement of the programme , the Lecturers are putting in their efforts in maximizing the available resources towards students' success, which is the goal of Office Technology and Management Programme. Apart from computer laboratories, Shorthand laboratories and typing pool are coming up, and will be for the use of students.

The three phases noticed in Post Pandemic Era are put in place in Office Technology and Management Programme as the PartTime students resumed, and also when the Full-Time of the Office Technology and Management students resume on Monday 13th of October 2020. The same preparation is made for them. These are again what the three phases stand for in this Era,

1. **Planing for students resumptions:** This has been explained before. Arrangements had been made , and date fixed for their reopening.

2. **Preventive measures provided for their resumptions:** This is to prevent them from covid-19 pandemic, to avoid reinforcements or re-attack of the covid-19 pandemic.

3. **Development:** Restorations or redevelopment of what Covid-19 pandemic destroyed or delayed or put on hold as the case may be.

The class room lectures that were on hold, or stopped because of covid-19, and advantages of class room lectures are being attained by students and lecturers again. More also so practical aspect of teaching the online teaching did not handle well were perfected on the board. The students who could not attend online classes because of financial challenges or what have you, are now available for physical classes.

Conclusion

In conclusion, the Office Technology and Management in the midst of Covid 19 Pendemic has able to manage challenges, to a reasonable extent, has achieved a very good degree of results, which if they are to measure will lead to furtherance of discussions of this study.

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A COMPARATIVE ANALYSIS OF HEALTH EDUCATION AS A TOOL FOR FIGHTING AGAINST COVID-19 IN IJEBU-ODE AND IJEBU-IMUSHIN, OGUN STATE

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Abstract

The study was carried out to evaluate the impacts of health education in the fighting against COVID-19 among Ijebu-Ode and Ijebu-Imushin residents. Presently, the COVID-19 has no vaccine or drugs for its cure but can be managed through series of human efforts by observation of personal hygiene and environmental sanitation and maintenance of physical distances. All these activities require knowledge, positive attitudes and right perception that are the hallmark of Health Education and Promotion. The study employed a cross-sectional online survey using google forms.to gather information from the four hundred (400) respondents of the study areas and descriptive statistics and percentile used for the analysis. The results showed that This survey was dominated by female (60.75%) and single (49.5%) respondents who are mostly educated up to college (Bachelor) degree or above (65.25%) with an overall 100% awareness of COVID-19 thus, depicting that the respondents are knowledgeable about COVID-19 pandemic. In the study area, only the educated use social media and the internet since they understand the use of the English Language This study provides a comprehensive impact of health education in the fighting COVID-19 among residents of Ijebu-Ode and Ijebu-Imushin. The findings suggest that participants in this study have good level of knowledge on COVID-19, which are necessary for mitigating the spread of COVID-19.

Keywords: COVID-19, Health Education, Impacts, Ogun

INTRODUCTION

Health education is very important for the general public to internalize appropriate health information that will serve as guides to their health behaviour. This is because people are likely to exhibit health behaviour based on available information to them. The point to make here is that health behaviour of people is largely dependent on information available to them. He et al. (2016) after their study using a Chinese population concluded that health information and health behaviour are key to public health education. Within the context of public health, information possession is vital because poor knowledge about public health issues could have corresponding negative implications on health behaviour. Conner (2010) corroborates that information is one of the fundamental cognitive determinants that influences health behaviour. Limaye et al. (2020) also acknowledged the important role of information in health education.

COVID-19 was first reported in the city of Wuhan in China in December of 2019. As at that time, it was largely regarded as a Chinese problem that was also going to end in China. According to Wu et al. (2020) in an article which was published by *Journal of the Chinese Medical Association*, COVID-19 was first reported in late December in Wuhan and quickly spread to other places in China and eventually, other parts of the world. In Nigeria, COVID-19 was first confirmed on 27 February 2020. This was after the virus was reported in many other parts of the world like United States, Italy, Russia, among others. This means that Nigeria had ample time to prepare for the outbreak.
There have been many global confirmed cases of COVID-19 with several fatalities. The World Health Organization (WHO, 2020) says there is a total of 5 267 419 confirmed cases of COVID-19 as at 25 May 2020. It adds that a total of 341 155 have died of the virus. The situation, when compared with 1 month ago from May 25, is frightening. This is because as at 25 April 2020, there were only 2 710 948 confirmed cases globally and 187 844 deaths. These figures represent multiple increases in the number of cases. WHO also reported that in Nigeria, there were a total of 7839 confirmed cases and 226 deaths as at 25 May 2020. This figure represented an exponential increase because as at 25 April 2020, Nigeria had only 1095 confirmed cases with only 32 deaths, but a month later, these increased more than four times.

Education systems should be part of the response to prevent, limit or slow the spread of the virus and curtail its impact. Compared to the education system, the public health system has a smaller presence.

The education system has a large institutional base that links it to the community, especially through the parent body. Schools are the primary institutional form of government with a physical presence and relationship through parenthood with a significant proportion of adults in the population. Therefore, this study aimed to evaluate the impact of health education in the fighting against COVID-19 among Ijebu-Ode and Ijebu-Imushin residents.

RESEARCH METHODOLOGY

Study Design and Population

This study was designed as a cross-sectional survey conducted in Ijebu-Ode and Ijebu-Imushin using a simple random sampling technique. A semi-structured online questionnaire was designed using google forms. Through emails, WhatsApp and other social media, the link of the questionnaire was sent to prospective respondents by the investigator. On sending the link, prospective respondents were encouraged to share the survey link with their contacts and online platforms. Thus, the link was forwarded to people apart from the first point of contact and so on. The online survey was selected for this study since a population-based survey was not feasible under the current critical condition.

The study population were individuals with access to the internet. Respondents who understood the English language and were 18 years old and above. Been an online study using a simple random sampling method, the survey also allowed respondents from other communities to participate should they be willing. Participation in this survey was anonymous, consensual and voluntary.

Measures

The survey instrument used in this study was designed according to the guidelines recommended for the awareness and prevention of COVID-19 by the NCDC (2020). The online questionnaire used in this study was initially drafted and validated before hosting it online. Public health and epidemiology experts were asked to assess the instrument and give their expert view on the relevance and correctness regarding COVID-19, and also the relativity and simplicity of the instrument having in mind the study population. In a pilot study, the questionnaire was pretested on 20 participants which were excluded afterward from the study. Expert opinions were used in reshaping the questionnaire into an easier, simpler and shorter instrument which could be filled within 6 min. The data generated from the initial pilot study was excluded from the final analysis.

The online self-reported and a respondent-friendly questionnaire designed for this study contained questions assessing socio-demographics, source, Knowledge toward COVID-19. The sociodemographic variables included age, gender, marital status, level of education, residence, residential structure, and the number of family members living together.

The components of the knowledge section included the awareness of COVID-19 and the source of information, cause and modes of transmission, symptoms, individuals at risk and preventive measures.

RESULTS AND DISCUSSION

Table 1

Socio-demographic characteristics of participants

Variable		Frequency (n = 400)	Percent (%)
Age (years)	18–29 years	206	51.5
	30–39 years	132	33
	40–49 years	43	10.75
	50–59 years	19	4.75
Gender	Female	243	60.75
	Male	157	39.25
Marital status	Married	169	42.25
	Single	198	49.5
	Divorced	23	5.75
	Widow/widower	10	2.5

Level of education	High school	43	10.75
	College/bachelor	261	65.25
	Master	65	16.25
	PhD	23	5.75
	Others	8	2
Residence	Ijebu-Imushin	196	49
	Ijebu-Ode	204	51
Residential structure	Flat	120	30
	Congregated compound	202	50.5
	Estate	78	19.5
Number of family member living together in one house	0–5 people	244	61
	15–20 people	19	4.75
	5–10 people	87	21.75
	10–15 people	42	10.5
	Much more	8	2

A total of 400 respondents participated in this study survey. Majority of the study population were female 60.75% (243), 51.5% (206) were between ages 18–29 years, 65.25% (261) had a college (Bachelor) degree or above and 51% (204) reside in Ijebu-ode and Ijebu Imushin 49% (196). The majority of the respondents 61% (244) and 21.75% (87) have from 0 – 5 people living together in one house as family and 5 – 10 people living together in one house as family (Table 1).

Table 2

Knowledge of residents of north-central Nigerian about COVID-19

S/N	**Questions**	**Frequency (n = 400)**	**Percent (%)**
1	Have you heard of COVID-19?		
	Yes	400	100
	No	0	0
2	If yes in 1 above, from where did you hear of it?		
	Other sources	22	5.5
	Internet/social media	129	32.25
	Newspaper	44	11
	Friends/family	109	27.25
	TV	81	20.25
	Government enlightenment campaign	15	3.75
3	Is COVID-19 the same as Flu virus?		
	Yes	98	24.5
	No	287	71.75
	I don't know	15	3.75
4	What causes COVID-19?		
	Bacteria	34	8.5
	Fungi	1	0.25
	Virus	236	59
	I don't know	29	7.25
5	Does eating or contacting wild animals' results in COVID-19 infection?		
	Yes	65	16.25
	No	312	78
	I don't know	23	5.75
6	Which of the following disease(s) is similar to COVID-19? You are free to choose more than one		
	Typhoid	55	6.5
	Malaria	119	14.1
	Ebola	199	23.6
	HIV/AIDS	50	5.96

	SARS	326	38.6
	All of the above	29	3.4
	None of the above	65	7.7
7	Is it possible for a COVID-19 positive person to show no symptoms?		
	Yes	298	74.5
	No	89	22.25
	I don't know	13	3.25
8	How long does it take from contracting the disease till showing symptoms (Incubation period)?		
	Less than 7 days	73	18.25
	1–14 days	231	57.75
	2–21 days	26	6.5
	1–3 months	5	1.25
	I don't know	65	16.25
9	Who can get infected with COVID-19?		
	Old people only	7	1.75
	Young adults only	3	0.75
	Anyone can be infected	387	96.75
	Teenagers and children only	5	1.25
10	Which is a symptom for COVID-19? (select all that applies)		
	High fever	341	20.8
	Runny nose	211	12.9
	Dry cough	378	23.1
	Breathing difficulty	277	16.9
	Muscle pain	181	11.1
	Fatigue	211	12.9
	Bleeding	34	2.1
11	How does the virus spread? (select all that applies)		
	Air droplets (from patient sneezing/coughing)	365	36.5
	Mosquitoes/flies	4	0.4
	Contact with contaminated surfaces	237	23.7
	Close contact with people who have the virus	392	39.1
	I don’t know	3	0.3
12	What can kill the virus? (select all that applies)		
	Clean surfaces with diluted chlorine	263	26.9
	Alcohol-based sanitizers	377	38.6
	Soap/detergents	299	30.7
	Water alone	9	0.9
	I don’t know	29	2.9
13	Is hand-wash important?		
	Yes	391	97.75
	No	4	1
	Maybe	5	1.25
14	If yes in 13 above, how long should you wash your hands to kill the virus?		
	Less than 20 s	57	14.25
	20 s to 1 min	285	71.25
	I don't know	58	14.5

The current findings showed that all the respondents 100% (400) had knowledge of COVID-19 with the majority of the respondents 32.25% (129) and 27.25% (109) stating the internet/social media and family/friend as their major source of knowledge. Although 59% (236) of the respondents agreed that COVID-19 is caused by a virus, only 38.6% (326) believed that it is similar to SARS. Knowledge regarding the transmission of COVID-19 showed 96.75% (387) and 57.75% (231) believed everyone is at risk of infection and COVID-19 virus have between 1 and 14 days incubation period while 39.1% (392) and 36.5% (521) of the respondents knew that COVID-19 virus can be transmitted through Close contact with infected persons and Air droplets (from patients’ sneezing/coughing). Also, majority of the respondents mentioned dry cough 23.1% (378), high fever 20.8% (341) and breathing difficulty 16.9% (277) as COVID-19 symptoms. However, 74.5% (298) of the respondents believed that it is possible to be infected without showing any symptom, and also 38.6% (377), 30.7% (299) and 26.9% (263) of the respondents opined that alcohol-based sanitizers, soap/detergents and cleaning of surfaces with diluted chlorine could kill COVID-19 virus (Table 2)

The public lack of awareness of infectious diseases

Seven studies (Song, et al., 2004; Bener A, Al-Khal A. 2004; Huang, et al. 2016' Bawazir, et al. 2018; Alqahtani, et al. 2017; Al-Mohrej, et al. 2016) revealed that the public did not know how to face emerging infectious diseases. However, three surveys (9,10,12) showed that people had good knowledge, attitude and practice (KAP) of COVID-19, yet it is necessary to strengthen the community publicity, and the health education of residents. One survey (Zhong, et al. 2020) revealed that most Chinese residents are knowledgeable about COVID-19, hold optimistic attitudes, and have appropriate practices (like wearing mask) towards COVID-19. One study (Person, et al. 2004) showed that myths, fear and stigmatization of potential SARS patients emerged in the outbreak, as global media reported dramatic stories from the media, television, and the Internet. Another study (Bomlitz LJ, and Brezis M. 2008) revealed that emerging health hazards were over-reported in mass media in comparison to the common threats to public health. A survey (Bawazir, et al. 2018) from Saudi Arabia suggested that epidemiological knowledge received by the public was inadequate, and their recognition of MERS-CoV relied on the clinical manifestations, rather than epidemic features. Age ≤30 years, male gender, and not having tertiary education were independent predictors of poor epidemiological knowledge.

Five studies (Gautret, et al. 2013; Sahin, et al. 2015; Alqahtani, et al. 2016; Alhomoud F. 2017; Migaul, et al. 2019) showed that pilgrimage travelers lacked awareness of infectious diseases. The Middle East, where MERS outbroke, is also a region with a great number of religious pilgrimage sites. A study in Australia evaluated pilgrims' awareness of MERS-CoV during travel, preventive measures, and the contact with camel exposure, and found that only 28.0% of Australian pilgrims knew that Saudi Arabia was affected by the MERS-CoV outbreak (Alqahtani, et al. 2016). A survey in France (Gautret, et al. 2013) reported that only 35.3% of people knew about the Saudi Ministry of Health recommendations for at-risk pilgrims to postpone participation in the 2013 Hajj. None of the 179 at-risk individuals decided to cancel their Hajj participation even after being advised during the consultation. A study from the United States showed that their CDC's health website for visitors was frequently clicked in the first half of 2003, and visitors visited 2.6 million times for travel warnings, consultations, and other SARS-related documents (Arguin, et al. 2004)

The effect of health education

A survey (Zhong, et al. 2020) showed health education programs aimed at improving COVID-19 knowledge are helpful for Chinese residents to hold optimistic attitudes and maintain appropriate practices. During the SARS epidemic in 2003, a study evaluated the level of the awareness of SARS among older people, then provided them with health education by telephone, and assessed the change. The authors found that after telephone health education, the anxiety level of the elderly people decreased, and their awareness of the modes of virus transmission improved (Chan, et al. 2007). A study from China showed that comprehensive health education and publicity improved Beijing residents' attitude towards SARS, enhanced their awareness of preventing SARS, and significantly decreased the occurrence rates of tension, anxiety, depression and fear ($P<0.01$). There were also more behavior changes ($P<0.01$) in the prevention of SARS, which fully testifies the effect of comprehensive health education publicity (Song, et al. 2003). Another study showed that the awareness of four items of MERS knowledge was significantly higher after a health education intervention than before ($P<0.01$). The health behavior formation rate of MERS was also higher after the intervention than that before ($P<0.01$) (Alqahtani, et al. 2016).

Discussions

The emergence of COVID-19 from the city of Wuhan, China in December 2019 and its rapid global spread across over 215 countries and territories has become one of the largest pandemics in recent times with several devastating and significant public health challenges (WHO, 2020). Being the most populous African nation and the 7th most populated country in the world, Nigeria's population could undoubtedly be associated with a higher risk of increased morbidity and mortality due to COVID-19. With the infection prevention and control (IPC) strategies adopted by the NCDC and Nigerian government to curtail COVID-19, the adherence of the citizenry depends largely on their level of awareness and knowledge regarding the pandemic (Zhong, et al. 2020). Unconcerned attitudes and adherence to false and superstitious beliefs by the public often arise due to inadequate awareness, which further affects the level of preparedness and the proper implementation of IPC measures at the national or subnational levels.

This study is the first epidemiological survey aimed at assessing the impact of health education in the fighting against COVID-19 in Ijebu-Ode and Ijebu Imushin as well as identifying key areas of concerns and needs for optimal sub-national and community intervention. Collating such information is necessary for the promotion of major preventive behaviors including personal hygiene, social distancing as well as appraising the challenges emanating as a result of prolonged lockdown and restrictions.

This survey was dominated by female (60.75%) and single (49.5%) respondents who are mostly educated up to college (Bachelor) degree or above (65.25%) with an overall 100% awareness of COVID-19 thus, depicting that the respondents are knowledgeable about COVID-19 pandemic. In agreement with our findings, previous studies conducted in different Asian countries (Zhong, et al. 2020; Azlan, et al. 2020; Giao, et al. 2020; Saqlain, et al. 2020), Egypt, Kenya and Nigeria (Abdelhafiz, et al. 2020 Austrian, et al. 2020; Olapegba, et al. 2020) indicated high COVID-19 knowledge among the population. The high level of COVID-19 knowledge recorded in this study could be attributed to the caliber of respondents who participated in the survey. In the study area, only the educated use social media and the internet since they understand the use of the English Language. Those with college (Bachelor) degree or higher educational qualifications, and less than 40 years old constituted the vast majority of the respondents in this study (Table 1). Although the high level of COVID-19 awareness among the respondents signifies a positive predictor in curtailing COVID-19 pandemic within north-central Nigeria, the result however excluded the underprivileged (uneducated and vulnerable) individuals. The use of social media (32.25%) and family/friend (27.25%) constitute the major sources of information about COVID-19. This is consistent with other findings that reported the use of social media as the major tool for COVID-19 information (Abdelhafiz, et al. 2020; Zhong, et al. 2020; Saqlain, et al. 2020). In Nigeria, the use of the social media especially WhatsApp, Facebook and the internet constitute the main sources of information with about 85.49 million users recorded within the first quarter of 2020 of which more than 70% are youth (IWS, 2020) (who constitute the majority of the respondents in this study). Right from the WHO declaration of COVID-19 as pandemic, several guidelines and information on COVID-19 have been uploaded online by WHO and NCDC which are easily accessible by internet users. Access to such reliable information could help dispel the pandemic of misinformation, misconception and citizenry ignorance about COVID-19.

Although 59% of the respondents believed that COVID-19 is caused by a virus, only 38.6% agreed that it is similar to SARS. The transmission routes, incubation period and symptoms of COVID-19 are well recognized by the respondents. Also, 96.75% of the respondents believed that everyone is at risk of getting infected with the COVID-19 virus. This further reflects the effectiveness of the social media and internet in the creation of awareness about COVID-19 pandemic within the Nigerian population however, some media platforms often exaggerate the risk associated with COVID-19 pandemic (Abdelhafiz, et al. 2020).

Boosting health education to improve public health awareness for infectious diseases

Improved public health awareness for emerging infectious diseases plays a critical role in at least two ways. On one hand, appropriate behavior of the public, like adhering to self-quarantine and practicing the necessary hygienic habits will definitely slow down the spreading and help control the epidemic. On the other hand, outbreaks of emerging infectious diseases can often lead to negative social phenomena such as fear, stigma, and discrimination (Person, et al. 2004). Individuals who are feared and stigmatized may deny early clinical symptoms, delay seeking care, and remain in the community undetected, which may aggravate the spread of infection. Better knowledge and awareness promote understanding and communication between different groups of people and improve mental health. WHO had developed guidelines for preventing and addressing social stigma (WHO, 2020), and governments, media, and local organizations working on the SARS-CoV-2 epidemic should follow the recommendations. To control the spreading of COVID-19, boosting public health education should be a priority.

Improving access to more reliable information

Two studies (Storino, 2016; Cisu, et al. 2019) showed that health information from nonprofit, government and academic websites was more accurate than privately owned commercial websites and media websites. With the development of new media, people can now draw information from multiple sources, and through mobile devices basically at any time and place. Social media like Facebook, Twitter and WeChat are full of SARS-CoV-2 news and health education resources, which is convenient for the phone users. However, fake news and gossips are spreading fast, just like the virus. We appeal for the media and publishers to take deep consideration before post any information to the public. Official websites of the WHO and the national CDC are updating information about the epidemic and necessary preventive measures, and it is suggested for the publisher to cite and follow them.

In the event of a public health emergency, professional agencies, government departments, and authoritative media should fully cooperate according to the information needed by the public at different stages of the crisis under the united coordination of the government. This way the core information required by the public will transmit to the public in a timely, accurate, and appropriate manner (Du, et al. 2009).

Launching health education campaigns

Although we have collected data on some health education and promotion campaigns or programs in the world, we still need a wide influenced and persistent-actioning campaign to face the outbreak of the novel infectious disease. The outbreaks of SARS, MERS, Ebola and COVID-19 have given us every time a lesson for solidarity and collaboration. Suffering from the pain of lost lives, health education campaigns should be launched as early as possible to slow down the spread immediately

CONCLUSION

This study provides a comprehensive impact of health education in the fighting COVID-19 among residents of Ijebu-Ode and Ijebu-Imushin. The findings suggest that participants in this study have good level of knowledge on COVID-19, which are necessary for mitigating the spread of COVID-19.

Boosting health education to improve public health awareness for infectious diseases is urgently needed, especially for some vulnerable groups. Considering that information from the social media may be unreliable, the public should obtain information from the official websites of authorities such as the WHO and national Center for Disease Control, or from other sources endorsed by these authorities, rather than from a general search of the internet or social media. For educating and cultivating children, parents need to educate their children on the importance of evidence-based information on COVID-19 and help them practice preventive measures and hygiene behaviors

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THE EFFECT OF DIFFERENT AGRICULTURAL WASTEWATER AND VEGETABLE GROWTH FOR PUMPKIN AND TOMATOES

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Abstract

The irrational consumption of water is one of the greatest problems in the world today which can be solved by using agricultural effluent. Rather than disposing of effluents, gotten from agricultural farms or industries which had gotten nutrients and fertilizer in it. The study was aimed at determining the effect of various agricultural wastewater on the growth of vegetable crops. Three sources of wastewater namely fishpond, cassava mash and poultry were compared with natural water which served as control. Two crops (tomatoes, pumpkin), were experimented in a greenhouse at The Federal Polytechnic, Ado-Ekiti, Ekiti State, Nigeria. Buckets (20) filled with soil were used and divided into 4 which has a plant in each bucket. After the germination, the growth of the plants were measured viz-a-viz the height, leaves length, and number of leaves were counted. The data acquired was analyzed using ANOVA which gave a p-value as 864, 991 for tomatoes and pumpkin respectively which shows that the result was not significant. Although, there was no statistical significance but were ecologically significant, because at the end of the study, plants were having different height, with fishpond effluent followed by control, and poultry effluent with the best respectively. The Cassava effluent has a stunted growth on the pumpkin and a negative effect on the tomatoes which made it to wither after a month of planting. This finding is very important to farmers who finds it hard to acquire or access clean water in their farm environment due to cost. It is also important because this type of irrigation is organic, environmentally friendly and a sustainable farming.

Keywords: Wastewater, Vegetable, Growth, Pumpkin, Tomatoes, Effluent, Irrigation, Farming.

INTRODUCTION

The current high demand for freshwater has made it a very important resource that must be managed with care. The amount of fresh water available for agriculture has been significantly reduced due to increased population, low rainfall, frequent droughts, industrialization and urbanization. For these same reasons, the adoption of wastewater is in practice in most developing and developed countries (World Bank 2012). Wastewater is generated in very large quantities in our daily life and in all sectors for different purposes. This wastewater is generated in industries, food processing plants, other businesses and even in the home through cooking, washing, bathing and other purposes. The volume of water used for hygienic purposes per day is based on age, location and seasons. Each person in a household uses an average of 80 to 100 liters per day (NIGERIA Geological Survey 2013).

According to the result published by the Nigeria National Bureau of Statistics; the population of Nigeria was 178,571,721 in 2014. Based on this information, the average volume of wastewater generated in a day will be approximately 18 billion liters (WHO, 2006). The presence of this large quantity of wastewater constitutes major environmental problems; among other things, it generates a foul odor and serves as a breeding ground for mosquitoes (Buechler and Devi G. 2002). The use of wastewater for irrigation reduces pollution of rivers that would otherwise serve as receiving bodies for discharged wastewater. It also reduces the cost of disposing of wastewater (Scott et al., 2011).

Vegetables crops serves as a source of oil, carbohydrates, minerals and vitamins by type (Ihekoronye and Ngoddy 2014). Vegetable fats and oils have been reported to reduce the incidence of high blood pressure (Onunogbu 2015). Demand for vegetables in cities has stimulated the growth of commercial production of the product. Vegetables are a rich and relatively cheaper source of nutrients in developing countries. Their consumption brings taste, palatability, increases appetite and provides fiber for digestion and prevents constipation. They also play a key role in neutralizing the acids produced during the digestion of pretentious and fatty foods, and provide valuable fodder that helps the movement of food in the intestine. Vegetables find their importance in many dimensions as they can be taken as food, used in pharmaceutical companies and other industrial applications and serve as a source of employment and income for the producer.

Given the importance of vegetables in human nutrition while trying to prevent environmental problems, the use of wastewater for vegetable production and its effect on the macronutrients of pumpkin and tomatoes will be a welcome investigation. Vegetables and tomatoes are very popular vegetable crops.

Industrial wastewater is discharged directly by different industries such as electroplating, lock manufacturing, small industries, die casting, meat production industries, mining industries, etc. This is evacuated by manufacturing processes and commercial enterprises. Industrial wastewater contains drainage from the industrial site (silt, sand, alkali, petroleum, chemical residues, and heavy metals); Industrial cooling water (biocides, heat, sludge, silt); Industrial process water, organic or biodegradable waste, including slaughterhouse, creamery and ice-cream waste,

Organic or non-degradable (difficult to treat pharmaceutical or pesticide manufacturing waste), waste at extreme pH (from acid / alkali manufacturing, metal plating), Toxic waste (metal plating, cyanide production, manufacturing pesticides, etc.), solids and emulsions (papermaking, foodstuffs, lubricating and hydraulic oil manufacturing, etc.), agricultural drainage, direct and diffuse (Gabon, 2014).

This further leads us to the aim of the study which is to determine the effect of various wastewater on vegetable plant. The objectives are stated as follows:

(1) Determine chemical, biological and physical property test on the various waste water and the soil.

(2) Evaluate the effects of waste water on the growth of the vegetable.

(3) Compare the effect of the various waste water on the plant production.

Nigeria is a nation with abundant water resources but due to geographic location and ecologic differences, some states like Ekiti, among others, suffer from water shortage during the dry season, with this situation of poor farmers who are less privileged from a sustainable source of water or who could not afford to buy clean or treated water, commonly use nutrient-enriched agricultural effluents to irrigate vegetable farms, although with conservation and poor management, the use of irrigation water is essential to the success of vegetable production, especially during the dry season. Extremely hot and dry conditions can reduce production over large areas of the region, limiting the supply of vegetables and driving up prices. Profit opportunities exist for the producer with a well-organized water management plan when these conditions occur (Ensink et al., 2002).

In this study, the wastewater used was obtained from poultry (poultry effluent) cassava puree, (cassava effluent) pond of fish (fish pond effluent) and used to water tomatoes and pumpkins planted in the greenhouse of the Department of Agriculture, the Ado Ekiti Federal Polytechnic. From a technological perspective, the problem of wastewater collection and treatment has been solved. However, in some nations they do not have access to this technology or do not have the human capacity and financial stability to operate such treatment plants efficiently in order to treat all effluents before discharging them to the environment or reusing them. Although important, the safe use of wastewater in agriculture has often not been adequately addressed. In particular, it should be understood that, where water is scarce, the lack of implementation of regulations and guidelines will not impede the use of wastewater, but, rather, will lead to unsafe practices.

METHODOLOGY

Experimental Design

The Randomized Completely Block Design (ANOVA) was used. Three wastewater treatment namely: cassava effluent, poultry effluent, fishpond effluent, and natural water from well used for control experiment. Twenty buckets of equal size, and the same quantity of soil, collected from the same location. Three replications for tomatoes and two replication for pumpkin, making five replications for each wastewater sample.

Plant identification

The whole plants on every plot were sampled and tagged with plastic material for easy data collection, and for proper identification.

Land preparation

The soil sample was collected on July, 2019. Form the same location, and filled into bucket of the same sizes and the same quantity of soil. On the same day, and left for a week after applying one liter of water into each bucket, before planting the crops.

Planting materials

The variety of the tomato used was Eva. Seeds were bought from a certified seller in Ekiti State. And a local type of pumpkin seed

Nursing and transplanting

The tomatoes and pumpkin seeds were nursed on raised beds in July, 2019 under a palm frond shade to protect the seeds from adverse temperature. The seeds started germinating on the 5th day. Pricking out was done after one week. The seedlings were transplanted to the experimental field on the 3rd week.

Weeding

Weeding was carried out by pulling out the weeds with the hand and it was done on four occasions during the experiment which were:

1st weeding	-	1st week after transplanting
2nd weeding	-	Before flowering of the plants
3rd weeding	-	After flowering of the tomato plant
4th weeding	-	During fruiting

Data collection

The data was collected on the following growth and development parameters every 10 days:

Leaf count

Plant height

Leaf length

The data were collected on the tagged plants every ten days for three months.

Measurement of the growth parameters

The following plant growth and development were measured:

Leaf Count: The numbers of leaves were counted after pruning of the tomato plant.

Plant Height: The plant height were measured with a measuring tape from the base to the tip of the plant. (cm)

Leaf length were measured using ruler, and measured in (cm)

Irrigation Scheduling: Irrigation interval from the stage of transplanting to harvesting was 10 days. Irrigation was carried out manually by using a beaker which graduated in Ml. The quantity of water applied varied depending on the crop water requirement.

Amount of Water Applied: The amount of water applied to the tomato should be between 400-600mm per plant for tomato in the field for 90-120 days.

Data Analysis: The MstatC software was used for analysis of variance (ANOVA) of data and mean comparison was done using Duncan's Multiple Range Test.

Treatments: The treatments comprised irrigating with the following:

Control natural well water

Fishpond effluent.

Poultry effluent.

Cassava effluent

Determination of chemical properties of waste water

Determination of pH

The Hanna HI 204 pH meter was first standardized using standard buffer solutions of pH 4 and pH 9. The pH of the drain samples was determined by using the standardized pH meter.

Determination of Electrical Conductivity (EC)

The conductivity meter used in measuring electrical conductivity WAS DDS-307. The samples were thoroughly mixed together before an aliquot was poured into the meter sample holder. Immediately the reading knob was depressed, the reading was taken and recorded for the sample.\

Determination of Chloride

One hundred milliliters of the drain sample was measured into a conical flask and a pinch of $CaCO_3$ powder was added. This was followed by addition of 2 ml of the indicator. The whole mixture was then titrated against standard $AgNO_3$ solution to a permanent reddish-brown precipitate. A blank titration was equally carried out by substituting the sample with distilled water

$Ag^+ + Cl^- \rightarrow AgCl$

$2Ag^+ + CrO_4^{2-} \rightarrow Ag_2CrO_4$

The chloride content was expressed as:

$$Cl^- \text{ (mg/l)} = \frac{(A - B) \times M \times 35450}{\text{ml of sample}}$$

Where A = ml of $AgNO_3$ for sample

B = ml of $AgNO_3$ for blank

M = molarity of $AgNO_{34.}$

Determination of Sulphate (SO_4^{2-})

The turbidimetry method was used by using $BaCl_2$. 10 ml of the drain sample was introduced into 25 ml volumetric flask and 10 ml of distilled water added. This was followed by addition of 1 ml of gelatin – $BaCl_2$ reagent. The mixture was made up to the mark with distilled water. The mixture was allowed to stand for 30 minutes before the optical density was determined at 420 nm.

Calculation;

$$SO_4^{2-} \text{ mg/L} = \frac{\text{Mass of Sulphate from curve} \times 1000 \times D}{\text{ml of sample}}$$

Where D is dilution faction, and obtained as shown in the equation 3.6.

$$D = \frac{total\ volume\ of\ mixture}{sample\ volume}$$

Determination of Nitrate (NO_3^-)

The colorimeter method was used with a suitable spectrophotometer.

0.5 ml of each standard and drain sample were introduced into test tubes with micropipettes. Then 1 ml of salicylic acid solution was added to each test tube prior to mixing and it was allowed to stand for 30 minutes. This was followed by addition of 10 ml of sodium hydroxide to each test tube. The whole mixture was left in the dark for color development. The absorbance of the sample and standard was read at 410 nm.

Calculation;

$$NO_3 - N\ (mg/l) = \frac{\mu N\ from\ Curve}{ml\ of\ sample}$$

Evaluating the Effect of Wastewater on the Vegetable growth

Laboratory test

The vegetable height were measured from the bottom to the top in cm. making use of measuring tape. While the leaves length were measured in cm making use of ruler. Leaves number were counted in numbers.

Data Analysis

Data collected from leave length, crop height, and numbers of leaves were analyzed using (ANOVA)

Determination of Soil Moisture Content

100g of soil sample was collected, the soil oven dried for 24 hours, the dried soil sample was poured into a can of 30g, the can and dried soil sample were weighed together. The result was analyzed using this formula $\frac{w2-w3}{w3-w1}$

Where W1 is empty can.

W2 is wet soil sample with can.

W3 is dried soil sample with can.

Determination of Soil pH Value

100g of soil sample was collected, and it was dried naturally in an open air. Then 1oog of distilled water was added. The mixture was stirred together perfectly, the mixture was then left for 30 minutes, after which a litmus paper was dipped into the mixture, before it was compared to the color comparator.

RESULTS AND DISCUSSION

Table 1: Chemical, biological and physical composition of various wastewater.

PARAMETERS	FISHPOND EFFLUENT	POULTRY EFFLUENT	CASSAVA EFFLUENT
P^H	7.56	7.99	4.50
ELECTRICAL CONDUCTIVITY(Us/CM)	172.3	5620.0	7910.0
TOTAL DISOLVED SOLID(PPM)	82.40	2650.0	3540.0
HARDNESS(mg/L)	540.0	660.0	480.0
TOTAL ALKALINITY(mg/L)	300.0	390.0	150.0
SULPHATE(mg/L)	240.0	380.09	140.20
NITRATE(mg/L)	23.32	21.20	2.50
CHLORIDE(mg/L)	376.30	413.08	24.56
CU(PPM)	2.30	1.60	1.89
Pb(ppm)	0.60	0.36	2.40
CR(PPM)	0.07	0.00	0.05
ZN(PPM)	0.60	0.02	0.01
CD(PPM)	0.00	0.00	0.00
FE(PPM)	6.80	5.23	10.20
CO(PPM)	0.01	0.01	0.00
MN(PPM)	0.05	0.02	0.01

Table 2: Effects of Wastewater on the Growth of the Vegetables

Weeks			Control	Fishpond Effluent	Poultry Effluent	Cassava Effluent
Week 1	Pumpkin	No of Leaves	4	3.5	3	2.5
		Length of Leaves (cm)	2.5	3.5	4.5	4.5
		Height of Crops (cm)	25	35	18	34.5
	Tomatoes	No of Leaves	3.7	6.7	4.3	4
		Length of Leaves (cm)	3	4.3	5	3
		Height of Crops (cm)	62	2.16	17	17.3
Week 2	Pumpkin	No of Leaves	7	6.5	6.7	3
		Length of Leaves (cm)	6.1	2.61	5.76	4.5
		Height of Crops (cm)	65.16	90.0	39.6	37.5
	Tomatoes	No of Leaves	6.7	7.1	7.6	3.67
		Length of Leaves (cm)	22.3	2.74	7.7	3.01
		Height of Crops (cm)	67.03	29.1	19.0	33.0

Week 3	Pumpkin	No of Leaves	11	16.5	1.1	6
		Length of Leaves (cm)	4.2	7.1	2.3	4.5
		Height of Crops (cm)	85.1	130.0	21.4	69.02
	Tomatoes	No of Leaves	12.1	10.3	6.3	3.6
		Length of Leaves (cm)	5.7	8.2	4.5	5.2
		Height of Crops (cm)	24.01	140.01	23.5	20.1
Week 4	Pumpkin	No of Leaves	40	56	39.5	29.5
		Length of Leaves (cm)	2.7	3.56	5.05	4.5
		Height of Crops (cm)	125.01	193.51	102.05	90.56
	Tomatoes	No of Leaves	9.3	12	9	…….
		Length of Leaves (cm)	2.9	6.7	4.4	…….
		Height of Crops (cm)	30.69	43.7	23.68	…….

Table 3: Variations between Effluents used

Weeks			Control	Fishpond Effluent	Poultry Effluent	Cassava Effluent
Week 5	Pumpkin	No of Leaves	46.5	59.5	45	34.5
		Length of Leaves (cm)	2.25	3.56	5.05	4.5
		Height of Crops (cm)	28.1	70.9	70.1	90.56
	Tomatoes	No of Leaves	12	13.3	10.3	…….
		Length of Leaves (cm)	2.76	3.09	4.09	…….
		Height of Crops (cm)	27.6	40.1	11.6	…….
Week 6	Pumpkin	No of Leaves	51	63.5	54	36.5
		Length of Leaves (cm)	2.2	3.5	5.0	4.5
		Height of Crops (cm)	42.0	213	107.0	91.5
	Tomatoes	No of Leaves	14.67	15.3	12.3	…….
		Length of Leaves (cm)	3.48	3.4	7.0	…….
		Height of Crops (cm)	82.01	43.1	37.0	…….
Week 7	Pumpkin	No of Leaves	10.2	92	82	71
		Length of Leaves (cm)	11.1	70	97	91
		Height of Crops (cm)	41	90	82	43
		No of Leaves	88.99	11.07	10.7	……..

	Tomatoes	Length of Leaves (cm)	11.40	50	48	……..
		Height of Crops (cm)	10.1	9.2	8.2	……..
		No of Leaves	29.1	73	61.5	40.5
	Pumpkin	Length of Leaves (cm)	2.7	3.56	5.05	4.5
Week 8		Height of Crops (cm)	176.0	267.6	118.6	11.0
		No of Leaves	21.3	23.3	18	……..
	Tomatoes	Length of Leaves (cm)	3.4	3.4	4.43	……..
		Height of Crops (cm)	38.0	54.3	29.7	……..

Determination of chemical, biological and physical composition

Table 1 is showing the chemical composition of the three effluents used for this practical, it is clearly stated in this table that cassava effluent is more acidic than all others, (4.50), fishpond effluent is having (7.56) while the poultry effluent is having level of acid (7.99).

Evaluation of the effects of wastewater on the growth of the vegetables and variation between effluents used

Tables 2 and 3 are showing the variation between effluents used for this project practical. As it is shown in this tables, the fishpond effluent provide the best growth followed by the control practical. Next is the poultry effluent and finally cassava effluent which provide the lowest growth.

Table: 4: Correlation Coefficient of Different Effluent variables of Tomatoes

Variable	*Control*	*Fishpond*	*Poultry*	*Cassava*
Control	*1*	*0.789*	*1.000***	*0.998**
Fishpond		*1*	*0.779*	*0.751*
Poultry			*1*	*0.999**
Cassava				*1*

**Correlation is significant at the 0.01 level
* Correlation is significant at the 0.05 level

Table 5: Correlation Coefficient of Different Effluent variables of Pumpkin

Variable	*Control*	*Fishpond*	*Poultry*	*Cassava*
Control	*1*	*0.998**	*-0.349*	*0.998**
Fishpond		*1*	*-0.408*	*0.993*
Poultry			*1*	*-0.295*
Cassava				*1*

Test of Significance of the observed correlation coefficient

The significance of the observed correlation coefficient has been tested by using the "t" test is as shown in Table 4 and 5. In Table 4, out of total 6 correlations found between two parameters, 2 were found to have significant level at 5% level. The positive correlations observed existed across all the variables (Effluents). Some of highly significant correlation were found between Control and Poultry (r =1), Control and Cassava (r = 0.9) and Poultry and Cassava (r = 0.9). In all the parameter tested using t-test correlation analysis , there were significant between the Control and Poultry at 99% confidence interval, between Control and Cassava at 95% confidence interval and also, between Poultry and Cassava at 95 % Confidence interval. This implies that Poultry and cassava effluent has a positive and significant impact on the growth of tomatoes

Table 5, out of total 6 correlations found between two parameters, two were found to have significant level at 5 % level. The positive correlation observed existed Control and Fishpond Effluent (0.998), Control and Cassava (0.998), Fishpond and Cassava (0.993) respectively. The negative correlations observed existed between Control and Poultry (-0.349), Fishpond and Poultry (-0.408), Poultry and Cassava (-0.295). There were significant between Control and Fishpond and Control and Cassava at 95 % confidence interval. This implies that, Fishpond and Cassava Effluent contribute in a high proportion to the growth of Pumpkin in compare with other Effluents tested.

CONCLUSION AND RECOMMENDATION

This study presents the results of the effects of using three different wastewaters on some selected vegetable crops Pumpkin and tomatoes. A significant difference in the growth of the vegetable was observed with the wastewater treatments. The growth of the vegetable was at the highest when fishpond effluent was used. Although statistically not significant, the P^H total dissolved solid (TOD) electric conductivity (Us/CM) hardness among other contents were found to increase respectively under the treatments of selected wastewaters when compare with the results from the treatments. The values of the growth obtained from the sturdy makes it clear that agricultural effluents may be useful for vegetable farm irrigation. Either to increase soil nutrients or to serve as water supplement, it even reduces the cost of clean water purchase and it also increase water reuse management. By reusing agricultural effluents, it also improves environmental earth status by reducing pollution. However not all effluents are useful for crop production, because are heavily acidic such as cassava effluents that contain 4.50 P^H value below or above which may not be conducive for the crops to grow. It is thereby recommended that Farmers should not make use of cassava effluent for crop production, because it is highly acidic.it is also advised not to use Sprinkler or drip irrigation system for the application of effluent or wastewater to avoid irrigation system damage.

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EVALUATION OF TECHNOLOGY TOOLS AS E-LEARNING CONTENT DELIVERY IN THE WAKE OF CHANGING ROLES AND METHODS

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Abstract

In a dynamic world of uncertainties, plagued with the novel coronavirus pandemic, organisations and sectors have resorted to technology as an option. Connectivity is the new watchword as different organizations seek to adjust to this unpredictable future. Information and Communication Technologies have therefore influenced the landscape of many sectors especially the education sector by changing the way various activities of education are being conducted. One of such adjustment is the adoption various online tools for learning. In this study, these tools were evaluated as to whether they are capable of enhancing interactions, collaborations, connectivities and communication within and post covid-19 era especially in the education sector. A Mixed method research methodology involving questionnaires through Computer Assisted Surveys and empirical research were employed in the collection of quantitative and qualitative data respectively using the Federal College of Fisheries and Marine Technology, Lagos as case study. The surveys were administered to lecturers with the data analysed and reported using descriptive tools. The result from the surveys shows that majority are familiar with the e-learning tools and found them effective as content delivery tools. WhatsApp as an engagement tool especially the audio conference has the lowest data consumption followed by zoom and then google meet. The data plans, location, power supply, network provider among others remain important factors in evaluating these tools. The study also provided recommendations for better coordination to enhance the smooth running of e-learning program.

Keywords: Evaluation, Technology tools, E-learning, Content Delivery

INTRODUCTION

Pandemic is generally defined as a new disease that rapidly spreads in a number of countries and continents (WHO, 2020). This has affected people's life both economy and socially (Kelion, 2020). The pandemic, COVID-19 has its footprints on the education sector as with other sectors. The outbreak of this contagious virus across the globe has forced educational institutions to shut down in order to control the spread of the virus. This has made the teaching professionals think of alternative methods of teaching during the pandemic, and this opened the world to web-based learning (Kshetri, 2017). In today scenario, learning has advanced into the digital world, in which teaching professionals and students are virtually connected. The web based of learning is quite simple to understand, implement and accepted globally. The use of gadget and the internet forms a major component of this learning methodology. E-learning provides rapid growth and proved to be the best in all sectors, especially in education during this pandemic (Kelion 2020).

Information and Communication Technologies (ICTs) has been of tremendous help to many sectors with the education sector inclusive during the lockdown and even post COVID as things are opening up gradually. It has influenced the way various education activities are being conducted. The improvement of the ICTs tools have improved accessibility and efficiency of the teaching and learning processes in many institutions (Lwoga and Komba, 2015). With the sudden drift from the physical classroom in many parts of the world, many are wondering if the adoption and use of electronic (e) learning will be sustained post-pandemic and how this would impact the education market globally.

The developed countries seems a bit prepared for this change but this is not so with most developing economies. The perception of many in the latter is that the unplanned drift to e learning especially without the appropriate training, with low bandwidth and little preparation will result in a poor user experience that is unconducive to sustained growth. The elites on the other hand believe that a blended model of education will emerge with significant benefits. It is believed that the integration of information technology in education will be further accelerated and that online education will eventually become an integral component of school education (Kelion 2020).

Despite the benefits and opportunities that comes with the emergence of e-learning, there are many challenges to overcome. For instance, some students without reliable internet access and/or technology struggle to participate in digital learning; this gap is seen across the developing and undeveloped countries and between various income brackets in the various countries. For those without access to the right technology, it is believed that e-learning can be more effective in many ways. Kelion, (2020) reported that on average, students retain 25-60% more material when learning online compared to only 8-10% in a classroom. This is usually because the students are able to learn faster online; time consumption (i.e. e-learning requires 40-60% lesser time to learn than in a traditional classroom settings). This is because the students can learn at their own pace, they can always go back and read, skip or accelerating through concepts as they choose.

Nevertheless, age groups have effects on the effectiveness and efficiency of e-learning. For children, especially younger ones, the need for adequate and conducive environment is required, because children are more prone to distraction. In other for these kids to benefit greatly from e learning, there is need for a concerted effort to provide the structure apart from replicating the physical class/lecture through video capabilities. Use of collaboration tools and engaging methods that would promote personalization and intelligence are also necessary.

Therefore, while the cost of internet and accessibility are unlikely to be a barrier among middle-class households, the quality of access remains in question. Nigeria is placed at the bottom quarter globally in broadband speed rankings for 2019 (Kelion, 2020). The internet speed and short attention span of young learners could be problematic leading to ineffective learning.

The scenario is quite different for the low income group with e-learning, the cost of broadband access and internet-enabled devices are major concerns. The existence of e classes in many schools, teachers usually deliver teaching to students through WhatsApp and Telegram groups. And, in cases where students do not have personal phones, parents do releases their gadget for children to easily access the e coaching. However, a few weeks on, the flaws of the model are manifesting as many students are missing out on classes and learning due to a lack of access.

With virtual learning being the only alternative to the continuation of academic activities of all tertiary institutions in Nigeria and most countries in the world due to the pandemic with total lockdown and social distancing enacted to save lives. However, before relaxing the lockdown, it became necessary to adopt e-learning tools for virtual meetings for academic purposes. The FCFMT employed e-learning tools for virtual classes. This study therefore became necessary with the sole aim of evaluating these e-learning tools for virtual learning within FCFMT so as to make recommendations for other institutions. This research seeks to evaluate various technology tools on teaching online during the pandemic.

Specific objectives

- To determine and highlight the various technology tools used during the pandemic
- To investigate the perceptions of various users on these tools using computer assisted surveys
- To evaluate the tools using experiences such as data consumption, voice and video quality, simplicity of operations among others as indices.

METHODOLOGY

The case study for this study is the Federal College of Fisheries and Marine Technology (FCFMT) which is one of the 13 Federal Tertiary Institutions established to meet the needs of the Agricultural, Fisheries and Maritime Subsectors of the Nigerian economy. The Institution has the Mandate to Train Middle level Manpower in the areas of Fisheries Technology, Nautical Science, Marine Transport and Business Management, Labour and Industrial Relations and Marine Engineering. The institution though a public institution was able to introduce online teaching during the pandemic due to the shortened processes being a specialized and relatively small sized one.

Mixed methodology i.e. both qualitative and quantitative was employed in this study. The use of secondary data from past studies was used for the background of study, introduction and some aspects of methodology. Surveys and focus group questionnaires developed through computer assisted surveys such as google forms were used to obtain primary data to evaluate perceptions towards technology tools.

Primary data were obtained through first hand experiences from some selected lecturers through experiment. For the experiment, six researchers were selected carefully to evaluate three of the tools (WhatsApp, Google Meet and Zoom) based on their functionality as meeting or conferencing medium. They were evaluated on data consumption, quality of video, audio, accessibility of features free of charge, simplicity of use among others.

The seven researchers listed the type of smart phones used for the experiment, their network provider and observations during and after each of the meetings.

The meetings were scheduled for 10 minutes each with a timer attached with the devices used for the study.

The meetings were done at 9pm in the evening to reduce distractions of calls and interferences during peak data surfing and periods.

The experiment was done first for video on Google meet, WhatsApp and zoom respectively and then zoom, Google meet and whatsapp in the order listed for audio meeting subsequently. The experiment was well recorded and replicated as well. Data obtained were recorded and analysed appropriately.

Furthermore, in depth survey was conducted among 40 lecturers at FCFMT on e-learning tools for virtual learning. The study's purpose was to discover the e-learning tools' ease of usage and understand the effectiveness in imparting knowledge, level of complexity, and identifying which is/are the best tools for virtual learning.

E-learning became necessary to improvise and find a way to ensure continuity of learning during the pandemic that has affected or altered many ways of life and traditional practices.

The survey was conducted through online questionnaires using Google form. The questionnaire dealt with the type of learning tools, the frequency, the data consumption, the ease of usage, and many other variables in relation to the interaction between lecturers and students and users interface. Participants were asked about the type of e-learning tools they are familiar with, the frequency of usage, how they have helped in the impartation of knowledge, how they consume data, and how effective they are. The participants also gave their opinions and recommendations, which serve as material for this evaluation.

Categories of medium content delivery: online tools as grouped below were selected being the tools used in the case study during the pandemic restrictions.

Chat tools- Instant messaging such as WhatsApp and Google Chats

Live video class –Google Meet and Zoom

Recorded video – Screen recorders such as DU recorder, Loom etc

Live board – Google white boards, zoom boards etc

Web conferencing tools Learning Management System (LMS)- Google Classroom and Google drive

An LMS is a medium that usually includes documents, tools for live classes, chat tools, all in one place.

For each category, likert scale were used to evaluate how often the tools were used for lectures, how enjoyable the tools were using this method, the effectiveness of the tools delivering the required content, challenges experienced when using this elearning tool, internet speeds, funds for data, appropriate laptop/smart phone, environmental distractions etc. The survey were sent to all lecturers comprising of all gender groups, age brackets and al fields of interest within the institution. Further details on the forms for the different users are contained in the inks below. https://forms.gle/o4ANhJp8jkawQBFz5 for FCFMT lecturers

RESULT AND DISCUSSION

Experiment on Data Consumption of Different E-Learning Tools

Table 1. ***Data consumption of different e-learning tools***

	GoogleMeet	Video	Audio	Zoom	Video	Audio	WhatsApp	Video	Audio	Network	Device
1		35.29MB	4.96MB		47MB	38.21MB		27.9MB	7.8MB	MTN	iPhoneX
2		50MB	15MB		34MB	26MB		25MB	6MB	Airtel	TecnoCamon
3		X X	30MB		40MB	30MB		50MB	10MB	MTN	BLUR1Plus
4		42MB	30MB		28MB	9.8MB		33MB	X X	Glo	INFINIXHot8
5		55MB	37MB		56MB	20MB		27MB	8MB	Airtel	GioneeF6
6		44.12MB	24.36MB		54.29MB	X X		27.97MB	7.79MB	MTN	TECNOPOP2POWER

Table 2. *Data consumption of e-learning tools regards to web conferences*

Data Consumption (MB)							
Video Conference					Audio Conference		
	Google Meet	Zoom	Whatsapp		Google Meet	Zoom	Whatsapp
1	35.30	47.00	27.90		4.96	38.21	7.80
2	50.00	34.00	25.00		15.00	26.00	6.00
3		40.00	50.00		30.00	30.00	10.00
4	42.00	28.00	33.00		30.00	9.80	
5	55.00	56.00	27.00		37.00	20.00	8.00
6	44.12	54.29	27.97		24.36		7.79
Average	45.28	43.22	31.81		23.55	24.80	7.92

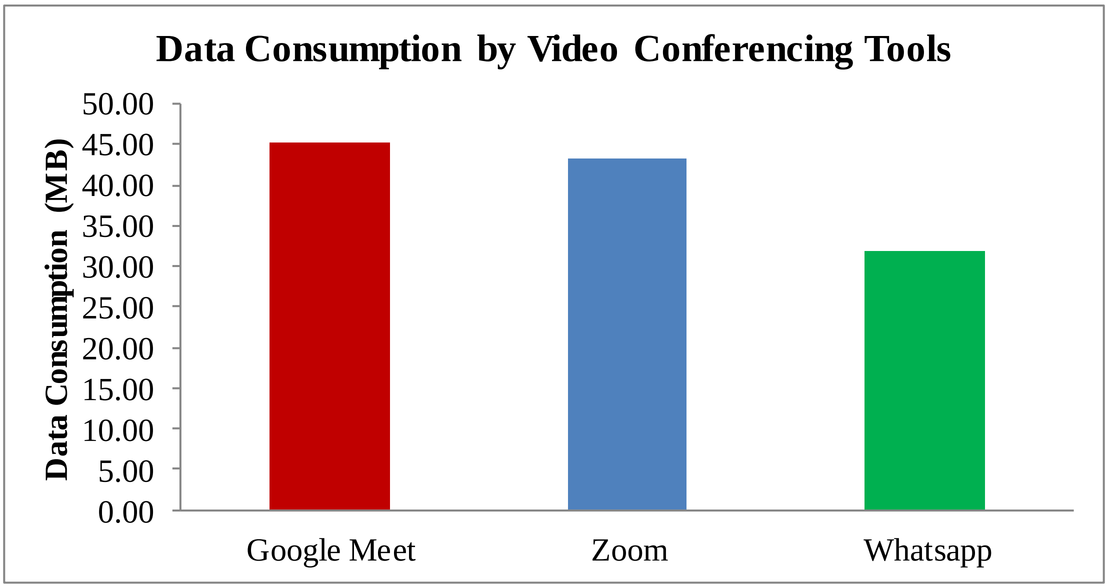

Fig. 1. *Data consumption of different e-learning tools*

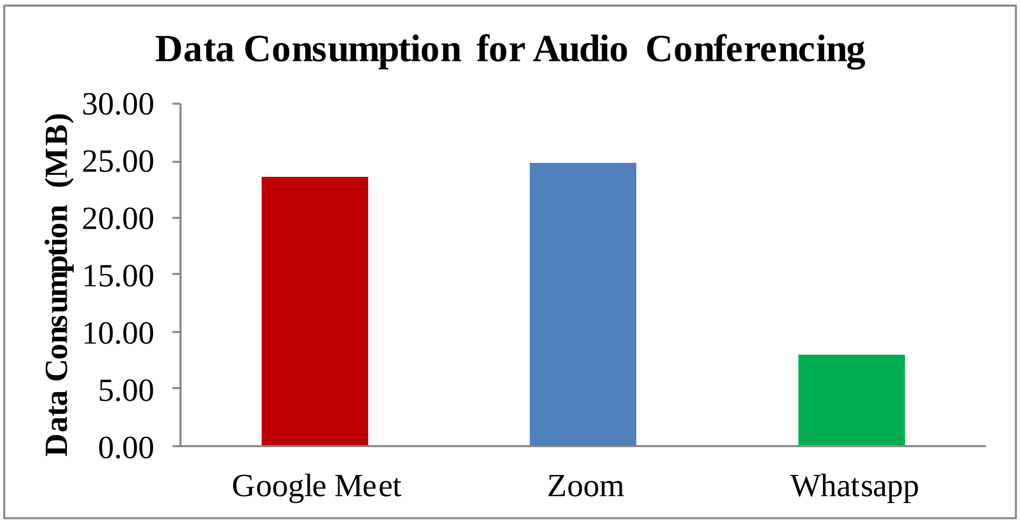

Fig. 2. *Bar chart of data consumption of e-learning tools regards to web conferences*

Data Analysis of data consumed by the video conferencing tools.

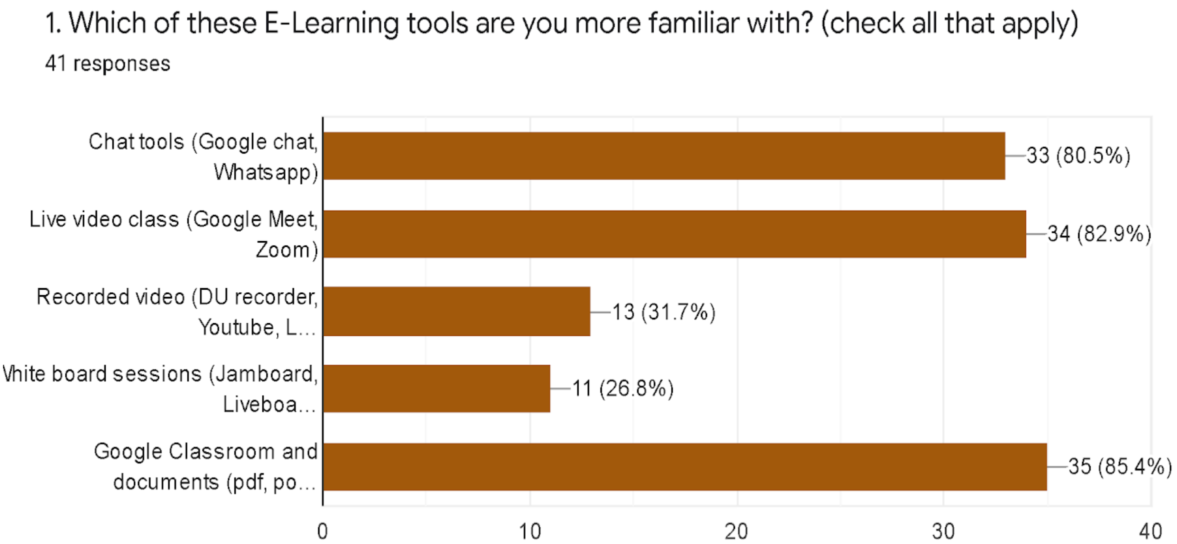

Fig. 3. *Chart of analysis on data consumed*

Most respondents (84%) are more familiar with the Google classroom as an e learning tool followed closely by the chat tools and then live video tools while many are unfamiliar with the pre-recording and liveboard tools.

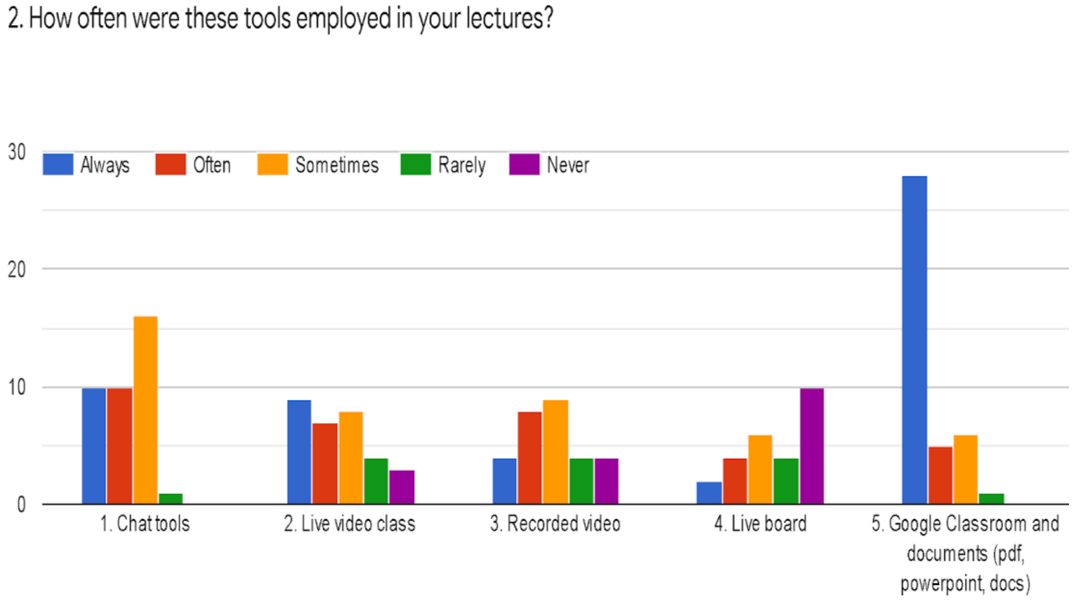

Fig. 4. *Shows the frequency of usage by lectures*

The above chart shows Google classroom as the mostly used tools of all the e learning tools highlighted in the study. Also, this tool and chat tools are the only tools that have never been used by all the lecturers that participated in the survey. The recorded tools and live board just like the result obtained in figure 3 above have the lowest usage of the 5 tools.

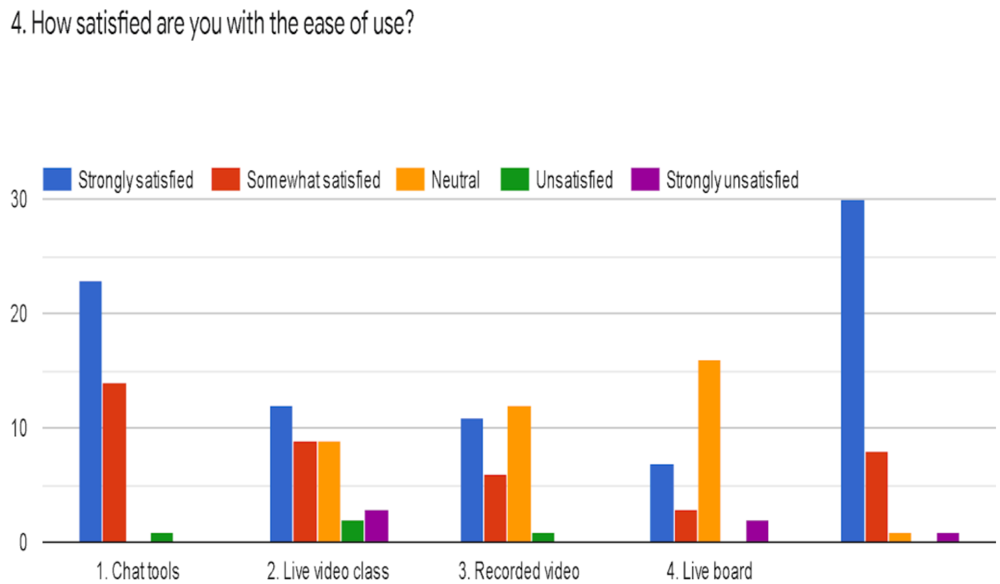

Fig. 5. *Depicts satisfaction of each tool*

Many of the respondent i.e, a larger percentage 75% were strongly satisfied with the ease of use of Google classroom in their content delivery to their audience. This was followed closely by the chat tools wherein 57.5% were strongly satisfied with the use of these. Many respondents had similar perceptions about the live video and recorded tools as only about 50% and 43% of the respondents were satisfied with ease of use. Live board on the other hand was the least familiar tool so majority of the respondents were neutral about its ease of use. Only a few respondents were strongly unsatisfied with ease of use of google classroom, live board and live videos in ascending order respectively. These were all reflected in figure 5 above in the study.

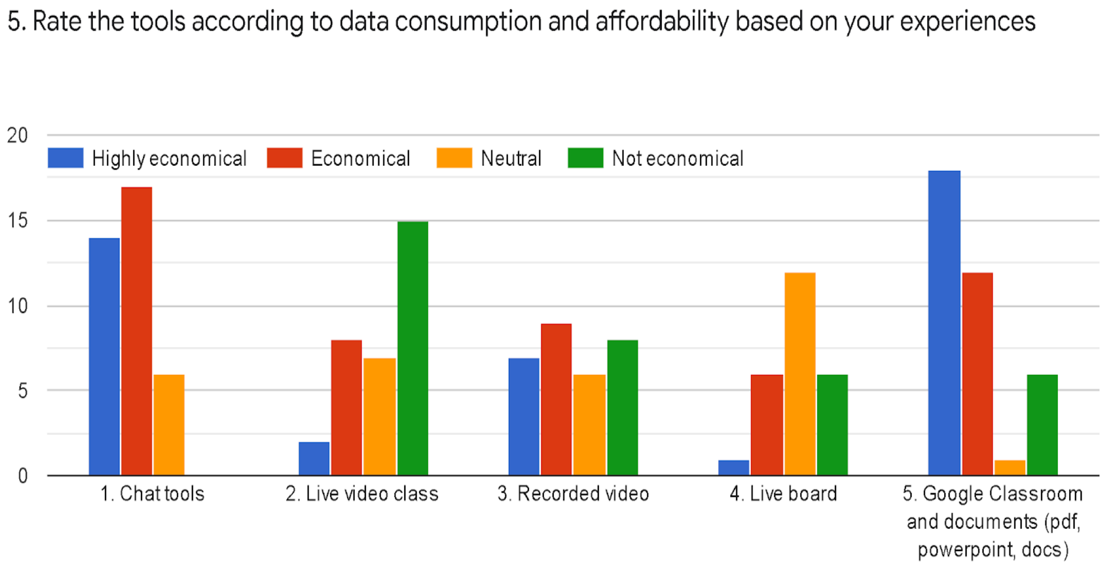

Fig. 6. *Bar chart of the ratings according to affordability*

The tools were evaluated on perceived data consumption and affordability by the respondents and from the results in figure 6 above, google classroom was rated highest in economics followed by chat tools and then recorded video. Live video tools had the least economics and then live board tools. Only the chat tools had no respondent going for the not economical options while the Google classroom and live board had about 15% respondents say they are not economical. Of course the live video tools had about 38% of the respondents rate the tool as not economical for their content delivery.

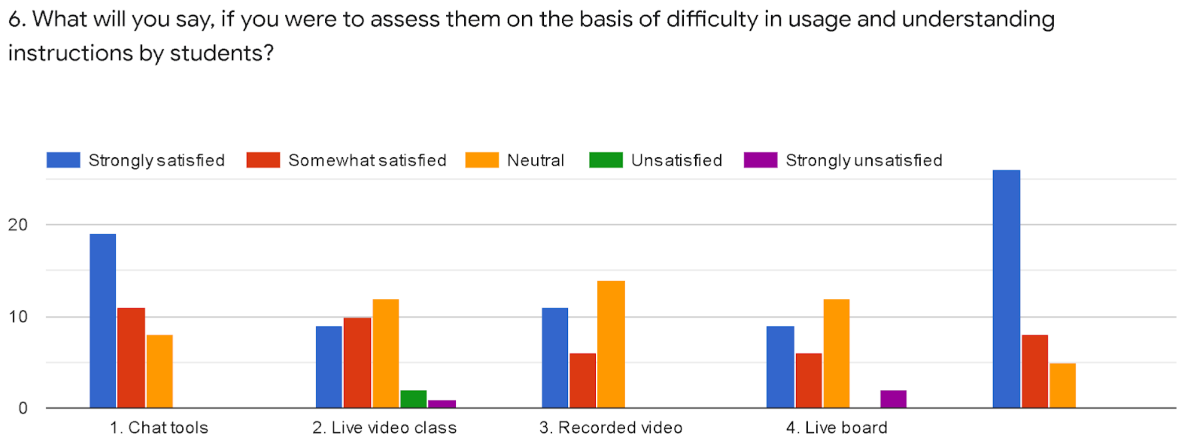

Fig. 7. *Shows the efficiency and difficulty in usage*

From figure 7 above, most of the respondents found these tools efficient in delivering content to enable understanding of the introduced concepts by their audience with only a very few percentage reporting one of these (live board) tools very difficult to use.

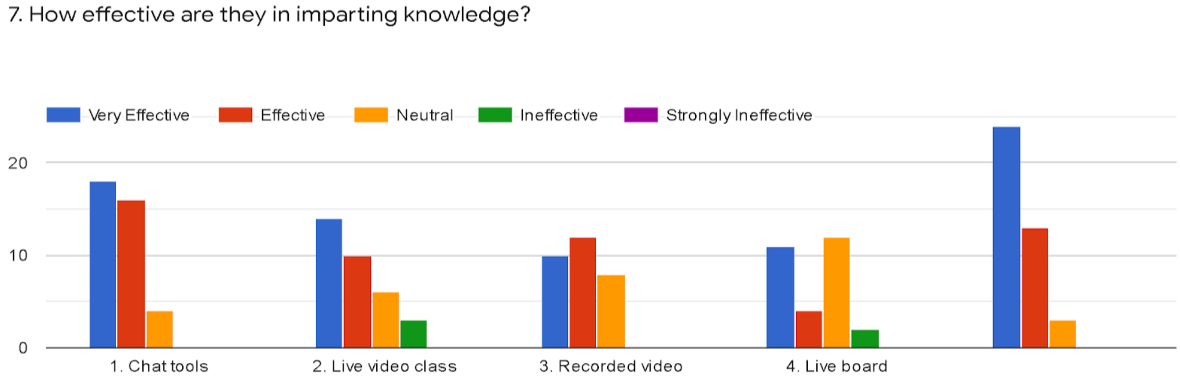

Fig. 8. *Chart of effectiveness in imparting knowledge*

The results experienced in figure 8 is similar to that of figure 7 in that all the respondents found the tools very effective in imparting knowledge.

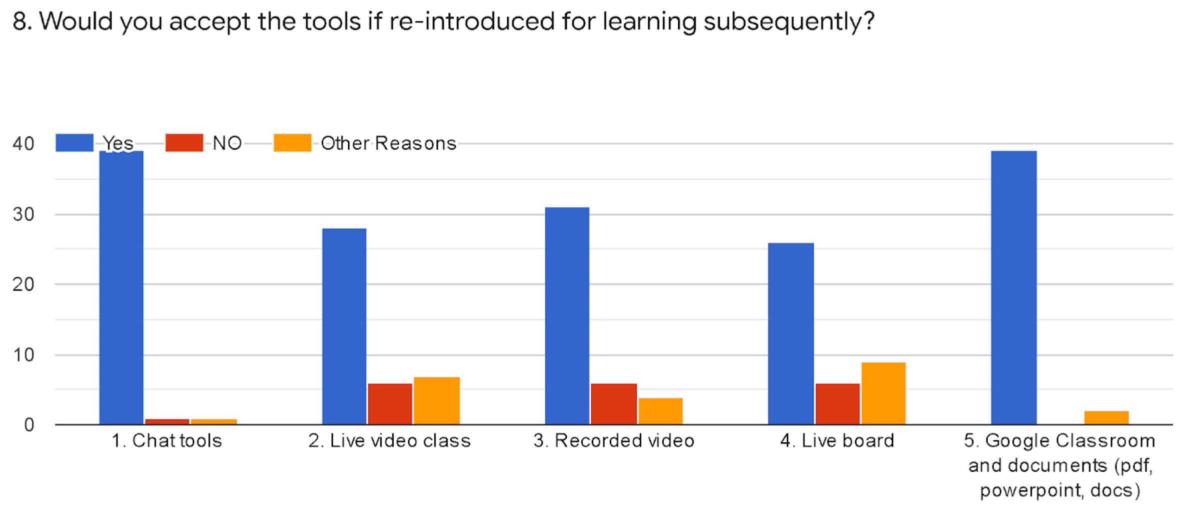

Fig. 9. *Chart on re-introduction of the tool*

From the figure above, almost all agree to use these tools subsequently if re-introduced for content delivery. Some i.e. about 25% especially for the live video, recorded video and live board tools raised other reasons why they may not adopt these tools afterwards.

9. A blended environment combines e-learning tools with physical classes. Would you accept using these tools in such an environment?

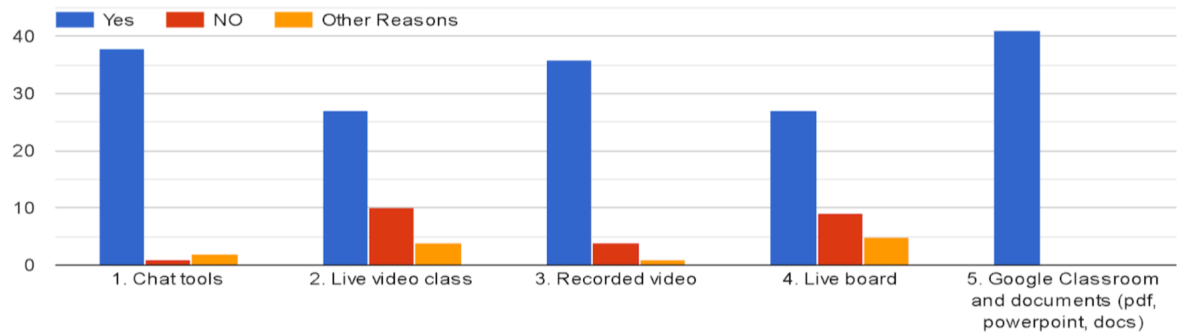

Fig. 10. *Acceptance in a blended learning environment*

In a blended/hybrid environment, all will gladly adopt the Google classroom as e learning tool and almost all will adopt chat tools followed closely by recorded video and lastly live video and board tools. About 25% would not adopt the live tools in a blended system.

10. What were your challenges while teaching using these tools?

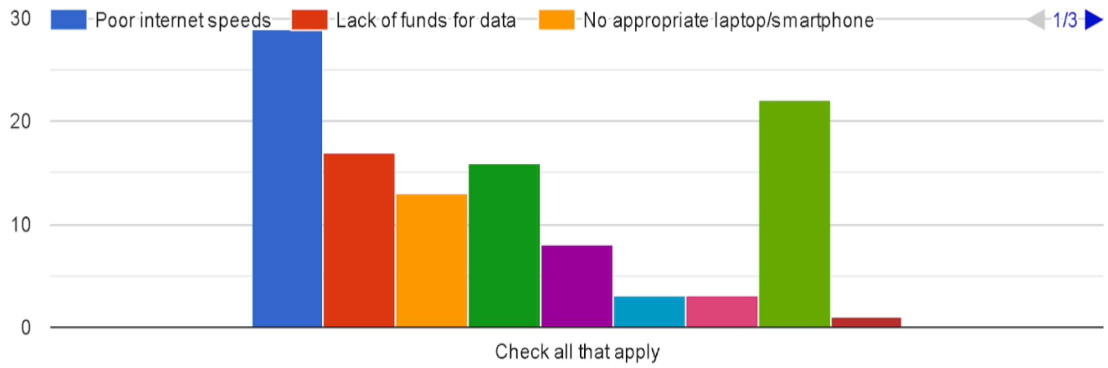

Fig. 11. *Chart on challenges encountered while teaching using the tools*

Challenges experienced by respondents varied from poor internet speeds to lack of funds for data to unavailability of appropriate tools to electric power issue to environmental distractions to poor implementation by faculty to sophisticated interface to students absence/ lack of interest and finally to other reasons. Poor internet speeds was rated as the most common challenge being faced. This was followed by the absence of students in the classroom.

11. What aspect of these tools were most useful or valuable

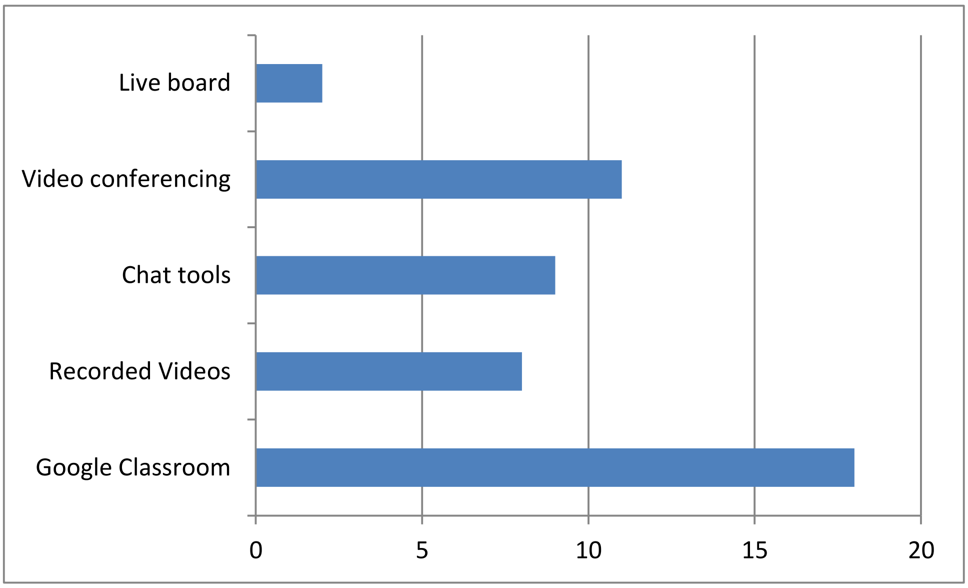

Fig. 12. *Depicts the most useful and valuable aspect of the tools*

Figure 12 reveals most respondents i.e. about 45% of the respondents found the Google classroom tool to be most valuable and useful followed by video conferencing which has about 27.5% of respondents and then chat tools, recorded videos and lastly live board where 5% felt this was the most useful tool.

12. Recommend/suggest better solutions for improved e-learning...

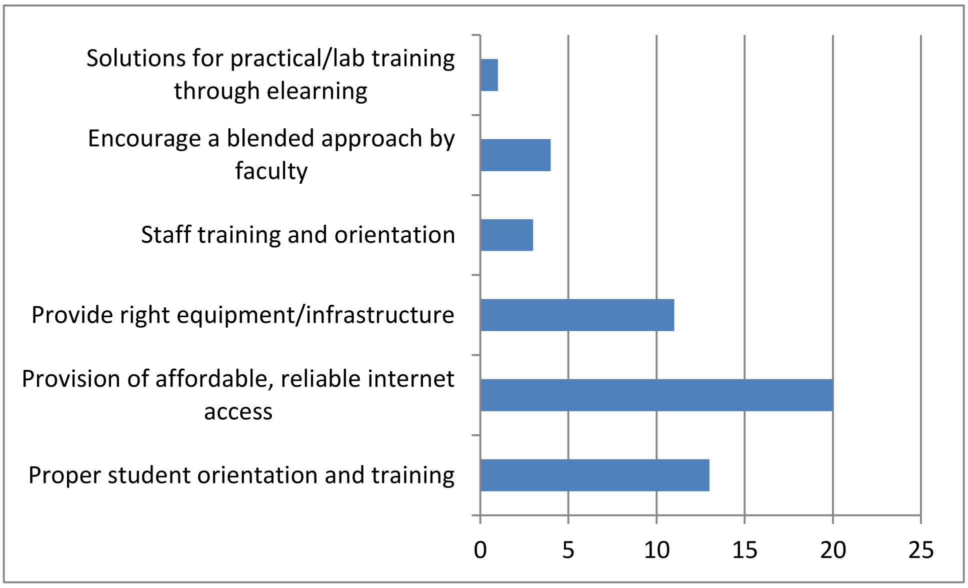

Fig. 13. *Highlights of suggestions to better solutions for improved e-learning*

DISCUSSION

The use of a learning management system such as Google Classroom was well received by the faculty. The LMS enables proper organisation of teaching resources and an effective student coursework management. Its use in a blended instruction environment was unanimously preferred.

Response from faculty also indicated that video conference tools were an effective means of teaching, although it's high data consumption and thus cost was an issue, most especially for students. Data reliability during live classes was also another concern and led to frequent dropped connections and a general poor remote class experience. Some faculty resorted to recorded video lectures to overcome some of these challenges.

An experiment compared data consumption during live sessions in three widely available tools: Google Meet, Zoom and WhatsApp. Data consumption for Meet and Zoom was marginally higher for video and significantly higher for audio sessions when compared to WhatsApp. The reason for this may be due to the fact that Meet and Zoom are core video conferencing applications and thus have several features that aid online classes such as screen sharing, live polling, over 100 participants, live recording and chat features. WhatsApp is more of a communication tool lacking these features and it's use for live classes is due to its wide spread use with over 1.5billion monthly active users world-wide (Statista, 2019).

RECOMMENDATIONS

The last figure 14 above has the recommendations and suggestions of respondents who are lecturers for improved e learning in our various institutions of higher learning. The suggestions are listed below from the one with the highest frequency to the least in that order:

- Provision of affordable and reliable internet access and service to our various institutions.
- Proper orientation and training of all students and audiences at the point of admission/engagement
- Provision of the right equipment and infrastructures to encourage interest and participation.
- A blended learning approach should be encouraged by all faculties even post COVID -19 which is more sustainable and will allow for better resilience to succeed in the future of work.
- Improved and regular training of staffs is suggested to keep them updated on new tools and how to use them best
- Lastly, solutions to practical and laboratory training should be developed and transferred to end users.

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THE IMPACT OF COVID 19 ON SMALL AND MEDIUM SCALE BUSINESS PROFITABILITY MARGIN AND CONTINUITY IN LAGOS STATE.

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Abstract

There is global economic crisis as a result of the effect of covid 19 pandemic that is ravaging the entire world populace. Going concern status of many businesses across the world are been threatened as a result of the negative impact of this covid 19 pandemic. Against this background, this study evaluated the Impact of covid19 on small and medium scale business profitability margin and continuity in Lagos state, Nigeria. Statistical mean and chi square test were used as the method of data analysis. The analysis revealed increase in the level of unemployment, irregular payment of salaries/wages and increase in operational cost of SME's operators. However, there has been improvement in the competence level of SME's operators as result of adopting innovative ways in rendering their services in order to improve on the profitability and ensure continuity of the business. The need for government to re-implement the new economic strategy for SME's financial repositioning and application of coordinated and highly intentional response that will encourage businesses to retain their workers were recommended

Keywords: Covid -19, SME's, Profitability, Continuity

1. INTRODUCTION

The continuous consequential effect of the current covid19 pandemic outbreak has had severe economic across the world, and it does not look like any country will be left out from unaffected. This not only has consequences for the economy all of society is affected, which has led to dramatic changes in how small and medium businesses act and consumers engage in their business activities. However, Small and medium scale enterprises (SMEs) in Nigeria are not left out in the share of this negative effect of the invisible enemy, as their survival is being threatened. The majority of SMEs are concentrated in the service and commercial sectors, the effect of covid 19 pandemic has disrupted their businesses profitability even majority of the SMEs operators can continue their businesses.

Against this back drop, many SMEs operators tend to become less interested in investing and more interested in saving their capital, resulting in reduced economic growth and low profitability in business. Therefore, profitability is the lifeblood of SMEs enterprises. Given the current situation, in which saving capital means negative returns as a result of the pandemic, it is not at all certain that SMEs will be as conservative as they have been in the past.

Behavioral pattern and new normal situation related to pandemic outbreaks seem to be connected with personal protection (Funk, E Gilad, &C Watkins, 2009), such as the use of face masks, rather than general behavior changes. Our lives, as humans in a modern society, seem to be more centered around convenience than around worrying about what might happen in the future. However, this paper sort to evaluated the Impact of covid19 on small and medium scale business profitability margin and continuity in Lagos state .

Problem Statement

In actual fact, small and medium scale business have been fully recognized by government and development experts as the main engine wheel that propel economic growth and a major factor in promoting private sector development and partnership. The growth of SMEs is an essential element in the development strategy of most economies and holds particular significance for Nigeria (Udechukwu, 2003). Today, the negative effect of Covid19 pandemic is disrupting the entire SMEs businesses, leading to traumatic global economic crisis. Businesses across the Nigeria are feeling the negative impact of the coronavirus COVID-19 pandemic and many of the SMEs operator cannot locate their bearing. However, this paper sort to evaluate the impact of covid19 on some selected small and medium scale business profitability margin and continuity in Ikeja local government in Lagos Nigeria.

Research objectives

1. To know the effect of Covid-19 on the level of profitability of SMEs operators in Lagos

2. To determine the effect of covid19 on SMEs operator's' business continuity

Research Hypotheses

Ho1: Covid-19 pandemic does not affect the level of profitability of SMEs operator's in Lagos

Ho2: Covid-19 pandemic does not affect business continuity of SMEs operators' in Lagos

2. LITERATURE REVIEW

Overview of Coronavirus Pandemic in Nigeria:

According to (Olapegba, P. et al. 2020), On February 27, 2020, Nigeria recorded her first case of the dreaded coronavirus (COVID-19) disease- an Italian citizen who travelled into the country. This reality woke the federal and state government up to protect its citizens. Having acknowledged the fast rate of morbidity and mortality of the virus in other countries across the globe, their aim was to prevent an outbreak of the disease in the country. Civil societies and government agencies embarked on enlightenments campaigns for good hygiene and social distancing in public places). Also, the body responsible for disease control in the country – the Nigeria Centre for Disease Control (NCDC), partnered with states governments to trace and track victims and their contact.

To further prevent the spread of the virus, the Federal government of Nigeria on March 30, 2020 took a drastic decision to close all national borders and airspace, schools, worship centres and other public centres and placed the Federal Capital Territory (FCT), Lagos and Ogun State on total lockdown for fourteen (14) day (Olapegba, Olowo et al. 2020). They later extended this lockdown to May 3, 2020. COVID-19 testing laboratories was set up in Lagos, Irrua in Edo State and the FCT and states government opened isolation centres and imposed a dawn to dust curfews in their territories. These drastic decisions or measures taken by the federal government had negative effects on her citizens and also on the economy. They coerced people to stay at home; businesses and offices were closed, excluding the health care sector and essential goods providers (like food and water).

This lead to loss of job across the country accompanied with high crime rates in states on total lockdown (Aifuwa, Musa & Aifuwa, 2020). On the bright side, the decision and measure have yielded a high compliance rate from citizens, as they frequently engage in hand washing, practice social distancing and self-isolation, avoided going to work, schools, or crowded area (Olapegba, et al. 2020). Also, most religious leaders in the country have stopped large gathering, forbade hand shaking, and directed its member to pray at home and use of hand sanitizers (Makinde, Nwogu, Ajaja & Alagbe, 2020; Olatunji, 2020).

Concept of Small and Medium Scale Enterprises

Small and medium enterprises have been identified different individuals and organization, such that an enterprise considered SME in one country is viewed differently in another country. The international Chamber of Commerce (ICC) defines SME as having 100-2,000 employees. Central Bank of Nigeria (2002) also defined SME as a firm with capital outlay of not more than N200m.

The Small and Medium Enterprise Equity Investment Scheme (SMEEIS) sees the SME as "any enterprise with a maximum asset base of N500 million (excluding land and working capital), and with no lower or upper limit of staff". However, for tax purposes, Section 40(6) of the Companies Income Tax Act Cap C21 LFN 2004 alludes to companies with a turnover of N1 million and below operating in the manufacturing, agricultural production, solid mineral mining, and export trade sectors as SMEs; While subsection 8 states that as from 1988 all companies engaged in trade or business with a turnover of N500, 000.00 and below qualify as Small and Medium Scale enterprises (Iwuji,n.d). SMEs have been an important tool of economic development for Nigeria.

The emerging future of any growing economy such as Nigeria's depends on the entrepreneurial energy of vibrant SMEs because a lot of large businesses start out as SMEs. Many authors believe that they are the starting point of development in the economy towards industrialization. Udechukwu (2003) for example sees the SME sector as a very important sector that will enhance the contributions of the private sector and provide the critical building blocks for industrialization and sustainable economic growth.

IMPACT OF COVID-19 ON SMEs BUSINESS

The fact remains that SMEs have not made the desired impact on the Nigerian economy in- spite of all the efforts and support of the present administrations and governments gives a cause for concern. It underscores the belief that there exists fundamental issues or problems prior this era, which confront SMEs but which hitherto have either not been addressed at all or have not been wholesomely tackled. The incidence of Covid-19 pandemics has put pressure on working capital, which constrains productive capacities of the SMEs as well as their continuity. Moreover, the persistence of unstable macro-economic environment, arising mainly from the traumatic pressure of covid19 excesses has often opposed the viability strengths of many SMEs (Ojo, D. 2020).

Despite the fact that economy of Nigeria is one of the largest economies in Sub-Saharan Africa and even though Nigeria relies majorly on oil, her economy is also sustained largely by small and medium scale enterprises (SMEs). SMEs in Nigeria are non-subsidiary, independent firms/organizations which employ fewer numbers of employees with an annual turnover not exceeding Five Hundred Thousand Naira (N500,000). The attraction to the owners of SMEs in Nigeria lies in the fact that these kinds of businesses are less capital intensive as well as highly flexible in filling the need in various niche markets. As much as these small businesses are often neglected by the bigger dogs in the game, they are quite literally the backbone of practically all developed economies because they contribute immensely to employment, economic and export growth in these nations. You might not know this but SMEs in Nigeria contribute a whopping 48% of our national GDP, account for 96% of businesses and provide for 84% of employment of our citizens. With a total number of about 17.4 million, they account for about 50% of industrial jobs and nearly 90% of the manufacturing sector, in terms of the number of enterprises

According to the 2010 Survey report on SMEs in Nigeria conducted by the National Bureau of Statistics, the SME sector in Nigeria is strategically positioned to absorb up to 80 percent of jobs, improve per capita income, increase value addition to raw materials supply, improve export earnings, enhance capacity utilisation in key industries and unlock massive economic expansion and GDP growth.

The role of SMEs in the political economy can not be undermined. They help to promote and strengthen reforms. They sum up the commercial activities in our country regardless of the sector involved because they produce what we need, transport them to consumers all over the country and do all the other necessary tasks in between. They perform all these tasks despite challenges such as inadequate working capital, stiff competition from larger companies, difficulties in sourcing raw materials, low capacity utilization, lack of management strategies and the poor educational background of operators.

The point I'm trying to make here is that, despite the significant contribution of SMEs to the Nigerian economy, these many challenges still persist and hinder the massive development of this sector. When bank loans are given, most of them find it hard to access the funds as a result of insufficient collateral, or due to the category of funding the opportunities belong to. And all these challenges were before the current pandemic brought us all to our knees. Back in 2017, the National Bureau of Statistics (NBS) reported that Nigeria's unemployment rate rose to 23.1% and underemployment rose to 16.6%, with over 20 million Nigerians currently unemployed. Well, when you consider that SMEs in Nigeria play pivotal roles in the provision of employment, you are bound to surmise that this figure is likely to increase because these businesses have been hard hit as a result of the pandemic.

Moreover, with domestic and international restrictions on movement hampering trade and travel, most of these businesses have had to stop, reduce or alter their operations. Productivity has become even challenging, and even though we are a resilient people, the effects of this pandemic will likely linger long after the crisis has been averted, especially on SMEs and the labour market.

Perhaps, since the lockdown became our new normal, most of these SMEs have been unable to lay their hands on the raw materials they need. Some are already shutting down and some can even continue since there is no material for production. Lots of containers have been delayed at the seaports and shipping dates have been repeatedly postponed on account of COVID 19. Even micro businesses that buy and sell cannot get supply of the goods they buy because most of them are majorly imported from China.

Most of these SMEs operate on a day to day level and so this entire pandemic situation has been nothing short of a nightmare for them. Their investments for the first half of this year have all but washed down the drain in one failed swoop. In the manufacturing sector, as factories and cities have been shut down and a large portion of the labour force demobilized.

Perishable products have gone to waste in warehouses or been sold off at pittances. Distribution of non-perishable goods is practically at a halt and transportation businesses are stuck with vehicles in their parks all day long. As if all these aren't enough, there are increasing reports of looting in various states and as much as this development affects us all as a nation, it makes an already bad financial situation worse for the SMEs in this country.

Most of these small businesses are understandably ill-equipped to handle a crisis of this scale, and so for many the focus has rapidly switched from profit-making to survival mode. It's a downright depressing situation but what else can they do?

However, currently the impact Covid- 19 have posed many challenges which SMEs face in Nigeria, include irregular power supply and other infrastructural inadequacies (water, roads etc), unfavorable fiscal policies, multiple taxes, levies and rates, fuel crises or shortages, policy inconsistencies, reversals and shocks, uneasy access to funding, poor policy implementation, restricted market access, raw materials sourcing problems, competition with cheaper imported products, problems of inter-sectoral linkages given that most large scale firms source some of their raw material outside instead of sub-contracting to SMEs, insecurity of people and property, fragile ownership base, lack of requisite skill and experience, etc. (Onugu,A 2005). Against this back ground, the impact of Coronavirus outbreak as the country is in a partial lock down added more negative impact on the SMEs businesses and caused a reduction in their operational activities..

SMALL AND MEDIUM ENTERPRISES PROFITABILITY IN COVID-19

The primary objective of every business is profitability. Profitability is the ability of a business to make profit, (Olusola, Ayandele,olowo et al ,2009). Profit has a great important for the survival of an enterprise in a competitive environment. It is an indicator of SMEs' performance. Measuring profitability current and past profitability is crucial. Predicting future profitability is also essential for a business venture survival. Income and expenses are used to measure profitability. Income is the gross profit generated during the accounting period, as a result of the normal activities carried out by an undertaking. And incomes make the capital increase. Therefore, income is the money made by all the activities of a business. Measuring profitability is the most important thing used to measure the success of an undertaking (Ekpeyong 2009). An undertaking that is not generating profit/ revenues, cannot survive. In the contrary, if an undertaking is much profitable, it has the capacity to pay back the owners in the form of return on investment made.

Since the majority of SMEs are concentrated in the service and commercial sectors, earning a profits is important to small business because profitability impacts whether they can secure financing from bank attract investors to fund its operations and growth its business. However, SMEs operators can only maintain sales at a maximum level by minimizing their operational costs. If the condition of production is stable, there will be high level of sales and returns on the investment which lead to profit. Moreover, for SMEs operators to be successful and remain in business, both profitability and growth are important and necessary for survival. However, it is cleared that SMEs operators under the current system of pandemic are facing the rigor of Corvid -19 pandemic thereby created paradigm shift in the operations of SMEs, against this background, the emergence of invisible enemy pandemic has posed threat to the survival of SMEs profitability and continuity.

SMALL AND MEDIUM ENTERPRISES CONTINUITY

Disruptions to business can happen at any moment, business continuity is about having plan to deal with difficult situation. As new businesses are emerging in this country each year; almost as large a number have discontinued during this covid19 era. The bulk of the firms in both categories are, of course, small and medium enterprises. Since 1990, the annual net increase in the number of businesses in operation has averaged about 41,000 firms, with both the number of business continuity and the number of business deaths rising moderately. Businesses may be discontinued for a number of reasons. Some discontinuance is forced by failure, although the number of failures appears to account for only a small fraction of all business deaths over the years.

Those interviewed in connection with the Federal Reserve System's survey of opinion among persons involved in supplying external equity capital to small business were generally of the opinion that the prospect of a 30% annual appreciation on their investment was needed to induce investors to put equity funds into small enterprises (Britzelmaler ,2013). Availability and Cost of External Equity Capital for Small Business Ventures voluntarily wind up their affairs without involving creditors in losses; and in still others the discontinuance may be the result of an absorption or merger. However, the emergence of Covid-19 has appeared to have contributed significantly to small business failures, the blame for which has usually been placed on such economic crisis and some personal factors as incompetence, inexperience, lack of judgment, and the like. On the other hand, some writers argue that the major basic reasons for survival and high turnover in the new business is when there was no undercapitalization. Since the new business that fails within a year or two after its formation rarely has earned any profit or incurred, but the impact of covid-19 on the personal savings of the owners of the new business could, of course, have contributed to the original undercapitalization and lack of continuity of the firm. The present pandemics problems is, however, known to have had a very noticeable negative impact on the extent of their turn over and performance operations in this country since March 2020.

Although, the federal government of Nigeria has just lunched the MSMEs survival fund. This fund is a conditional grant to support Vulnerable Micro and small business enterprises in meeting their payroll obligations and safeguard jobs as well as to aid in continuity of MSMEs operators in Nigeria. But however, many SMEs operators in which this study was carried out complained about the difficulty in the accessibility of the fund. According to our survey in this fidings, it appeared that many SMEs operators heard about it but they do not know how to go about it. We therefore suggest that government should create a flexible access for SMEs to access the fund when necessary in order to be to forge ahead in their business activities.

3. RESEARCH METHODOLOGY

In order to obtain adequate and correct information, questionnaires was used. The questionnaire was employed to address the research questions and was directly administered to the SMEs operators in Ikeja local government area, Lagos state. To achieve the objectives of the research, 80 questionnaires were distributed randomly to SMEs operators in which 72 questionnaires were returned. The questionnaires were designed on Likert 5 rating scale (Strongly Disagree, Disagree, Undecided, Agree and Strongly Agree). A likert scale is a psychometric scale in surveys research. In this study, a 5-point rating scale will be employed to analyze some stated constructs in respect to the impact of Covid 19 on SMEs operators.

The mean score (MS) of the respondents' base on the 5 point ratings scale will be computed

as $\frac{5+4+3+2+1}{5}$ = 3.0 mean score

Based on this, any score below 3.0 (MS< 3.0) will be taken as a weak factor and may not be considered while those with mean score of above 3.0 (MS > 3.0) will be taken as strong factors and thus be considered. Chi square test was used to test the formulated hypotheses with the aid of SPSS version 23.

4. ANALYSIS AND DISCUSSION

Socioeconomic Characteristics of the Respondents

Out of the 80 questionnaires administered 72 were returned (90%) which can be regarded as been high enough to enable valid analysis. Table 4.1 shows the details of socioeconomic characteristics of respondents. In respect to the gender distribution of the sample 42 respondents which represent 58.33.3% of the population were male while the remaining 30 respondents which represent 41.66% of the population were female. This shows that the majority of the respondents were male. In respect to the age, 11 respondents representing 15.27% of the population are between the ages of 20-30 years, 27 respondents representing 37.5% of the population are between the ages of 31-40 years, 12 respondents representing 16.66% were between the ages of 41-50, 8 respondents representing 11.11% were between the ages of 51-60 and 14 respondents representing 19.44% of the population are above 60 years. The analysis shows that the majority of the respondents that participated in this study were between 31-40 of age. As regard educational qualification, 5 respondents which represent 6.94% of the population were not educated, 12 respondents which represent 16.66% of the population completed primary education, 23 respondents which represent 31.94% of the population completed secondary education while 32 respondents which represents 44.44% of the population completed tertiary education. In respect to the number of staff working in the surveyed sample 12 respondents which represent 16.66% was in the category of 1-10 employees, 10 (13.88) respondents were in the category of 11-20, 11(15.27) were in the category 21-30 15(20.83%) respondents were in the category of31-40 while 24(33.33%) were in the category of 41 and above. In respect to the annual turnover of the respondents, 14 respondents which was the highest number of respondents representing 19.44% fell into category of respondents that make 201,000-300,000 annually while 11 respondents representing 15.27% which is the least number of respondents make 301,000-400,000 annually.

Table 4.1: Socioeconomic Characteristics of Respondents

	Frequency	*Percentage*
Gender		
Male	*42*	*58.33*
Female	*30*	*41.66*
Total	*72*	*100*
Age		
20-30	*11*	*15.27*
31-40	*27*	*37.5*
41-50	*12*	*16.66*
51-60	*8*	*11.11*
61 and above	*14*	*19.44*
Total	*72*	*100*
Educational qualification		
No formal education	*05*	*6.94*
Primary education	*12*	*16.66*
Secondary	*23*	*31.94*
Tertiary	*32*	*44.44*
Total	*72*	*100*
Number of employees		
1-10	*12*	*16.66*
11-20	*10*	*13.88*
21-30	*11*	*15.27*
31-40	*15*	*20.83*
41 and above		*33.33*
	24	
Total		*100*

	72	
Annual turnover (#) *0- 100,000* *101,000-200,000* *201,000-300,000* *301,000- 400,000* *401,000 and above* *Total*	 *13* *12* *14* *11* *12* *72*	 *18'05%* *16.66* *19.44* *15.27* *16.66* *100*

Evaluating the impact of Covid 19 on SME's operations

As shown in table 4.2, the respondents were asked to rate their extent of agreement to the statement posed to them in respect to the impact of Covid 19 on the operations SMEs on a five-point Likert scale. The range was strongly agree (5) to strongly disagree (1). Based on the computed rating scale, any score below 3.0 (MS< 3.0) will be taken as a weak factor with less impact while those with mean score of above 3.0 (MS > 3.0) will be taken as strong factors and thus be considered as having significant impact. However, in respect to table 4.2, mean score of 4.06 shows that there was improvement in the competence level of SMEs operators. This can be as a result of innovative way and adoption of technology in rendering their services so as to stay competitive in the business. Mean score of 4.10 in respect to staff downsizing shows that many employees of SMEs operators were relieved of their job which contribute to the level of unemployment in the country. However, mean scores of 3.72 and 3.57 indicate that Covid 19 has led to inability of employers to regularly pay salaries of their workers and those that pay regularly opt for the reduction of salaries /wages of their workers respectively. Also, the mean score of 4.49 is an indication of significant increase in the operational cost of SME's operators. This are as a result of increase in the price of fuel which as affected almost all sectors in Nigeria and hike in the electricity tariff by the government even as people are still struggling with the negativities that come with Covid 19. However, the mean score of 4.19 is an indication of the respondents' views that there is no concrete or visible intervention by the government at both state and federal level to ameliorate the effect of Covid 19 on SMEs operators.

Table 4.2: Impact of Covid 19 on SMEs operations

Constructs	N	Mean	Std. Deviation
Improved competency level of SMEs operators	72	4.06	1.310
Staff downsizing	72	4.10	1.323
Increase in operating cost	72	4.49	.872
No intervention from the government to help SMEs	72	4.19	1.158
Inability to regularly pay salaries/wages of employees	72	3.72	1.091
Reduction in salaries of workers	72	3.57	1.677

Test of Hypotheses

Lucey (2002) defined Chi-square test as an important extension of hypothesis testing and is used when it is wished to compare an actual, observed distribution with a hypothesized or expected distribution. However, the decision rule as applicable in this study states that: null hypothesis would be rejected if the calculated value is greater than the table value, otherwise alternative hypothesis will be accepted.

4.3.1 The First Hypothesis

Ho1: Covid-19 pandemic does not affect the level of profitability of SMEs operators

Table 4.4 :chi square test analysis on the effect of covid19 on SMEs profitability

Variables	Observed N	Expected N	Residual
Strongly agree	2	14.4	-12.4
Agree	11	14.4	-3.4
Undecided	4	14.4	-10.4
Disagree	20	14.4	5.6
Strongly Disagree	35	14.4	20.5
Total	72		

	PROFITABILTY
Chi-Square	50.639[a]
Df	4
Asymp. Sig.	.000

Table 4.5: Test of statistics

Table 4.4 and 4.5 showed the effect of covid-19 on the level of SMEs operators profitability. The result of the calculated chi square was 50.639 and the table value at 0.05 significance level with 4 degree of freedom is 9.488. However, the calculated value was greater than the table value showing that the Covid -19 pandemic affect the level of profitability of SMEs operators, in Lagos. The null hypothesis is therefore rejected.

4.3.2 Second hypothesis

Ho2: Covid-19 pandemic does not affect the business continuity of SMEs operators' in Lagos

	Observed N	Expected N	Residual
Strongly agree	2	14.4	-12.4
Agree	4	14.4	-10.4
Undecided	3	14.4	-11.4
Disagree	18	14.4	3.6
Strongly disagree	45	14.4	30.6
Total	72		

Table 4.6: Chi square test analysis on the effect of Covid 19 on business continuity

Table 4.7: Test of Statistics

	CONTINUITY
Chi-Square	93.139[a]
Df	4
Asymp. Sig.	.000

Table 4.1.5 and 4.1.6 showed the effect of Covid-19 on as regard SMEs business continuity. The result of the calculated chi square was 93.139 and the table value at 0.05 significance level with 4 degree of freedom is 9.488. However, the calculated value was greater than the table value showing that the Covid-19 pandemic affected the SMEs business continuity in Lagos. The null hypothesis is therefore rejected.

5. CONCLUSION AND RECOMMENDATIONS

Since, Small and medium enterprises(SMEs) served as veritable means of mobilization and utilization of domestic savings as well as increased efficiency through cost reduction and greater flexibility, and very prominent in the business services, manufacturer of semi raw materials, manufacture of bakery products, leather manufactures, furniture, textiles and products required for the construction industry. Also, SMEs have been fully recognized by government and development experts as the main engine of economic growth and a major factor in promoting private sector development and partnership. Thus, the development of SMEs is an essential element in the growth strategy of most economies and holds particular significance for Nigeria and contribute to improve living standards, bring about substantial local capital formation to achieve high level of productivity and capability. This study evaluated the impact of Covid-19 pandemic on some SMEs operators' profitability and continuity in Lagos. The study revealed that the impact of Covid 19 on SMEs operators which are; staff downsizing, increased operational cost, reduction in employees' salaries and in some cases some employers were unable to pay the salaries of their employees regularly. Also survey showed that Covid-19 has negatively impacted on the level of SMEs profitability and business continuity in the Covid-19 period. However, Covid 19 is said to have increased the competency level of SMEs operators as some of them have devised innovative strategies to improve on their business performance and avoid winding up.

Moreover, we therefore suggest that there is need for government to re-implement the new economics strategy for SMEs financial repositioning such as regular power supply and other infrastructural adequacies(water, roads), favorable fiscal policies, soft taxes, levies and rates, stable fuels price, favorable consistencies policy , easy access to funding, implementation of policy that do not restrict market access, raw materials sourcing problems should be addressed, competition with cheaper imported products, problems of inter-sectoral linkages given that most large scale firms source some of their raw material outside instead of sub-contracting to SMEs also should be tacked by government agency, insecurity of people and property is another great problems that demand urgent attention, etc. This will address the pain point of SMEs operators to regain their sustainability and continuity, in other word to be able to act as the principal means of achieving equitable and sustainable industrial diversification in the post pandemic. The solution to this current predicament of SMEs in Nigeria can be broadly classified in two major tiers. On the one hand is the best approach for these businesses going forward while on the other hand, we must examine how the Nigerian government and necessary agencies can help. For SMEs businesses already in distress, the priority should be survival, and all business goals and actions taken from now till further notice must be geared towards that. Post-COVID-19 recovery priorities in every aspect of the business value-chain must be centered around revitalizing the enterprises first because consumer needs are bound to change.

On the part of the Nigerian government, a coordinated and highly intentional response is expedient and long overdue. In this regard, I should probably point out here that as a means of encouraging SMEs businesses and other enterprises to retain their employees at this time, the government has come forth with an Emergency Economic Stimulus Bill 2020. This bill, more or less states that any company that does not retrench staff between the 31st of March 2020 and the 31st of December 2020 (except for reasons related to a breach of Labour Act) will receive a 50% tax refund. Though, Nigeria Government has just launched a new MSMEs survival fund to boost the business capacity and continuity of micro, small and medium enterprises. This is a positive step and may encourage businesses to retain their employees and stay in business but at times like this SMEs and their owners really need to start looking at options for alternative sources of income.

The government should be keen to keep SMEs in Nigeria afloat because, given their significance to the Nigerian economy, support for these businesses cannot be overemphasized. Their contribution to the growth of the Nigerian economy cannot be understated as they drive the economic and industrial transformation of the country. They are the foundation of our commercial life as a nation and they have been some of Nigeria's strongest footholds all these years. For the SMEs operators are to make any real headway after this pandemic, it is crucial that the SMEs business sector receive all the help it may need for them to be properly positioned.

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RESILIENCE AND SUSTAINABILITY: A PANACEA FOR POST PANDEMIC ECONOMY IN NIGERIA

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Abstract

The Covid-19 pandemic has generated shockwaves that have caused economic instabilities across the world, requiring for a better understanding of the effect on Nigeria economy. This study presents the resilience and sustainability, a solution to the impact of the Covid-19 pandemic in Nigerian economy. It employed a fact-finding research approach through review of literatures on impact of Covid-19 pandemic in Nigeria's economy. The study relied on secondary sources of data collection with content analysis of library materials, journal articles online and textbook. From the discoveries, the pandemic has pushed researchers and policymakers beyond their respective daily routines and certainly exposed fundamental weaknesses in the world system, thereby forcing them to deploy solutions. The study also shows that the Covid-19 pandemic has negative impacts on basic economic variables in Nigeria such as inflation, crude-oil prices, employment, exchange rate, GDP growth, among others. The findings therefore reveal that most countries are adopting resilience and sustainability, which is becoming core philosophy of countries economy to continue to function despite disruptions of Covid-19, in other to adapt and improve in its post pandemic world. It is hoped that the attendant policies would be properly implemented in Nigeria so as to provide the critical framework to repositioning the country's economy on the path towards inclusive and sustained economic growth and development.

Keywords: Resilience, Sustainability, Panacea, Pandemic and Economy

INTRODUCTION

So Many countries and Nations across the globe are facing unparalleled challenges due to the Covid-19 pandemic, which Nigeria is no exceptions. It is expected of the leadership of the country to make sure the populace spirit of unity can rouse collectively to fight the ravaging virus. Nigeria is tested today just as the whole world, importantly, time is of an essence, immediate and decisive action is needed. Desperate situations sometimes require desperate solutions.

The corona virus outbreak, later coded as Covid-19, hit the world like a shock towards the end of December, 2019. At its inception in Wuhan city in China, at first the risk was summarily underestimated and regarded as a regional health challenge. Countries were in solidarity with China upon this health disaster, Covid-19 initially was not perceived as a threat with a global scale. In fact, the World Health Organization (WHO) declared that the health crisis in China had no global potential threat (WHO, 2020). However, knowing fully well that the world is a global village and the position of China being one of the commercial nerves of the world; allegedly less risky Chinese health issue mutated into a global scale with lethal consequences (Price and van Holm, 2020; Ezeaku and Asongu, 2020). The Outbreak of the virus has since spread to over 170 countries and almost every continent across the globe. While there are ongoing determinations to curb the range of infection which is almost entirely driven by transmission among human, it has however accounted for over 34,060,041 confirmed cases with over 1,016,065 deaths as at 30th of September,2020, which statistics showed that the total global active cases of Covid-19 stand as 7,741,943. This indicated a 3% fatality rate and about 77.2% recovery rate (Worldometer Report, 2020). Africa, being a highly vulnerable continent, soon recorded imported cases of Covid-19. As at 28th September, 2020, from 55 African countries the total confirmed cases of Covid-19 in Africa as reported by African Center for Disease Control on Covid-19 in Africa ; total confirmed cases stand about 1,460,328 , Active cases of 253,067 with about 1,207,261 recoveries and 35,163 deaths recorded . This represents 82.7% recovery rate and about 2.4% fatality rate, respectively (World Bank, 2020; Africa news report, 2020).

However, there have been a lot of debates on the reasons for the low cases of the infection recorded in Africa. The epicenter of Covid-19 happened to be Europe and America continents respectively in compare with that of Asia were it originated from, while Africa has a relatively low case. This seems ironical given the level of public health infrastructure, governance structure, porous borders, weak institutions, inter alia, in the region. Recent report from World Health Organization regional office for Africa suggests that in their preliminary analysis that over 80% of Covid-19 cases in Africa countries are asymptomatic. Which studies indicated that there are communities of people infected but not detected (Adejoro, 2020, WHO Report, 2020)

Moreover, in Nigeria scenario, the most populous country in Africa is awakened to a new economic and health reality due to the Covid-19 crisis. The country with about 200 million people, recorded its first case on February 28, 2020. This case index was an imported case by an Italian on a business trip to Ogun state, Nigeria. Consequently upon this and in consonance with the measures taken across the world, the country took various actions to contain the range of the Covid-19 virus which included: full or partial lockdowns, testing, contact tracing, case isolation, among others. Leveraging on previous disaster management and containment skills such as the handling of the Ebola virus that broke out between 2014 and 2016, the country instituted a relative response by constituting a Presidential Task Force (PTF) which was saddled with the responsibility of managing the government response to the pandemic(Farayibi and Asongu, 2020). As at 30th of September,2020 the NCDC confirmed cases in Nigeria stood at 58,647 with 49,937 discharged and 1,111 deaths; representing about 85% recovery rate and 1.9% fatality rate, respectively. This shows the country is witnessing a drastic drop cases as the time the paper is ongoing, but it's yet to be recorded if it is as a result of low testing or lack of testing facilities as stated earlier on cases of the Covid-19 infection recorded in Africa. But this cannot rule out the negative effect it has had on the country economy sector.

STATEMENT OF PROBLEM

The relapse in the global economy and lockdown in some countries, as a result of Covid-19 taken its toll on the global demand for oil. In other words, the oil markets have been on a downward trend as Covid-19 has crippled demand. Fuel prices fell and recorded 18-year low trading at less than 22 dollars per barrel. With the drop in oil prices, government revenues are expected to fall from an already low 8% of GDP in 2019 to a projected 5% in 2020. The report has it that the economy would likely contract by 3.2% in 2020. This projection assumes that the spread of Covid-19 in Nigeria is contained by the third quarter of 2020. If the spread of the virus becomes more severe, the economy could contract further. Before Covid-19, the Nigerian economy was expected to grow by 2.1% in 2020, which means that the pandemic has led to a reduction in growth by more than five percentage points.

Nigeria, like all the nations of the world, is navigating uncertain times. However, for Nigeria, as an oil-dependent economy, this is a Twin Shock: Covid-19 Pandemic shock and Oil Price Shock. Nigeria's vulnerabilities to the impact of these external shocks can further be ascribed to increased dependencies on global economies for fiscal revenues, foreign exchange inflows; fiscal deficit funding and capital flows required to sustain the nation's economic activities. The Twin Shocks are expected to impact the economy through three channels: supply, demand and financial. The scope and severity of the economic crisis in Nigeria, caused by the fall in oil price and the Covid-19 pandemic, is a clear signal that growth and development reforms are needed in Nigeria.

On this note, the broad aim of the paper is to evaluate how resilience and sustainability is a panacea for post pandemic economy in Nigeria;

The specific objectives of the Paper are:

1. To examine the Impact of Covid-19 on Nigeria economy.
2. To assess the concept of resilience and sustainability and ;
3. To critically examine the framework adopted during the ongoing Covid-19 pandemic which would serve as a mitigating factor to the post pandemic Nigeria Economy.

METHODOLOGY

The methodology adopted in the paper research was designed to be purely based on content method of analysis. Being a fact-finding study, the research paper explores past publications to determine and appraise the full impact of Covid-19 on Nigeria's economy and looking at resilience and sustainability as a panacea to post pandemic economy. As such, the data generated was therefore analyzed through inductive reasoning rather than statistical procedures. The data collection technique was fully based on secondary data. Which means the study was sourced from relevant books, journals articles, newspapers, magazines, government publications, conference proceedings, unpublished dissertations, seminar papers and the Internet. Data generated from the study was analyzed using descriptive method.

IMPACT OF COVID-19 ON NIGERIA ECONOMY

The outbreak of the Covid-19 also disrupted the conduct of major economic policies across the globe. Like many resources-dependent developing countries like Nigeria confronted the effect of the fluctuations in the price of crude oil -which accounts for about 70 percent of Gross Domestic Product (GDP) and 65% of total government revenue (Farayibi and Asongu, 2020). The rise in government spending driven by the need to combat the effect of Covid-19 had increased the country's fiscal deficit and high public debt vulnerabilities. Furthermore, the gloomy capital flows which put serious compression on Nigeria's foreign exchange reserve and exchange rates. These have also affected the conduct of different monetary policies in the country. This circumstance is expected to result into economic consequences on outcomes such as economic growth, inflation, unemployment and exchange rates. Without Covid-19 outbreak, the number of Nigerians living in poverty is projected to increase on yearly basis due to population growth. The country per capita incomes keeps falling yearly because the economic growth does not represent the population growth. The GDP growth rate of 2.2% continued to be below the population growth rate expected at 2.6% per year (Farayibi and Asongu, 2020).

In 2016, it's worthy of note that the country went into recession, with a negative 1.6% impact growth rate which gradual recovery with rebound to about 2% in 2018. And the GDP growth rate with slight improvement in 2019 before the lockdown in early 2020. Although IMF forecasts that growth will remain feeble at an annual average of about 1.9% from 2019 – 2023. Oil characterizes above 70% of our exports. Considering the oil prices drop, government revenues are anticipated to plunge as of an already low 8% of GDP in 2019 to an estimated 5% in 2020.

Furthermore, growth has also been driven by Service Sector, which signifies around 50% of the country's GDP. The key performers here were the communications and financial services. Agriculture and use of local contents including restrictions on importation of food items (Rice in particular) also contributed to positive up growth of the economy up to 2019. The economy had started showing significant signs of recovery but with the pandemic in sight, it slows this progress. Obviously, the economy impact of the Covid-19 can still be substantial, even if we manage to contain the range of the virus. That tells on the current hardship in the country and decline in exchange rate (Farayibi and Asongu, 2020). The preponderance of the vulnerabilities of economic variables due to the consequence of infectious diseases on the economy therefore calls for proper understanding of the effects of Covid-19 on Nigeria economy.

ASSESSMENT OF SUSTAINABILITY AND RESILIENCE AS A CONCEPT

Resilience is ability to recover rapidly from problems and toughness. Resilience helps to prevent adversities as well as to anticipate, captivate, accommodate or recover from crises in an appropriate, effective and sustainable manner. The importance of investing in resilience is predicated upon the deepening health and economic crises caused by the pandemic given the fact that more shock will emerge though it's unclear about the form in which it will surface. Resilience is an attribute that we should all strive to achieve. The interconnected nature of our society means that events in one part of the world can create dramatic, ripple effects that are felt around the globe. This presents a nexus between our society and economy which are so closely connected and complex, that a small number of infections in one section of a city in China, led to a chain reaction of events that resulted in hundreds of thousands of deaths, millions of people becoming infected, and effectively shutting down the global economy, all in a matter of months. Therefore, enhancement of resilience therefore begins with the identification of critical systems, infrastructure and even workers that are absolutely needed in order for society to function no matter what happens.

While sustainability on the other hand is the ability to be continued at a definite rate or level. Sidestepping of the depletion of natural resources in order to maintain an ecological balance Sustainability involves the re-organisation and reorientation of entire socio-economic systems in order to improve people's lives. While it is necessary that sustainability principles must not be forgotten in the post-pandemic world. Those urban spaces and cities that do thrive will need to be better prepared for a future pandemic but also for climate change impacts, which requires not only an adaptable approach, but mitigation measures too. A renewed focus on retrofitting, monitoring and evaluation of systems which help critical systems to adapt to changing circumstances and to operate more efficiently. Consequently, there is need to be adequately prepared for the unthinkable as approaching resilience from a risk-management perspective alone will not adequately prepare us for future unknown shocks. Risk management is an important part of resilience planning, but to explore resilience solely within a risk framework means that unexpected resilience challenges will undoubtedly be missed. A typical example of this, is the Risks Report 2020 issued in January 2020, suggested that the rate at which coronavirus was spreading was enormously undiscovered around the world. With the understanding of past events of this magnitude, it becomes crystal clear that assessments can be woefully inaccurate. Thus, the emergence of Covid-19 has unravel unanticipated gaps inherent in our society and economy, which has provided ample evidence for why we must quickly address those resilience challenges that we already knew existed.

CHANGES AS A RESULT OF PANDEMIC

Considering the fact that there are not enough relevant literatures on the Covid-19 impacts on the economy in Nigeria, as well as ways to mitigate or survive such incident, simply because it’s still an ongoing trend, since the pandemic is still around us. The few relevant works would be looked into to enrich the paper. As earlier discussed there is no gain saying that Nigeria experienced crises in the economy twice within ten years. The crisis of 2009 was as a result of the aftershock between 2007 to 2008 global financial crises, while 2016 economic crisis came about of the sudden fall in oil price in the world market. It is therefore important to understand the economic transmission channels in which the shocks adversely affect the economy consequently the imminent negative economic impact of Covid-19. These explain the justification to reviewed works on effect of Covid-19.

Ozili (2020), showed in his work that the Covid-19 pandemic and the lockdown restrictions had negative socioeconomic consequences for African countries. He examined the Nigerian experience and structural causes. His paper analyses the COVID-19 condition in Nigeria, its impact on the economy and the operational causes that deteriorate the Covid-19 crisis. His findings revealed that the economic decline in Nigeria was caused by a mixture of fall in oil price and spillovers from the Covid-19 occurrence, which not only led to a fall in the demand for crude oil products bring economic activities to an abrupt end as a result of social distancing policies were enforced. On the contrary Farayibi and Asongu (2020) early review of the economic impact of the Covid-19 in Nigeria with the usage of aggregate demand and supply in analyzing macroeconomic impacted. They submitted that infected cases reflected important connections with economic activity from the perspective of a trend analysis. In their findings through the trend analysis showed that the Covid-19 pandemic has insignificantly caused a decline in basic macroeconomic variables in Nigeria.

Socio-economic analyses of the impact of the covid-19 pandemic in Nigeria. UNDP reported that the pandemics have a bearing on the social fabric of society. Stress initiated by economic losses result in visible cracks where incidences of once socially unacceptable norms become more frequent. Evidence suggests that health related pandemics have the potential to increase the risks of domestic violence with cases in China showing that domestic violence increased during the epidemic; viciousness against health workers due to serious stress levels that the pandemic places on patients. Submitted that frustrations resulting from economic loss could also play into existing regional fault lines within Nigeria. While Ohia et al (2020) predicted that the result on Covid-19 will be serious in Africa because African nations have friable health systems. They argue that Nigeria's current national health systems cannot respond to the growing number of infected patients who require admission into intensive care units. They suggest that Nigeria should explore available collective measures and interventions to address the Covid-19 pandemic.
KPMG (2020) examined the economic impact of Covid-19 in Nigeria with emphasis on business activities. Findings revealed that the pandemic has a twin shock on the Nigerian oil-dependent economy, namely, global and domestic shocks as well as oil price shock. The study opined that the twin shocks are expected to affect the economy through the supply, demand and financial channels. It concluded that, unlike the threat of Ebola, Zika and SARS viruses which faded with time, the social-economic impact of the pandemic might still persist well after the virus had been conquered.

From the above reviews of relevant literatures, it’s evident that the pandemic has an enormous impact on the economy which has brought a new normal in the global society at large. It’s also expected that the impact will continue to be felt across all regions especially the under developed and developing country like Nigeria.

RESILIENCE AND SUSTAINABILITY AS A PANACEA

Resilience being the ability to recover and adapt to unanticipated threats, has been on for a while, which the public health authorities are conscious of. According to Hynes et al (2020), they admits that immense interferences can and will happen, and it is crucial that countries have the ability for recovery and adaptation to ensure their economy and political stability in the future. Which is often referred as bouncing back or bouncing forward (Hynes et al, 2020).

On Arcadis group report who are expert consultancy on asset management and development, looks into post pandemic resilience, they emphasis that It is imperative that we embrace resilience thinking while we are working to recover from the pandemic. At Arcadis, experience shows that there is usually a short window of opportunity following shock events – floods, hurricanes, super storms, terrorist attacks – within which greater steps can be taken towards increasing resilience. This is typically the timeframe within which client focus is aligned with a supportive regulatory or business environment, typically with increased access to funding, which can help them move more quickly from strategy to implementation. Organizations need to harness all their mental energy and resources, embrace entrepreneurship, and push for significant government action to enhance the resilience of all of those critical systems that are essential for survival.

They narrow their resilience based on market perception, which they fails to equate it on a global scale as a solution in the post pandemic world. From the work of Mensah and Ozer, seeing Africa is currently the fastest growing continent in the world. The economic growth and development story started after colonial rule, and for most countries it was in the 1960 but the high level of corruption, political instability, poor infrastructure, and capital flight, which have been a major contributor of setbacks in its economic growth since independence. They wrote that the long-term economic impact of the coronavirus pandemic is still unclear, but there is no doubt that we have entered a prolonged period of change. Stimulus packages in most of the largest economies are contributing to a short-term softening of the economic blow, but major questions remain over what will happen when the stimulus packages end and the impact of true levels of unemployment and declining economic output become apparent.

Also Globalization is also at risk. Political pressure in many countries around the world may lead to more nationalist policies, but the interconnected and interdependent nature of the global economy means that a widespread wave of protectionism would make the global economy less resilient and could instead lead to a prolonged period of economic distress. Rather than retrenching and looking inward, it's our belief that nations that continue looking for collaboration beyond their borders will benefit the most.

According to UNDP report (2020) emphasis on recovery considering the case of China, in 3 months, they do well in containing the spread of the virus, due to measures took. This successful flattened the caseload curve, saved many lives and set the stage for gradually reviving the economy. The industrial sector was back to around 80 percent capacity by early April, although the services sector, which was the most ruthlessly hit, is lagging behind. China's experience highlighted organizational economic susceptibility, with possibly significant impact on long-term sustainable development. The UNDP report also stated that the china model of recovery as a post pandemic measures is worthy of emulating, but the lack of availability of data flow and inability to learn from China, especially developing countries like Nigeria becomes a major challenge at this period in time (UNDP Report, 2020).

Eldridge (2020) on his own findings, look at building resilience of food system in the post pandemic. He pointed out that its essential we mug up from the coronavirus pandemic, its impact on the world economy, the rapid way in which it transverse across the globe and the effect it is having on our daily lives. An aspect to deliberate on undoubtedly is how to build better resilience into food systems, the ability to better endure a crisis in the future (Eldridge, 2020). He posited that the flaws that Covid-19 had exposed are not necessarily at specific farm level but highlighting a systemic weakness across the food sector. One way in which we can hope to increase the resilience of the global food system is by backing up a extensive range of suppliers. By diversifying away from a centralized supply chain to a more multifaceted one, we can increase the food system's ability to react and adapt to shocks (Eldridge, 2020). And to achieve this Government needs to shift their actions to build on the groundbreaking work of farmers, growers and local food champions who have advanced a range of successful ways to market food locally. In line with this is Nwagwu (2020) who posited that sustainability can be achieve by expanding finance opportunities for the farmers, creating access to appropriate training in, and tools for, agricultural best practices. Investing in logistics, transportation and storage systems can enable greater access to retail markets at fair prices.

Finally considering the OECD reports, Governments' first priorities in engaging the Covid-19 pandemic have been to overcome the health crisis and to device swift economic rescue methods, aimed at providing critical liquidity and protecting livelihoods in the face of unexpected losses of income. As the health crisis gradually abating some countries, attention is now turning to preparing incentive measures for triggering economic recovery. This policy brief examines how these stimulus packages can create a recovery that "builds back better", not only getting economies and livelihoods back on their feet quickly, but also continued prosperity for the extended term.

This means triggering investments and societal changes that will both reduce the likelihood of future shocks and improve our resilience to those shocks when they do occur, whether from disease or environmental degradation. At the heart of this approach is the transition to more inclusive, more resilient societies with net-zero emissions and much reduced impacts on nature.

DISCUSION OF FINDING/RESULTS

The study reviewed various literatures regarding the effect of covid-19 on the economy and recovery. The findings first revealed that the Covid-19 crises had its toll on Nigeria economy due to the lockdowns froze economic activities around the world causing job losses and supply chain disruptions. And it's over reliance on crude-oil for revenue and foreign exchange has made it vulnerable to the unprecedented oil price crash caused by a collapse in demand.

Findings also revealed that Africa as a continent and Nigeria in particular are more asymptomatic to the virus considering the World health Organization report. It was also evident that Nigerian current health system is not commensurate to the growing number of infected patients. Ohia et al (2020) by implication, there might be more people who are infected with the virus than the numbers of those who were actually tested, thus, more collective measures and intervention should be embraced.

The study further uncovers unforeseen inadequacies inherent in our global societies and economy. Thus, gaps exist in our dynamic complex and global economic systems. The study also provided plentiful evidence for the need to quickly address those resilience difficulties living with us that we already knew.

The study also shown that Covid19 has created a paradigm shift in the notion that investment in returns are not only acquired intentionally when and should a shock happens into a new level of understanding that resilience exist as an essential valuable purpose to pursue. Hence, resilience is a distinguishing attribute we must make great effort to achieve.

With containment measure in place the pandemic has created in the society a new normal which will have to live with us for a long time due to lay -off, rise in unemployment, introduction of remote working, loss of lives of household breadwinners heightened by the unnecessary fears created by pandemic and inadequate health response.

Finally, deducing from the UNDP and OECD report(2020) , resilience and sustainability must become a fundamental philosophy within the economy system and operation to guarantee we are able to continue to function in spite of disruptions of Covid-19, and are able not only to adapt and but to improve in its aftermath. This explains part of the reason government of Nigeria had to put in place Economic sustainable plans as a means towards post pandemic economy growth and development.

CONCLUSION AND RECOMMENDATION

Policy makers across the globe are making moves to improve their crippling economies and providing relief to citizens and businesses who are most affected by the pandemic. Governments in developed nations, in Europe and America are now offering economic incentives including disbursements of loans to citizens and industrialists during the pandemic but having it at the back of their mind that sustainability and resilience should be the way to avoid future shock like the Covid-19. Many governments as well recognized the necessity and the needs for sustainable recovery. There must be a focus on achieving resilience through a speedy transition from resilience formulation/planning to implementation of tangible projects and measures that makes difference. There must be a sustained and unwavering focus in preparing for an unpredictable and uncertain future in our society which must be robust and adaptable.

It is also therefore important for countries to understand most especially Nigeria the best approach to mitigate the effect on the economies. This becomes imperative to position the economy to attract the necessary investment needed to undertake meaningful developmental policies. Essentially, a developing country like Nigeria already battling with poor performance of basic development indices is likely to aggravate her challenges with the permanent changes that the pandemic has brought to the world. Given the heterogeneous households and firms characteristics, it is important to understand the country-specific characteristics as the nation continues the gradual relaxation of the nationwide lockdown in order to protect livelihoods and sustain the economy from collapse.

Finally in simple terms, Nigeria needs to first contained the outbreak and preparing for a more severe outbreak; enhancing macroeconomic management to boost investor confidence; safeguarding and mobilizing revenues; reprioritizing public spending to protect critical development expenditures and stimulate economic activity; and protecting poor and vulnerable communities. Thereabout resilience development within the economic system in Nigeria should be necessary for evolution of a post Covid-19 world. It should be a core philosophy within system and operations in other to ensure we are able to continue to function even after disruption like Covid-19.

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POST COVID 19 ECONOMY IN NIGERIA: THE ROLE OF LAW FOR SUSTAINABLE ECONOMIC DEVELOPMENT

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Abstract

Covid-19 otherwise known as Corona virus has impacted negatively on global economy and it may take time for nations of the world to come out of economic depression occasioned by the pandemic. This paper qualitatively identifies the roles of laws in post covid 19 economic recoveries. Specifically the article seeks to asses the degree with which law promotes economic sustainability in the areas of banking & Finance, dispute resolution, energy, infrastructure, insurance and transportation. It also examine the extent to which economic growth might be affected if laws are not clearly defined, made public and applied in a consistent manner. Provision and application of legal frameworks in these key areas of the economy will trigger quick recovery and stabilize it for future growth. It was recommended among others that more laws should be enacted to provides additional lending authority for certain Small and Medium Scale Enterprises (SMEs) so as to boost the post COVID-19 economy in the country;loans and advances should be given to agricultural enterprises to speed up more supply of food to the economy.

Keywords: Covid 19, Sustainability, Economic Development, Law and Legal Framework

Introduction

Since the emergence of coronavirus also known as Covid-19 in China and the subsequent spread of the pandemic to other parts of the globe, authorities have acted to limit its spread and the antendant economic impact. Experience with similar diseases reveals that while the human costs are significant, the bulk of the economic costs are due to the preventive behavior of individuals and the transmission control policies of governments (Brahmbhatt and Dutta, 2008). Current experience is no different. As the virus spread internationally, many countries have already taken or will eventually take action to limit the spread, through social isolation policies, such as shutting educational institutions, limiting work and restricting the mobility of people. The preventive actions have had an immediate and significant impact on all economies, and through trade and tourism, on partner economies.

Though it is too early to make an assessment of the impact of the virus based on full statistical evidence, high frequency data are providing some indicators but it is hard to assess the depth and the breadth of the pandemic as it spreads, and to precisely estimate how long it will take countries to return to normal activity levels.

According to World Bank (2020) forecast for global economic growth, the economic recession in 2020 was estimated to be the deepest since World War II. It also estimated that the global economic recession would affect 90% of the world's economies, a percentage that is greater than what was experienced during the Great Depression. The World Bank's baseline estimate indicates that global economic growth could decline by 5.2% in 2020 and only partially recover in 2021 with a 4.2% rate of growth, assuming that the global economy can begin recovering in the second half of 2020. In contrast, the IMF forecasted a 4.9% rate of decline in 2020 and a recovery of growth to 5.4% in 2021. Similar to the OECD and the IMF forecasts, the World Bank argues that the economic impact of the global recession will fall most heavily on developing and emerging economies that rely on global trade, tourism, or remittances from abroad, and those that depend on commodity exports. In addition, the World Bank forecasted that most emerging and developing economies could experience rates of growth in 2020 that are the lowest overall since the 1960s, with 90% of such economies expected to experience contractions in per capita incomes and many millions of people falling back into poverty. The World Bank also forecasts that economic growth in advanced economies will decline by 7.0% in 2020 and recover. Based on the prediction of world bank and other relevant institutions on the woes of post Covid-19 in most nations of the world, there is need for adequate laws to be made to suatain the economy and make it functional. Hence, this paper seeks to qualitatively identify the roles of law for sustainable economic development in post covid 19 eras in Nigeria. It seeks to answer the following questions:

To what degree does law promote economic sustainability in the areas of banking & Finance, dispute resolution, energy, infrastructure, insurance and transportation? To what extent might economic growth be affected if laws are not clearly defined, made public, and applied in a consistent manner? These are the focus of this paper.

REVIEW OF RELATED LITERATURE

Law and the Economy

A modern market economy requires laws that are able to constantly redefine rights and market relationships when new forms of corporate structure emerge; to provide ever-changing determinations of contractual obligations, and extend them to new forms of financial instruments, tangible and intangible property; to redefine and enforce the rights of victims of new technologies and activities while protecting the environment from newly emerging risks. These are only some examples of the tremendous flexibility that the legal and judicial systems require in order to adapt the laws to a dynamic economic system. As Cooter (1996) states in his pioneering piece, 'if economic law is poorly adapted to the economy, expectations conflict, cooperating is difficult, and disputes consume resources. Conversely, if economic law is adapted to the economy, people cooperate with each other, harmonize their expectations, and use resources efficiently and creatively'. If public institutions are defective and political conditions too unstable, private contractual arrangements will also become riskier and negatively affect private investment. In short, the formation of larger markets and the possibility of longer-term contracts, both necessary conditions for economic growth, are hampered by an unclear or undefined system of legal rules and inconsistent application and interpretation of those rules. The application of the economic analysis of law to development issues sponsors a clear and consistent definition and enforcement of the conditions of ownership in developing countries undergoing transformations. As Orr and Ulen (1993) argue, 'a government that credibly commits itself to upholding rights of property and contract enforcement not only provides a basis whereby partners in economic transactions can trust each other; it also reinforces the hope that the government itself can be trusted to transact honorably and to meet its contractual obligations'.

The economic analysis of the law in developing countries such as Nigeria in a critical time as this represents an attempt to identify changes in laws, regulations and enforcement mechanisms that, within the legal tradition of each country, would be able to enhance economic efficiency and improve equity. Edmund Kitch (1983) argues that law and economics focuses on the study of the impact of a system of rewards and penalties that affect individual behavior. These rewards and penalties are defined by laws, regulations, doctrines, court cases, social norms, and so on. The central goal of law and economics is then to analyze the individuals' and firms' maximizing behavior within a system of rules in order to identify the effects of laws. In this sense, law and economics follows a methodology compatible with a legal realism and within an elaborate framework of analysis provided by microeconomic theory. In this context, we will analyze how legal doctrines are not hermetically sealed, self contained, or even self sustaining. we will follow a legal realism found in law and economics where the law cannot be understood apart from its social context. Thus an understanding of how to enhance a more efficient social order through legal reforms is the major focus of this paper.

Global Economic Forecast

According to the Organization for Economic Cooperation and Development(2020), an updated forecast that projects global economic growth will decline by 6.0% under a single-wave scenario and 7.6% in under a second wave scenario 2020. This forecast reflects the OECD's a high level of uncertainty about the course of the global economy over the remainder of 2020, because the pandemic is "a global public health crisis without precedent in living memory.The OECD also concluded that, "The global economy is now experiencing the deepest recession since the Great Depression of the 1930s." In addition, the OECD argued that the pandemic is fragmenting the global economy through a growing number of trade and investment restrictions and diverging policy approaches that are being implemented on a country-by-country basis.

As a result of uncertainty concerning the course of the global economy over the remainder of 2020, the OECD produced two "equally likely scenarios:" one that assumes the current containment measures are successful in curtailing infections, and another that assumes there is a second wave of rapid contagion. Under both scenarios, the OECD estimates that the global economic recovery will be slow and gradual. The OECD also estimates that the average unemployment rate among OECD countries is projected to rise to 9.2% under a single wave scenario and 10.0% under the second wave scenario. Through the first quarter of 2020, however, most OECD countries had not experienced significant increases in rates of unemployment, in part due to national income and wage maintenance programs. The main exceptions were the United States and Canada, where unemployment rates spiked starting at the end of the first quarter and into the second quarter of 2020. In a major difference between U.S. and EU data, in the EU, workers absent from work due to temporary lay-off are counted as employed, whereas, in the United States, they are counted as unemployed. Global trade is projected to contract by 9.5% or 11.4% in 2020 under the single or second wave scenarios, respectively.

According to OECD (2020) scenario, global economic growth is projected to fall by 6.0% in 2020, but rise by 5.2% in 2021. In contrast, the OECD's second wave scenario projects a global economic contraction of 7.6% in 2020 and a growth rate of 2.8% in 2021, delaying a return to full recovery until 2022.

The OECD forecast also indicates that economic growth among developed economies will be particularly weak in Europe, where the growth rate is projected to fall by 9.0% and 11.5% in 2020, reflecting the one and two-wave scenarios, respectively. Similarly, U.S. economic growth is projected to contract in 2020 by 7.3%, but rebound by 4.1% in 2021. Under the second wave scenario, however, U.S. economic growth is projected to fall by 8.5% in 2020, but rise by 1.9% in 2021. The UK is projected to experience a contraction in GDP growth in 2020 of 11.5%, or 14% under the second wave scenario, the largest estimated annual decline in economic growth of any OECD country in 202. Owing to the above economic forecast by OECD, there is need for adequate legal framework to be put in place to be able to speed up economic recovery.

Implications of Covid 19 on the economy and the legal actions

In the banking and finance industry, lenders and borrowers will need to consider their rights amd obligations under their facility documentation to determine how these will be impacted by the pandemic (Aelex, 2020).

The pandemic will impact some borrowers' ability to meet their obligations under any application facility agreement including but not limited to their repayment obligations and financial convenants. It is therefore necessary for borrowers to seek a renegotiation of terms before an event of default occurs. The Central Bank of Nigeria (CBN) has issued policies in response to the pandemic and has granted deposit money banks leave to consider temporary and time-limited restructuring of the tenor and loan terms for business most affected by the pandemic.

Some restructuring legal options include obtaining a moratorium on interest payment obligations or relaxation of certain financial convenants. As the Naira's value relative to the US dollar is being adjusted, Nigerian borrowers earning mostly in Naira but with FX loans should be particularly conscious about and seek legal advice on assessing their ability to meet their obligations and any resultant effects.

On dispute resoltuon, it is anticipated that post pandemic disputes are likely to a rise out of interpretation of contracts and force majeure clauses (Aelex, 2020). The key issue will be whether disruptions to performance of contractual provisions as if the pandemic can be classified as force majeure events. If there is no force majeure provision in a contract, the issue will be whether parties can rely on the common law principle of frustration to avoid liability for breach of contract. More so, there may be need for those whose contractual obligations have been affected by the pandemic seek to renegotiate contractual terms. Additionally, there should be established principles to which parties will be willing to consent to a "no faults" termination of the contract where performance of the contract has been disrupted.

It is therefore important that parties in a contract seek legal advice on the extent of their liabilities for such contractual obligations and ways to mitigate such liabilities. With the Federal Government's declaration of curfew and general lock down, other issues that may be considered by parties with potential disputes include:

Filling claims within statutory time frame. Limitation laws of various states of the Federation provide strict timelines for initiating certain actions, e.g. breach of contract and torts, action aganst public officers are also required to be initiated within three months of the accrual of the cause of action. Faliure to initate these actions within the stipulated timesframe would extinguish a cause of action by effluxion of time. The question then is, where a party's right of action is to lapse within the period of the pandemic, and courts are not open to the public, what happens to the right of the aggrieved person. Although these are unprecedented times, there have been certain interpretations by the courts as to how limitation laws should be interpreted in events beyond the contemplation of an aggrieved party. Therefore, parties may be able to find some recourse. In instances where time will lapse during the period of lockdown, it is advised that an aggrieved party seeks legal advice on creative ways to navigate and/or extend the limitation timeframe.

On issues that bother on Non-compliance with procedural timelines, rules of court provide for certain procedural timelines and penalities for non-compliance. The issue would be whether parties should be penalized for being unable to meet procedural timelines in view of the curfew/lockdown. In the absence of any directive from the Judiciary, parties would be required to seek extensions of time and comply with the penalties. For alternative dispute resolution mechanisms such as arbitration, parties may be agreed to precede dispiten the lockdown. However, there may be delay in the proceedings where court intervention is required for reliefs in the aid of arbitration.

In the energy sector, the pandemic has led to curfew and recent crude oil price crash, which has necesstitated the need to re-evaluate pricing and valuation mechanisms, particularly for the acquisition of interests in OPLs and OMLs, which were benchmarked on previous crude oil price (Aelex, 2020). Other issues which should be considered in the sector include disruptions in transaction timelines for projects concerning acquisitions and divestments of oil and gas assets. Parties should consider and seek legal advice on the most effective manner to mitigate the efects of these disruptions. With respect to off-grid generation, the restrictions on importation caused by border closures may render contractors who are required to import rendewable energy generating equipnebt for off-grid projects unable to do so. The implication is that this may trigger a force majeure event, causing delay or termination of contracts. However, the ability to reply on force majeure will depend on negotiations by parties, and how well the clause is drafted.

Production cuts and recuced production expenditures will negatively impact upstream projects for oil producing companies. It is expected that oil and gas companies will be seeking ways to effectively mitigate the economic implications. It is therefore advisable that such oil and gas companies seek legal advice with respect to anticipated amendments of contract terms and delivery expectations.

To manage the impact of the pandemic on infrastructure projects, relevant parties need to consider managing disruptions to project timelines (Aelex, 2020). Parties need to assess the effect of the lockdown, movement restrictions and the associated supply chain disruptions on project milestones and timelines. The outcome of this assessment may prompt early negotiations on contract variations and project term extensions.

It is necessary to asses the effect of potential long-term restrictions on performance obligations and determine whether the pandemic would constitute a force majeure event under the applicable contract. How would the force majeure clause (or principles of frustration, impossibility and impracticability) work vis-à-vis governing law clauses and contractually agreed dispute resolution mechanisms? Such collaborative analysis may make the force majeure notification and acknowledgement process non-contentious. Also very germane is financial considerations. How does the pandemic impact on project revenues (such as tool revenues and third-party lease payments where applicable) and the project budget and valuation? Will the parties be able to meet payment obligations (such as remittances to project owners, loan repayments and interest paynents)? Is there a need to engage the project financiers on payment term extensions or other concessions? Do the parties need to approach the government for guarantees or relief provided for under the economic stimulus legislation?

These are all issues which adequate legal advice will deal with while mitigating the risk and the impact of the pandemic on infrastructure projects.

In the insurance industry, the pandemic has had significant impact on businesses which are expected to fall back on insurance policies to mitigate the resulting losses (Aelex, 2020). The pandemic is likely to generate claims across several lines of business, especially in life and health insurance, travel policies and event cancellation. Important questions to be raised by businesses at this time should include. Whether the terms of existing policies accommodate losses arising from the pandemic. Businesses are of course advised to obtain professional advice on this, including whether an 'epidemics' cover will be sufficient. It is also important that businesses consider negotiating future insurance, contracts with epidemics and pandemics in mind.

More so, if the risks coverage of the policies includes epidemics and pandemics, then an insured should be aware of the timeline for making claims and ascertain if there is a prescribed mode of intiating such claims.

While it is expected that an email should suffice, there is the possibility of any other mode being impacted by the current state of affairs, i.e., business suspensions and movement restrictions.

In any event, professional legal advice should be sought by businesses to determine the scope of their insurance cover, what options are available for claims recovery and the mitigation ofany potentially negative impact.

According to the International Labour Organization (ILO), the outbreak of the pandemic is a major labour market and economic crisis, which could lead to the loss of up to 25 million jobs. The ILO says “the effects will be far reaching, pushing millions of peple into unemployment, underemployment and working povert.” Employers, whose businesses have been negatively impacted, are considering whether to declare redundancy, while also looking into possible alternatives to retain and keep staff. Aside from a declaration of redundancy, some of the key issues being considered in Nigeria by employers include:

- Whether the pandemic can be interpreted as a force majeure event absolving the employer from its employment obligations or whether the employer can rely on the doctrine of frustration to avoid such obligations.
- Compulsory leave and non-payment/reduction of salaries for an extended period despite the provisions of the Nigerian Labour Act.
- The involvenet of the Federal Ministry of Labour & Productivity with respect to negotiations with some clases of employees.
- Regulations for remote and the extent of employer’s vicarious liability.
- Government palliative for retrenched employees.
- The likelihood of courts’ interpretation of renegotiated employment terms as being unfair clauses and being unenforceable.

In order to mitigate risks and liabilities that may be associated with dealing with these labour & employment issues, it will be necessary to seek legal advice as to the best course of action for an employer in these unprecedented times. The toll of covid 19 is highly noticeable in the transportation industry. In view of the restrictions on travelling, the global transportation sector has taken a massive hit with the pandemic. CAPA center for aviation warned that most aviation companies may be bankrupt by May 2020, if the pandemic continues to spread. Airports, shipyards and land borders have closed which translate to loss of revenue to the industry due to staled ships, grounded airline fleets and closed airports. Considering the pressure the pandemic puts on the transportation industry, who bears the cost of storage fees and demurrage? What happens to statutory payments to the regulators? To remain profitable operators would have to seek legal advice and explore various interventions including tax concessions and bailouts.

In the transportation sctor which is also very key to the economy, there have been disruptions in the supply chain (Aelex, 2020). Due to Covid 19, manufacturers of aircraft are unable to meet their obligations to manufacture aircraft resulting from the lack of supply of the components for the assembly line, leading to a reduction in productivity and a breach of the terms of their contracts. While in the medium to the long term, the pandemic would lead to a decrease in and even cancellation of orders for new aircraft. Parties to a contract wwould therefore need to renegotiate contracts and consider the effect of pandemic on delivery timelines.

In view of the above, there is need to mitigate the potential disruptions to the terms of lease and rental payments under existing lease agreements with third parties, which may have a dominant effect on the obligations of the operators under security agreements. Airlines and shipping companies, therefore, have to seek legal advice in order to pursue creative legal solutions in this circumatance.

Conclusion

The outbreak of the pandemic is a major labour market and economic crisis, which could lead to the loss of up to 25 million jobs and at the same time affect virtually every part of the economy. We have approached law and economics of development in this paper by covering the main theoretical and empirical scholarly work identifying the substantive sources of efficiency-enhancing legal doctrines capable of revamping the post Covid-19 economy of Nigeria. Our discussion in this paper focused on five areas (banking & Finance, dispute resolution, energy, infrastructure, Insurance and transportation). The main legal procedures requirements needed to sustain an economy were also suggested.

Recommendations

To further strengthen the post covid 19 economy, legal efforts should be made to revamp the economy by injecting reasonable amount of money to small business, health care providers, and infrastrustures. In particular, the law should be made to:

- Provides additional lending authority for certain Small and Medium Scale Enterprises (SMEs) so as to boost the post COVID-19 economy in the country.Such loans and advances should include agricultural enterprises.

- Public Health and Social Services Emergency Fund should be provided to reimburse health care providers for health care related expenses or lost revenues that are attributable to the coronavirus outbreak; and for expenses to research, develop, validate, manufacture, purchase, administer, and expand capacity for COVID-19 tests to effectively monitor and suppress COVID-19.

- Resoanable amount of money should be allocated to states, localities, territories, and tribes to assist in the five critical areas outlined in this paper

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POST COVID-19 ASSESSMENT OF STUDENTS PERCEPTION OF FACE-TO-FACE LEARNING & ONLINE LEARNING IN ACCOUNTING EDUCATION

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Abstract

This study present the report of the survey carried out by the authors to assess students' perception of using online learning approach in teaching public sector accounting during covid-19 lockdown. The work is focused on effectiveness of online learning approach compared with the normal traditional method of learning before covid-19 lockdown. The sampled population was 450 students of national diploma (nd) accountancy federal polytechnic ilaro ogun state. Data was gathered using questionnaire and students provided informed assent to the question on the questionnaire. About 79.4% of the students believed that course objectives were reached and 76% of them thought that the course objectives were well-defined. sampled population used the e-learning platform design by the college 23.7% had difficulty understanding study materials online; 69.8% of the sampled population believed that online learning is better compared to face-to-face learning; 79.8% of the sampled population are of opinion that infrastructure such as power supply, limited bandwidth, cost bandwidth/computer or mobile device to connect internet, and digital divide was obstacle to effective learning using online learning during covi-19, and believed that teaching could not be totally done online. finding uncovered that students moral towards using online learning could be boost if government make available infrastructure for online learning at little and also put in place strategy and policy for bridging digital divide between people living in rural and urban settlement. There is no gainsay that online learning can help to achieve education learning outcomes, and can complement face-to-face learning after covid-19 lockdown.

Keywords: Covid-19, Public Sector Accounting, Online Learning, Face-To-Face Learning, Accounting Education

1. INTRODUCTION

1.1. Background to the Study

Covid-19 outbreak is a pandemic diseases that traveled wide since it first surface at china in december 2019, as at march 31st 2020 hit cases has been noticed in 202 countries across the land, sea and air. Yekini, Adigun, Akinwole, And Ojo (2020)**.**

There is no doubt that covid-19 pandemic has exposed the educational sector to adoption of ict and it tools to teaching and learning process. During the pandemic when government impose lockdown order. the educational sector has no other means of engaging learners apart from using online leaning techniques during covid-19 lockdown. Some institutions adopted use of social media tools like whatsapp, facebook, instagram, and other use online learning application like moodles or the application specifically designed for their own schools.

This research work is focus mainly on evaluation of student's opinion on use of face-to-face learning & online learning. It involves comparative analysis of effectiveness of face learning & online learning techniques in nigeria during covid_19 lockdown.

The researchers conduct an investigative research among students of national diploma (nd) accountancy federal polytechnic ilaro ogun state. Questionnaire will be used to obtain data, data obtained will be filtered, tabulated, analyzed and the results will be discussed.

1.2. Research Questions

This Study, Specifically Intends To Answer The Following:

1. Is online learning better compare to face-to-face learning in learning accounting education?

2. What are factors militating against the effective use of online leaning methods in accounting education?

1.3. Research Objectives

1. To identify the relevance of online and face-to-face methods in accounting education. in nigeria.

2. To identify the gaps in level of usage and application of online and face-to-face methods in accounting education in Nigeria.

3. To analyze the opinion of students of accounting towards online and face-to-face methods in accounting education in Nigeria.

4. To suggest measures to improve the usage and application of icts tools in accounting education.

1.4. Scope of the Research

The research study will be conducted in accountancy department of federal polytechnic ilaro, and the respondents will be from the national diploma students only.

2. Review of Related Literatures

The use of online learning has more benefit compared to face to face learning in this era of digital and ict proliferation. although lack of internet access, affordability of computers and internet usage, poverty, lack of computer skills, and poor infrastructures may hinder the efectve use and adoption of online learning system. (Omolara, Randall & thompson, 2016). Digital divide can also militate against the use of online methods of teaching and leanin (Marek, 2013; Ivan, Sinisa, & Cvitić, 2019).

Nigerian as in students and teachers needs to be educated on adoption of online learning in schools. (Olutola & Olatoye, 2015; Anene, Imam, & Odumah, 2014; Oyerinde, 2014). Nigeria had 92.3million internet users in 2018 which is projected to grow to 187.8millions in 2023. the number of smartphone users in Nigeria, Africa's biggest economy and most populous country, is forecast to grow to more than 140 million by year 2025 (Clement,. 2019).

nigeria needs to invest fully in integration of ict in learning in other to achieve three major goals (these three general goals acquisition & retention, understanding, and use of knowledge of learning in this era of ict diffusion yekini and lawal (2012). teaching and learning with social media network site will soon become sin-qua-non due to the larger universe of social media that continue to evolve **(**mclean, pamela. (2017).**)**

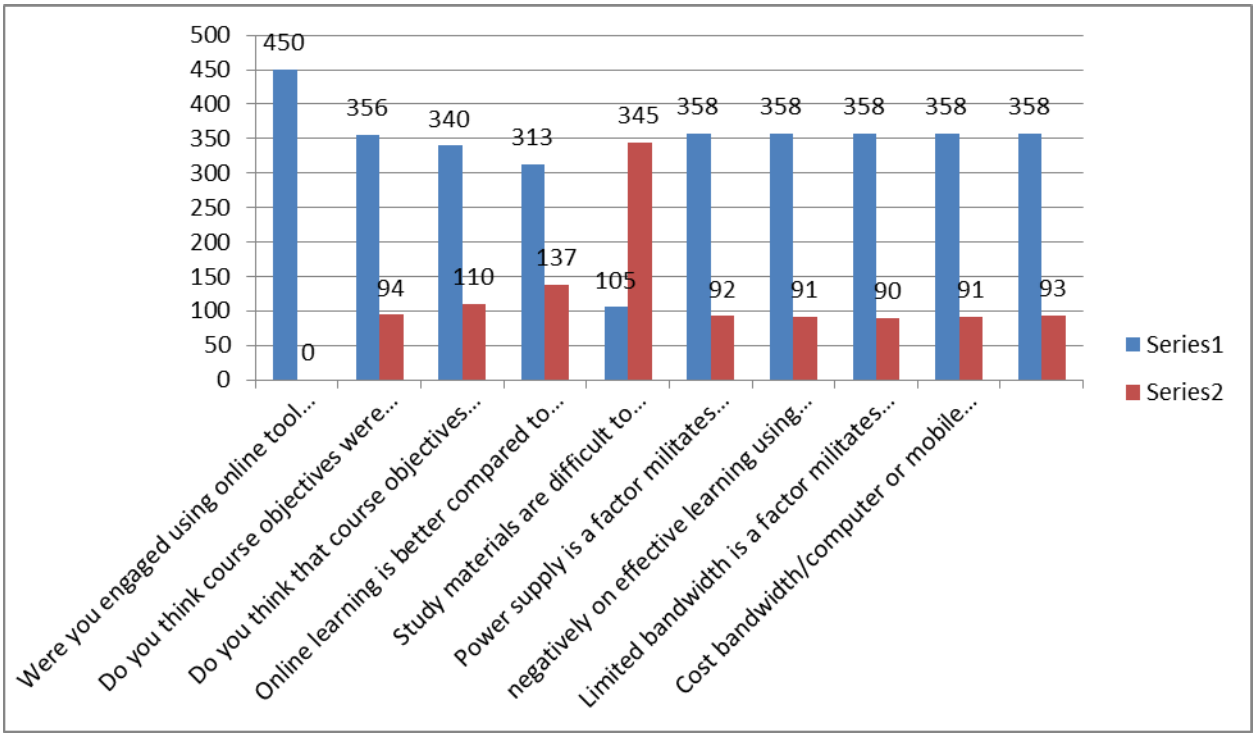
3. Research Methods Analysis and Findings

3.1. Research Methods

Data for this research were collected immediately the school resume after covid-19 lockdown in the year 2020. Questionnaire was used to collect data from year 1and 2 undergraduate national diploma students of accountancy department of federal polytechnic ilaro. Data collected were tabulated as in the table below that follows.

Questions	*Responses*	
	Yes	*No*
Were You Engaged Using Online Tool For Teaching And Learning During Covid-19 Lockdown	*450*	*0*
Do You Think Course Objectives Were Well-Defined Through The Use Of Online Teaching During Covid-19	*356*	*94*
Do You Think That Course Objectives Were Reached Through The Use Of Online	*340*	*110*

Teaching During Covid-19		
Online Learning Is Better Compared To Face-To-Face Learning	*313*	*137*
Study Materials Are Difficult To Understand Online	*105*	*345*
Power Supply Is A Factor Militates Against Effective Learning Using Online Learning During Covid-19 Lockdown?	*358*	*92*
Access To Computer And Internet Enable Ict Devices Impact Negatively On Effective Learning Using Online Learning During Covid-19 Lockdown?	*358*	*92*
Limited Bandwidth Is A Factor Militates Against Effective Learning Using Online Learning During Covid-19 Lockdown?	*357*	*93*
Cost Bandwidth/Computer Or Mobile Device To Connect Internet Is A Factor Militate Against Effective Learning Using Online Learning During Covid-19 Lockdown?	*356*	*94*
Digital Divide Is A Factor Militates Against Effective Learning Using Online Learning	*358*	*92*



3.2. Discussion And Result Analysis

From the data obtained it was obvious that all sample students were engaged using online tool for teaching and learning during covid-19 lockdown. 356 (79.1%) of the sampled population believed that course objectives were well-defined through the use of online teaching during covid-19; 340 (75.5%) are of the opinion that that course objectives were reached through the use of online teaching during covid-19; 313 (69.5%) believed that online learning is better compared to face-to-face learning. 105 23.4% are of opinion that study materials are difficult to understand online; the majority of the sampled population are of the opinion that: power supply, access to computer and internet enable ict devices, limited bandwidth, cost of bandwidth/computer or mobile device to connect internet are among factors that militate against effective learning using online learning during covid-19 lockdown. Digital divide is a factor militates against effective learning using online learning among the sampled population. on average 79.51% shared the opinion that the factors mentioned are obstacle to use of online.

4. RECOMMENDATION AND CONCLUSION

4.1. Recommendation

The inferences of our result analysis are: government and management of the institutions never prepared for adoption of online learning system for teaching and learning until lockdown surfaced; also use of online is welcome idea by the students beyond lockdown era; and that many factors like power supply, bandwidth cost, non-availability of ict facilities are among factors hindering the use of online learning. Subsequently we hereby recommended that use of online should be used with face-to-face methods in teaching and learning before any condition was set in to force online learning on the school system as it happened during covid-19. Government as a matter of urgency should put in place strategy and policy to address the factors that militates against adoption of online learning.

4.2. Concussion

This research work has reported a study that investigated assessment of student's perception of face-to-face learning & online learning in accounting education. it was discovered that the online learning system enhances students' learning experiences as majority of sample students were of opinion that course objectives were reached; course objectives were well-defined. Difficulty understanding study materials online were only among very few of the sampled population; more so larger percentage of the sampled population believed that online learning is better compared to face-to-face learning. For online system to be well utilized in our schools the factors militate against effective use of the online system in teaching and learning must be holistically addressed.

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THE ROLE OF LIBRARY IN MANAGING PANDEMIC FOR SUSTAINABLE ECONOMY

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Abstract

The total lockdown and closure of all business, educational organization due to the corona virus pandemic must surly breed austerity, inflation which affects the economy of the Nations of world. The information provided by the library serves as the cornerstone of successful socio-economic development and plays a key role in decision making for business organization managements. Since information has received a widespread acceptance as the essential feature of production, acquiring useful information from, the library services will enable the citizens to consume and utilize them for their personal growth as well as adds value for sustainable economy and national development. Effective and efficient economic development in the 21st century, by definition, demands access to information by all segments of society on an almost infinite range of topics: from how to find a job, to how to start a business. It is believed that libraries can promote growth by helping people to obtain the information they need in order to access economic opportunities, improve their health or support their communities. This opinion paper concludes that Library services is an integral and powerful force to reckon with and that Librarians and libraries are equally getting ready to play roles of informing the public and adapting services and programming to that will help meet the economic, political and social information that will help nations of the world to recover and build up sustainable economy which was badly affected by the pandemic.

Keywords: Library, Pandemic, Sustainable economy.

Introduction

For the reason of sustainable economy, libraries have been very vital in promoting such agenda. They have proposed and set out various services that are aimed to engender sustainable economy and to ensure that the citizens are well informed and provided access to the library services. The COVID-19 pandemic outbreak is having a global impact, and touching all aspect of human existence ranging from Social, Political, and Educational to Economy. Librarians and libraries are learning and equipping themselves with the facts about this public health crisis and its negative effect on the economy of nations which Nigeria will not be exceptional. Librarians and libraries are equally getting ready to play roles of informing the public and adapting services and programming to meet the economic, political and social needs of the challenges to help nations of the world to recover and build up sustainable economy which was badly affected by the pandemic.

The Concept of Sustainable Economy

Looking at sustainable Economy Schildberg (2014) said "It is an economic system in which formal and informal activities in caring for dependent adults, children as well as for non-human beings and the environment are adequately valued and remunerated". "Hence, in a sustainable and caring society, the economy should be perceived as an instrument for assuring the development of human capabilities and the expansion of real freedoms, while preserving and protecting life support systems of the Planet's Commons (Ventura-Dias 2013)". In his own idea sustainable economy Courtnell (2019) said *"*Economic sustainability refers to growth inclusive of practices that support **the preferred percentage of its population below its preferred minimum standards of living level**, without negatively impacting social, environmental, and cultural aspects of the community. Economic sustainability is not about continual growth in wealth. It is multidisciplinary, with huge social and environmental factors. It is about the regeneration of life on Earth by meeting social and environmental needs. The core value of our emerging sustainable economy is about stewardship, rather than extraction – the positive of which feeds on the positive. In this sense, sustainability is about meeting people's *needs,* to optimize the quality of life for those living and their descendants". Note it is the society and the environment that influence our economy and the library is posited to acquire information resources covering all aspect of human endeavor to serve the society which will be better equipped with knowledge especially business knowledge to run the economic environs

The concept of library

Library generally is that vicinity where information resources in printed and non printed form are acquired, professionally processed for easy accessibility and retrieval. The printed information resources include books, journals, and non-printed include visuals and audios DVDs, CDs, Films, etc. While our institutions for knowledge building focuses on curriculum, standards and testing, librarians and the library focuses on providing information resources needed for the curriculum achievements but goes beyond by providing services which if users explores will generate ideas needed for sustainable Economy. Specifically public libraries are vital institutions in any society which plays major role in providing services that will helps and supports the citizen to access information in various fields of human endeavors and in different formats which will contributes to sustainable national development and productivity. A literate society is an informed society therefore functional modern libraries are needed for socio-economic growth of Nigeria. It therefore behooves on the government at all levels in Nigeria to formulate policies and strategies to improve the quality of libraries if the social, economic and political aspects of national development are to be sustained.

According to World Health Organization A pandemic is the worldwide spread of a new disease.An influenza pandemic occurs when a new influenza virus emerges and spreads around the world, and most people do not have immunity". According to Medicinenet (https://www.medicinenet.com/script/main/art.asp?articlekey=4751) "Pandemic: An epidemic (a sudden outbreak) that becomes very widespread and affects a whole region, a continent, or the world due to a susceptible population. By definition, a true pandemic causes a high degree of mortality (death).By contrast: word "pandemic" comes from the Greek "pan-", "all" + "demos,""people or population" = "pandemos" = "all the people." A pandemic affects all (nearly all) of the people. By contrast, "epi-" means "upon." An epidemic is visited upon the people. And "en-" means "in." An endemic is in the people.

Library services and Economic aspect of sustainable Economy

The total lockdown and closure of all business, educational organization due to the corona virus pandemic must surly breed austerity, inflation that must affect the economy of the Nations of world. The librarians and libraries have a role to play to revitalize the economy of the world for sustainable development. According to Black (2020) "the public library is no stranger to crisis and has often flourished in times of wider emergency. The idea of providing tax-based local libraries was born during the first major crisis of industrial capitalism, against the backdrop of Chartist agitation. Library promoters also identified economic benefits. Library promoters argued that increased exposure to art and design through the provision of art books and artifacts in attached museums would improve the quality of manufacturers because taste would be universally elevated and workers' skills improved. While acknowledging the economic power of art, Edward Edwards, the country's first public librarian, believed libraries could help relieve the alienating, dehumanizing effect of industrialization. He suggested that giving artisans access to books would not only 'solace the intervals of toil' but also 'put new meaning in the toil, and new life in the toiler'. The public library carried these philosophical credentials with it through subsequent crisis. During the Lancashire cotton famine in the 1860s, libraries provided refuge for swathes of unemployed textile workers, who were praised for reading, not rioting. These were reflected in the upgrading of reference services and the growth of children's libraries – aided in no small measure by the 'collectivist self-help' philosophy of American industrialist Andrew Carnegie, who donated funds for the construction of hundreds of library buildings. Contributing further Chegoni (2014) said the libraries have played a vital role in the social, political, economic and cultural development of the society by enabling citizens to have access to information services that has increased their profession, task and business activities. "There is a growing recognition that library services, particularly in public libraries, are an integral part of the national socio-economic development and improvement of the general quality of life (Kibat, 1990)". On their own, Weiss, Van and

Benard (2000) stated that the information provided by the public library serves as the cornerstone of successful socio-economic development because it plays a key role in decision making. According to Opeke (2004), since information has received a widespread acceptance as the essential feature of production, acquiring useful information from the library services will enable the citizens to consume and utilize them for their personal growth that will adds value to national development. For sustained national development, library services (information) and its effective and proper dissemination is an integral and powerful force to reckon with. “No meaningful national development can take place if copious attention is not paid to libraries and information centers. Since research discoveries and inventions and the incubating homes of researchers most of the time, are libraries and information centers, it logically follows that the invaluable roles that libraries play in national development cannot be overemphasized (Fabunmi & Folorunso, 2009)”. Issa (2003) pointed out that economic and national power and status for instance are leveraged on the widespread use of information and knowledge which the library provides.).

Blair and Kochan (2000) observed that “Effective and efficient economic development in the 21st century, by definition, demands access to information by all segments of society on an almost infinite range of topics: from how to find a job, to how to start a business, or how to provide information on study possibilities”.

“In view of the foregoing, it is believed that libraries can promote growth by helping people to obtain the information they need in order to access economic opportunities, improve their health or support their communities, to name but three benefits that libraries can provide. Libraries represent a strong investment in an economic community. They offer all citizens opportunities to gain access to and use information and knowledge that can enable them to actively participate in society. This contributes to the economy by enabling members of the community to improve their employ ability skills, and health and well-being, use their creative potential, expand reading and literacy skills, and create new knowledge (Sipila, 2015,)” “The role of libraries in promoting the marketing of the tourism sector cannot be underestimated. Libraries as reservoirs of information are the most reliable information reference centers where tourists can seek information on hotels, motels, national parks, mountains, and other interesting places (Agbo & Onyekweodiri, 2014)”. “Public libraries contribute to local economic development. They are addressing issues on literacy, workforce training, prosperity of small-businesses and quality communal life. Reference desks have taken a new turn as they now house special sections for entrepreneurs where they can find sources of information about local and international businesses” (Yusufu, 2011). In the words of Glass, Clifford, Harris, and Carol (2000), “public libraries can play a large role in economic development by providing resources for existing businesses and for potential business start-ups. These resources should be seen as a source of value-added information that is got in time and accurately”. Furthermore, although in decline, agriculture remains the direct and indirect base for the economic livelihoods of the majority of the world’s population (IFAD, 2001). Agriculture is often seen as the mainstay of the Nigerian economy. It is equally incontrovertible that libraries have the greatest impact on agricultural development of a nation. Libraries provide relevant information on agricultural improvement to all agricultural officers, extension workers, researchers, peasant farmers, policy makers, etc. on the new method of improving livestock and better farming practices that will meet the increasing need of the population. Libraries make such information available and also provide positive steps towards improving the declining food security of a country (Agbo & Onyekweodiri, 2014). Edoka (2000) stated that one of the functions of a public library, which has positive implication for economic development of a nation, is to give the user access to information over the whole range of human activities such as agriculture, crafts, commerce and industry. He added that some public libraries concentrate on special services such as …business information service. Oti (2000) defined special library as those libraries in big corporations and industries as integral part of their organization. They are to serve the information needs of their parent organization, to enable them achieve their aims and objectives. The improvement of the financial status of corporate organizations in a nation goes a long way in enhancing the economy of a nation, and in this sense, special libraries contribute to the economic development of a nation.

The Role and Services Provided by Libraries for Managing pandemic for Sustainable Economy

The invaluable roles that libraries play in managing pandemic for sustainable economy and national development cannot be overemphasized. Onoyeyan and Adesina (2014) Libraries play vital roles during economic emergency and crisis. No nation can be developed without relevant information to drive its developmental sustainability. Gani, Kasa, and Allahmagani (2016) pointed out the following roles of library in support of sustainable development

- **Supporting the Research Process**. This position is vital and implies that librarians no doubt could continue by supporting research processes, supplying relevant literatures, undertake literature mining, information mapping and dispersion of acquire information resources.

- **Ensuring Research Visibility**: This act of exposure makes research work visible and inclusive, significantly it help to bridge communication gaps. Therefore, librarians should not thwart the effort of close coordinating and collaboration which makes exposing the visible content of other works and attracting.

- **Advocating and Encouraging Novelty in Research Activities**: The mediating roles of librarians include and not limited to encouraging scholars, pointing to novel researches and literacy. As a patron receives guidance from librarian, it becomes the responsibility of the librarian to encourage sharing of knowledge through the deposition of final document to the library.

The IFLA Statement on Libraries and Development (2013) stated that libraries contribute to the

delivery of Sustainable Development in the following ways:

- Libraries provides opportunity for all
- Libraries empowers people for their own self-development
- Libraries offers access to the words knowledge
- Libraries provides expert guidance
- Libraries are part of a multi stakeholder society.

Contributing to the Roles of the Library in Achieving Sustainable Development Goals Abata-Ebire, Adebowale,and Ojokuku (2018) enumerated the following:

SUSTAINABLE DEVELOPMENT GOALS	**ROLES OF LIBRARIES**
No Poverty	Information is the key to poverty eradication of and library and information center serves as the hub to make information available. Therefore, they should provide meaningful information on poverty alleviation and eradication in a packaged format.
Zero Hunger	Library and information centers should use their resources to eradicate extreme hunger and ensure proper functioning of food commodity by creating awareness and providing an enabling environment where information on sustainable agricultural practices in all its form can be accessed and use.
Good Health & Well-being	Library and information centers should provide information both in print and electronic format that will the public to eradicate child mortality and improve maternal health. The effect of bad dietary on health should be emphasized by providing information on the cause of diseases and the natural ways to prevent diseases. Also, they should ensure a universal access to sexual and reproductive health-care services, including family planning, information and education, and the integration of reproductive.
Quality Education	Library and information centre should provide information literacy skills and long life learning for the public by educating and enlightening youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship. More so, they must organize and disseminate information that society will access and use to inform themselves on various issues of life and by empowering communities through knowledge and the ability to access information for themselves.

Affordable & Clean Energy	Library and information centers should provide public access to ICT, study rooms, and classes on using mobile phones and ensure universal access to affordable, reliable and modern energy services through library campaigns.
Decent Work & Economic Growth	Libraries should provide education and training for both the young and old to make sure that they have access to information in an affordable way. It is also their responsibility to make sure that people find jobs through their public library and this will allow the Public access to ICT and skills enables people to apply for jobs, as the application process for all jobs has moved online
Industry, Innovation & Infrastructure	Library and information centers should provide access to information technology and endeavor to provide affordable access to Internet facilities to less developed areas. This can be achieved by engaging in lively debates, quizzes and spelling competitions through smart phone, laptop and video conferencing project.
Reduce inequality Goal	Library and information centers should encourage safe and dependable mobility of citizens through a reliable migration policy that is well planned and managed. Library Services including information and support about legal, childcare, housing, health, education; providing support with applications for citizenship, residence, subsidized housing, and government benefits
Sustainable Cities & Communities	Libraries should provide and protect the nation's cultural and natural heritage for posterity. It is the responsibility of the public library to develop and implement Disaster Risk management at all levels in the community
Responsible Consumption	Libraries should encourage organizations to adopt sustainable practices and to integrate sustainable information into their reporting cycle. Libraries can come together to ensure that all countries have access to information what they consume.

Another big role the librarians and libraries will play for managing pandemic for sustainable economy is Sharing business Information such as**:**

- Offering online business tips that can be embarked upon without coming into the library building to access such business information.
- Providing business information about preventative actions and updates about the impact on the economy.
- Providing video of recorded Business E-conferences such as webinar in zoom apps, googlemeet apps, connectals app, google classroom app, and social media platforms held in many countries of the world on the business opportunities especially online businesses that will help the economy to thrive.
- Creation of business media shout-out blog for active conversation as a way to help connect, reconnect people economically.
- Providing Virtual library services via business story time, business discussions, business workshops and seminars.

Conclusion

The information provided by the library through their serves as the cornerstone of successful socio-economic development plays a key role in business management decision makings that will resuscitate, revitalize and thrives the economy that is affected by the COVID-19 pandemic. Since information has received a widespread acceptance as the essential feature of production, acquiring useful information from, the library services will enable the citizens to consume and utilize them for their personal growth as well as adds value for sustainable economy and national development. The Library services is an integral and powerful force to reckon with and that Librarians and libraries are equally getting ready to play roles of informing the public and adapting services and programming to that will help meet the economic, political and social information that will help nations of the world to recover and build up sustainable economy which was badly affected by the pandemic. No meaningful sustainable economy and national development can take place if copious attention is not paid to libraries and information centers since research discoveries and inventions has libraries as the incubating homes most of the time. It logically follows that the invaluable roles that libraries play in managing pandemic for sustainable economy and national development cannot be overemphasized. Library services are an integral and powerful force to reckon with in this mission of sustainable economy.

Recommendation

This paper recommends the following

- Since libraries and information centers are the incubating homes for researchers and discoveries, attention should be paid by equipping the libraries with modern facilities, training and retraining of librarians to provide meaningful and business action oriented services.
- Libraries should be highly stocked with information resources that will enable the citizens to consume and utilize them for their personal growth as well as adds value for sustainable economy and national development
- The libraries and librarians should be proactive with their public relation outfit to make themselves known on their readiness and services that they can provide which will in turn build confidence on the citizen to consult and rely on them to provide such services.
- The Government should rely on Libraries to supply them with research results, conference communiqués that will enable them to be proactive in contributing their quota towards making the environment suitable and attractive for private sector entrepreneurs, inforpreneuers commitments.
- The technocrats, Business organizations should look forward by consulting the library for valuable, reliable business information that will help them rejuvenate the business to thrive and boost the economy.
- Librarians and libraries must embrace the expected new roles of facilitating creative interaction between people and business organizations for economic development.

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COVID-19: RECOVERY AND MANAGING POST PANDEMIC IMPACT IN NIGERIA

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Abstract

The COVID-19 virus has jolted the world in much the same way as the 1918 Spanish Flu did, severely rattling the public health systems of the United States and other advanced countries which, prior to the pandemic, were considered formidable. Although advanced countries have since deployed vast resources to address deficits and shore up their public health capacities, ineffective health and economic measures mean that Nigeria is far behind the rest of the world. This article which relies on secondary sources of data explores the economic and health policy deficits that are undermining pandemic preparedness and post-COVID-19 planning and recovery in Nigeria. Having compared the literature on pandemic preparedness and response in developed countries and Nigeria, it was found that in contrast to the former, Nigeria is seriously ill-prepared to respond to unanticipated emergencies. It was thus concluded that weak public health care infrastructure, the absence of robust social safety nets and poorly conceived policies are at the root of Nigeria's failure to respond proactively and decisively to unexpected shocks. It was recommended that to address the challenges and chart a way forward for recovery, the Nigerian government must collaborate with international agencies to increase its health sector funding, provide interest and collateral-free loan relief to vulnerable groups, and strengthen its ongoing fight against corruption.

Keywords: Covid-19, Recovery, Post Pandemic

Introduction

Public policies are decisions made by national governments to address challenges that confront them. The effectiveness of these decisions is crucial for the resolution of both seen and unforeseen problems, and for the survival of the state, especially during periods of emergencies or epidemics. Over the past decade, governments worldwide have been challenged to beef up their pandemic response, amidst the ongoing struggle to overcome other more familiar and everyday problems of terrorism, banditry, natural disasters, climate change, disease control and poverty. One of the earliest, and to date, deadliest known global health pandemic was the Spanish flu of 1918, which is estimated to have infected over 500 million people worldwide, and killed between 20 to 50 million (Finberg, 2014).

Some of the more recent global pandemics include the Severe Acute Respiratory Syndrome (SARS) outbreak in 2003, the avian influenza in 1997, the Ebola outbreak in 2013, and currently, the Coronavirus/Covid-19 pandemic which was first detected in December 2019 at the Chinese city of Wuhan, from where it spread to other parts of the world. The World Health Organization (WHO) reports that as of September 27, 2020, there have been 32, 730,945 confirmed cases of Covid-19 globally, including 991,224 deaths (WHO, 2020). In Nigeria, the first official case of Covid-19 was recorded on February 27, 2020. As of September 27, 2020, the National Center for Disease Control (NCDC) reported 58,198 confirmed cases, along with a total death toll of 1,106 (NCDC, 2020).

The pandemic has presented a serious public health emergency that has exposed some vulnerabilities and defects in existing global, national and local public health capacities. As of September 27, 2020, the United States (US), widely considered to have the best health care system in the world has reported over 6,960,152 confirmed cases of Covid-19, further reinforcing the danger that the pandemic poses worldwide. Notably too, it underscores the risks faced by ethnic minorities in the United Kingdom (UK) and US, as well as poorer populations in developing countries, in terms of infection, mortality and recovery. In view of the ghastly nature of the pandemic, most countries imposed lockdowns for several months in attempt to reduce new infections and possibly stifle the virus. Some of the measures included suspension of local and international flights, restriction of vehicular and pedestrian movement as well as the provision of financial packages to cushion the effects of the prolonged lockdowns. While these measures are yielding positive results in Europe and North America, in Africa, most governments are struggling to provide meaningful leadership, amid declining foreign financial assistance, worsening poverty and spiraling insecurity.

In Nigeria, the federal government enforced an initial two weeks total lockdown on March 30, 2020, in three states (Lagos, Ogun and Abuja), which was extended by a further two weeks on April 13, 2020. Other states of the federation also followed suit by enforcing similar restrictions within their jurisdictions. These were undertaken in line with WHO guidelines for preventing the spread of the virus which include stay at home, social distancing and frequent hand-washing. However, Kalu (2020) argues that as soon as the lockdown order was declared by the federal government, there was uproar among citizens, most of who are understood to live on daily income, and have no savings to rely on during the duration of the lockdown. In a country adjudged to be the world's poverty capital, for citizens in big commercial cities like Lagos, the prospect of staying home without money or adequate food supply arguably created an even more dangerous 'pandemic': hunger. Although the government promised to disburse funds and food items to vulnerable citizens, only a small percentage of the population attest to benefiting from the gesture (Kalu, 2020).

Thus, the Covid-19 challenge has brought to the fore once more, the role of public policy in unpacking both seen and unforeseen challenges, and in responding more proactively and effectively, to such challenges. Immediately after this introduction, the paper examines the conceptual and theoretical overview of the Covid-19 pandemic. Next, it analyses the impact of robust public policies in containing the pandemic in some developed countries, which unravels the gap that informs the study on Nigeria. Thereafter, we articulate the state of pandemic preparedness and response in Africa. After this, Nigeria's pandemic preparedness and policy responses to COVID-19 are discussed. Subsequently, some appropriate policy recommendations for post-pandemic planning and recovery in Nigeria are outlined. Finally, the last section nits the work together in the form of conclusions.

Conceptual and theoretical overview

On December 31, 2019, the WHO's attention was drawn by Chinese authorities to its Hubei province in Wuhan, where the Severe Acute Respiratory Syndrome, a coronavirus disease (Covid-19) first appeared (Obi & Kabandula, 2020). The virus' first reported victims were 40 traders at the Huanan seafood market, after which it spread rapidly to other parts of Asia, Europe, and the US, before making its way to Africa in February 2020. Amid the apprehension and panic that accompanied the spread of the virus around the world, the WHO declared it a global pandemic on March 11, 2020 and quickly rolled out measures to help contain it. These included the imposition of quarantines for the virus' index cases, contact tracing, curfews, lockdowns, hand-washing, the use of face-masks and social distancing. Like other countries, most African states also imposed these measures as a way of containing the spread of the illness.

Although the mortality rate occasioned by Covid-19 remains low in Africa compared to other continents, the United Nations Economic Commission for Africa (UNECA) estimates that the disease could claim between 300,000 to 3.3 million lives on the continent (Obi & Kabandula, 2020). This pessimistic projection was made against the backdrop of limited medical personnel/equipment, and the generally fragile health care systems in Africa, which could potentially pose difficulties in implementing health safety guidelines. Moreover, 71 per cent of the African population is reportedly engaged in informal employment, surviving on daily income obtained from manual labour and petty trading. This is in addition to the horde of challenges on the continent that range from socio-economic inequalities to surging poverty levels which, by and large, casts aspersions on the astuteness of Africa's policy makers.

Nigeria, with a population of about 200 million people, is bedeviled by many challenges which include a fragile health care system, dilapidated roads, poorly funded/equipped educational institutions, unemployment, heightening poverty and high rates of insecurity. Based on the magnitude of the aforementioned challenges, scholars have argued that Nigeria would struggle to contain any disease with pandemic potential. This is due to the obvious lack of commitment on the part of governance institutions to put in place measures to forestall and effectively respond to natural disasters or the sudden onset of deadly pandemics. Although conceived more than four decades ago, Thomas Dye's conceptualization of public policy as 'whatever a government chooses to do or not to do' (Dye, 2017) rightly suggests that the wellbeing or downfall of any country depends largely on the decisions/choices made by its leaders.

The worsening economic conditions in Nigeria, despite the enormous wealth that continues to accrue from crude oil, underscore the magnitude of corruption and mismanagement, as well as misplacement of policy priorities by successive administrations in the country. For instance, although over 2 billion dollars have been reportedly spent on procuring weapons and other logistics for prosecuting the Boko Haram insurgency in the northeast, the conflict continues to persist. Relatedly, billions of Naira has also been spent on electricity projects, but the country continues to experience epileptic power supply.

Similarly, since 1999, the Nigerian government has been paying lip service to the issue of revamping the country's refineries, having allegedly doled-out millions of dollars to contractors, but till date, no meaningful progress has been made. Most poverty reduction and employment generation programmes in the country have similarly failed to see the light of the day. This unsavoury development reveals the emasculated character of current public policy responses in

Nigeria and charts the need for the unbundling of the country's policy architecture in its entirety. Only by so doing can Nigeria beef up its preparedness to respond to, and quickly contain any unforeseen emergencies, including the sudden outbreak of a pandemic.

Robust public policies and pandemic preparedness in developed countries

Apart from the 1918 Spanish flu, no other pandemic has jolted the entire world and created the kind of uncertainty wrought by the Covid-19 virus. Most developed countries like China, Germany, the US, the UK, Spain and France do not only guarantee better living conditions for their citizens but also have formidable healthcare capabilities that have them better placed to respond to emergencies. In spite of this, the Covid-19 outbreak still took the world unawares, and exposed the gapping deficits in the global pandemic response architecture. Sadly, it has also taught us that pandemics, like natural disasters, do not always impact negatively on all categories of people (Davidson & Ward, 2018). Instead, while some people are at high risks of feeling the impacts of the crisis, others see an opportunity for profiteering (Parthasarathy, 2018). For example, Dodds et. al. (2020) argues that in the UK and US, ethnic minorities, especially black people, are more vulnerable to COVID-19 in terms of mortality. This in their view reveals the inbuilt inequalities of contemporary capitalist societies. Shuster (2020) further contends that such structural inequalities marked by the unequal distribution of resources, or the uneven delivery of healthcare, exposes some people to danger, more than it does others.

Despite the COVID-19 outbreak revealing deep-seated socio-economic, class, and ethnic disparities in developed countries, the governments of such countries have nevertheless put in place proactive measures that yield benefits which cut across board. For instance, on March 6, 2020, president Trump announced the release of $8.3 billion initial funding and support for vaccine development. On March 18, 2020, the government also released $105 billion to cover unemployment, paid sick leave and for food assistance. On March 27, 2020, the US government also signed the 'Coronavirus Aid, Relief, and Economic Security Act' (CARES Act) which involved the disbursement of $2.3 trillion to stimulate the economy and protect individuals and businesses (Dodds, et. al., 2020). All US citizens/residents have benefitted from these relief packages irrespective of race, gender or class. The financial package provided by the US government through the CARES Act is the largest to date in the fight against covid-19 worldwide. These measures, among others, have protected US citizens from potential covid-19 related hardships, and have also prevented the economy from being severely impacted by the pandemic.

China, where the virus was first discovered, has also been applauded by the WHO for swiftly alerting the world about the pandemic, and for its proactive response to, and successful containment of the virus within the country. The Chinese government displayed its pandemic response capability when it started and completed both the 1,000 bed Huoshenshan hospital and the 1,600-bed Leishenshan hospital in just over a week, to carter for COVID-19 patients (The Wall Street Journal, 2020). Furthermore, countries like Australia, Brazil, South Korea, Singapore and New Zealand have been similarly lauded for their robust health interventions, border closures and purposeful leadership. Germany, with a very strong political leadership, has also demonstrated, in the wake of the coronavirus, what a well-funded public health care system can achieve in terms of patient care and relief response.

The state of pandemic preparedness and response in Africa

While the rest of the world has continued to demonstrate admirable capabilities in their pandemic and disaster response systems by putting in place effective measures for cushioning the potential impacts on their citizens, the opposite seems to be the case in Africa. Obi and Kabandula (2020) argue that the appearance of the COVID-19 pandemic in Africa in February 2020, led to disastrous loss of income and livelihoods which consequently, has contributed to the spike in suicides and criminal activities on the continent. As one of the poorest continent with the most vulnerable populations, the economic and social impact of the pandemic on the precarious livelihoods of millions of Africans cannot be over-emphasized.

In the face of a disjointed public healthcare infrastructure, most African governments are waiting on the advanced countries for solution, funding and health supplies. Even where funding is available, many African health facilities are unable to acquire the needed supplies as the more advanced countries scramble to secure stocks for their own citizens (Kavanagh, et. al. 2020). Although some African states, with the assistance of global health agencies have improved their disease response capacity as demonstrated in the ongoing fight against HIV, Ebola and Tuberculosis, these strengths can be easily overwhelmed by a rapidly transmissible disease like COVID-19.

In the absence of a vaccine or highly effective treatment, the need to ramp up testing has become crucial in halting transmission and high mortality rates. In most countries such as Germany, South Korea, France and South Africa that have been praised for their robust and effective response to the epidemic, large-scale testing, physical distancing, availability of Personal Protective Equipment (PPEs), contact tracing and isolation have been key to the reduction in fatalities. In many unplanned high density urban centres in Africa however, social distancing is not practicable. Moreover, since most urban dwellers in Africa are employed in the informal sector, with many surviving on daily income, the lockdowns occasioned by the pandemic has heightened food insecurity and economic crisis. Unlike in the US, Uk and Germany, where cash transfers and other relief packages are being provided to citizens/residents ordered to stay home due to the pandemic, most African governments have failed to deliver sufficient food and financial supplies to their own citizens. Consequently, many day-wage earners in Africa's megacities defied the lockdowns to go about their businesses, despite the risks, in order to feed their families.

Also, unavailability of sufficient funding from national governments and donor agencies to finance health research in Africa is inhibiting efforts at manufacturing endogenous solutions to the continent's worsening health crisis. Accordingly, inadequate foreign supplies of test kits and PPEs, which with sufficient funding could be manufactured in Africa, is undermining the capacity to mobilize more effectively against the pandemic. Although the Africa Centre for Disease Control (CDC) in collaboration with the various national disease control agencies are providing strong coordination and COVID-19 guidance, a lot more needs to be done in the areas of testing, awareness creation and contact tracing.

Adequate public healthcare facilities also need to be constructed and equipped to handle unforeseen emergencies. In Malawi for instance, it is reported that at the onset of the pandemic, there were as few as 25 Intensive Care Unit (ICU) beds for 19 million people, while most counties in Kenya did not even have any functional ventilators (Manda-Taylor, Mndolo, & Baker, 2017). The situation is very much the same in other African countries like Nigeria, Ghana, Senegal, Zimbabwe, Niger, Chad and Cameroun, among others. These challenges underscore the need for African governments to be alive to their responsibilities of designing social safety nets for the citizens, and providing adequate funding for public healthcare systems in order to respond more efficiently to unanticipated emergencies.

Nigeria's pandemic preparedness and policy responses to COVID-19

Generally, the WHO has always advised that long before their outset, countries should endeavor to put in place adequate measures to forestall or effectively manage the outbreaks of pandemics. Unfortunately, the Nigerian government appears to have failed to abide by this advice, with evidence showing that the country's public health care system is deteriorating. For instance, Nigeria reportedly scored poorly during the WHO's Joint External Evaluation (JEE) of international health regulations' capacity to prevent, detect and respond to health emergencies (Dixit, Ogundeji & Onwujekwe, 2020). The outcome of the exercise clearly suggested that the country was ill-prepared to respond to a sudden health crisis. Yet, not much was done to address these deficits prior to the outbreak of COVID-19 in the country in February 2020. This is evident from several indicators such as the low testing rates, and the grossly limited stock of PPEs and ICU beds. As per COVID-19 testing, Nigeria, a country of 200 million people, currently has the capacity for just 2,500 tests a day, when compared to South Africa, which, with a population of only 58 million people, conducts more than 36,000 tests daily. As of October 4, only 535,733 samples had been tested in Nigeria (NCDC, 2020) as against 4,251,513 in South Africa (National Institute for Communicable Diseases, 2020).

Moreover, due to the widespread hardships, many Nigerians defied the lockdown directive to engage in their usual trading or to try to earn money through other means. Furthermore, there was also a notable spike in criminal activities, particularly armed robberies in Lagos, Abuja, Port Harcourt and other cities in the country. It was also observed that the high-handed tactics deployed by the police and military in enforcing the lockdown may have caused more deaths than the pandemic itself. Ongoing development programmes in other sectors of the economy, including infrastructural projects have been put on hold; even access to life-saving medications for people suffering from other illnesses such as HIV/AIDs have been severely threatened, as government attempts to contain the pandemic. Inflation has skyrocketed, and government, despite the hardship imposed by the lockdowns, recently increased electricity tariff and removed subsidy on petroleum products. These measures have provoked the ire of citizens, and presented the government as insensitive to the plight of the people.

Furthermore, prior to the outbreak of COVID-19, only a paltry 350 ICU beds and 350 ventilators were available in Nigeria. Although in April the country acquired an additional 100 ventilators, the number of laboratory-confirmed cases and reported fatalities continued to rise. As of October 4, the three states with the highest number of cases/deaths are Lagos (19,636 cases, 205 deaths), Abuja (5,745 cases, 78 deaths), and Plateau (3,479 cases, 33 deaths). Fourteen states in Nigeria, including Oyo, Rivers, Edo, Kaduna, Ogun and Kano have recorded over 1,000 confirmed cases, along with scores of deaths. Whilst a flattening of the curve (occasioned by a drop in the daily number of confirmed cases) has been observed since September, there is still widespread apprehension. This is evoked by the recent country-wide relaxation of the lockdowns and the noticed public disobedience to COVID-19 safety guidelines such as social distancing and use of face-masks.

The above challenges notwithstanding, the Nigerian government has taken numerous health, social, and economic measures to cushion the impact of COVID-19. For example, on March 24, the National Assembly initiated and passed the Economic Stimulus Bill to provide 50 per cent tax refund and thereby protect individuals and businesses. However, more than 90 per cent of

Nigeria's workforce is employed in the informal sector and most of such businesses are not registered. Consequently, only a few business enterprises could benefit from the economic stimulus package provided by the government. Similarly, on April 1, 2020, the Buhari administration announced that it will be making cash transfers of 20,000 naira each to poor and vulnerable households who are captured in the National Social Register.

Regrettably, only about 11 million people representing 2.6 million households are said to be on the register, meaning that just a fraction of the poor may have benefited from the cash payments.

Likewise, the Central Bank of Nigeria's (CBN) decision to grant loans of 3 million naira each to vulnerable Nigerians affected by COVID-19 may not benefit most people, since the loans require collateral, and are not interest-free. Besides, the government's COVID-19 food support programme for the vulnerable has been plagued by allegations of diversion and lack of transparency, with the supplies hardly reaching a significant number of those who need it.

Appropriate policy recommendations for post-pandemic planning and recovery in Nigeria

As earlier observed, pandemics, like natural disasters, have laid bare the inbuilt inequalities of the contemporary capitalist system in terms of access to healthcare, better livelihoods and resource distribution. In Nigeria, it has taught us about the need to align our public policies with robust improvements in healthcare infrastructure, and other social amenities to boost our capacity to respond more effectively to epidemics or disasters. At present, Nigeria's response to the COVID-19 pandemic has been poor, to say the least. This is because most of the measures taken by the Nigerian government to cushion the impact of COVID-19 carry serious barriers that prevent the vulnerable from accessing the economic relief packages made available. For example, how many informal businesses are registered with the Corporate Affairs Commission

(CAC) in Nigeria? Although the informal sector accounts for about 90 per cent of Nigeria's labour force, yet, the economic stimulus bill proposed by the government focuses on providing relief to only the 10 per cent engaged in the formal sector (Dixit, Ogundeji & Onwujekwe, 2020). Relatedly, only 40 per cent of Nigerians are believed to have functional bank accounts. This means that electronic cash transfers made by the government may not have reached many poor people, the bulk of who reside in rural areas where there are no banking services.

Further, how many vulnerable individuals affected by the pandemic can afford to pay the high interest rates or provide collaterals which are requirements for the 3 million naira CBN economic stimulus loan? How many poor Nigerians even have access to information about the availability of such packages and how to go about it? Clearly, not many Nigerians are capable of meeting such stringent conditionality which results in many people not being able to benefit from government's relief initiatives. In like manner, the high rate of corruption and unaccountability in government circles has meant that even food support initiatives conceived to provide temporary succour for those most hit by COVID-19 do not reach the actual beneficiaries. Against the foregoing, the following policy recommendations have been made to address these challenges and chart the way forward for Nigeria's post pandemic recovery;

- The Nigerian government has an obligation to protect its own citizens. As such, the federal government must as a matter of urgency, increase its financial allocation to the health sector and also enlist the assistance of international donor agencies so as to improve the sector's infrastructure, motivate health officials and provide the needed equipment and training required to contain the COVID-19 virus and the onset of future public health emergencies.

- At the moment, the health, economic and social measures adopted by the government to cushion the impact of COVID-19 are anti-poor. Accordingly, urgent steps should be taken to remove the interest rates and collateral requirement for the CBN economic stimulus loan. At such a time, government must demonstrate its commitment to alleviating hardships by provide non-interest and non-collateral loan facilities. Also, there should be more enlightenment about the availability of the loan and the procedure for accessing it, especially in rural communities.

- Since about 90 per cent of Nigeria's labour force is employed in the informal sector of the economy, COVID-19 economic relief packages and other future relief initiatives for the vulnerable should be focused on the sector. Such initiatives should not necessarily be disbursed through electronic means or bank accounts, but can be done through the community or ward level, to ensure that it reaches the most vulnerable.

- Finally, the federal government must step-up its fight against corruption to forestall a situation where funds or other support meant for vulnerable individuals end up in the private pockets of unscrupulous officials. Government needs to demand more accountability from its officials and those found culpable of corrupt involvement should be prosecuted and severely dealt with.

Conclusion

The COVID-19 pandemic has no doubt impacted health, economic and social systems worldwide, with most countries, both developed and developing, deploying vast resources to shore up their public health capacities. Yet, lack of proper planning and inappropriate economic and health policy measures mean that Nigeria is far behind the rest of the world in terms of pandemic preparedness and post-COVID-19 planning and recovery. In view of heightening health, economic and other uncertainties globally, the Nigerian government should urgently review its policy measures to boost its own capacity to respond more proactively to the COVID19 challenge and the emergence of unforeseen threats. Doing this requires massive investments in public health care infrastructure and social programmes targeted at the vulnerable groups.

In countries like the US, Germany and the Uk where there are better employment opportunities and other health and social safety nets in place to guarantee, at all times, the livelihoods of their citizens, measures for containing emergencies are more robust and efficient. Thus, Nigeria must borrow a leaf from these countries by dedicating herself more fully to fighting poverty, reviving the moribund health, educational and road infrastructure as well as providing social safety nets for both formal and informal businesses. Until the government re-jigs its policies to address more realistically the country's existential challenges, Nigeria will continue to be unprepared to effectively respond to sudden outbreaks of health and other emergencies.

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LIBRARY RESPONSIBILITY AND COMMITMENT IN MANAGING COVID-19 PANDEMIC IN NIGERIA TO ACTUALIZE SUSTAINABLE ECONOMY

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Abstract

Libraries and librarians are indisputably inseparable from the society in which they serve and the society in which they live. Also, a library is the best resource to save people from rumour to save people from resource to save people from rumours and misinformation in a pandemic. Thus, a library in a pandemic is indispensable. So, in this COVID-19 pandemic era, libraries have major parts to play in partnership with the Nigeria Centre for Disease Control (NCDC), which is the country's national public health institute, with the mandate to lead the preparedness, detection and response to infectious disease outbreaks and public health emergencies. On this note, this conference seminar paper intends to ascertain how much the libraries and librarians could execute or discharge their accredited responsibility in order to save life and sustain the economy of the country-Nigeria. To the end, the study highlights the origin of COVID-19 pandemic, library contributions in COVID-19 in the country, economic impact of COVID-19 in Nigeria and economic recovery strategy. Thus, this study offers the following recommendations among others: that the library scientists should always disseminate COVID-19 related information and resources to the public through various virtual media channels available to them, especially as most people may not come to the library may be closed during the COVID-19 pandemic. Secondly, now all the colleges, polytechnics and universities are in lockdown, the information professions gave the obligations to create awareness through, public health education, providing support to medical staff, researchers and providing support to medical staff, researchers and providing ongoing traditional services to regular library patrons in Nigeria.

Keyword: Library, Responsibility, Commitment, Management, COVID-19 pandemic, Sustainable Economy.

INTRODUCTION

Pandemic or epidemic is an outbreak of a disease that occurs over a wide, geographic area (as multiple countries or continents) and typically affects a significant proportion of the population, Merriam-Webster Dictionary (2020). This deadly disease called coronavirus (COVID-19) has actually arrived at the world to eliminate or exterminate the entire population of the whole globe.

The reason why this novel and unprecedented pandemic has invaded the world is simply because of the fact that many countries of the world have bluntly refused to serve and worship the true God, the creator of the whole universe to substantiate the forgoing statement the Bible says come, my people, enter thou into thy chambers, and shut their doors about thee: hide thyself as it were for a little moment, until the indignation be overpast for behold, the LORD cometh out of his place to punish the inhabitants of the earth for their iniquity: the earth also shall disclose her blood, and shall no more cover her slain, Isaiah Chapter (26v20-21). It is crystal clear that it is God who allows this incident to occur all over the globe. Had any reasonably wise person asked why the outbreak of pandemic (COVID-19) must invade the developed countries of the world first before getting to the developing countries like Nigeria etc? However, our God, the Almighty Jehovah, is a merciful and covenant- keeping God as He does not have pleasure in the death any sinners.

God usually uses a man to save a nation after unleashing his punishment and judgements against any nation. For instance, He used Moses to deliver the children of Israel that were in bondage in Egypt. So, in our own generation, He is still in the business of using men and women to deliver nations of the world from any danger.

Furthermore, as a result of this invasion of the COVID-19 pandemic all around the world, the remnants are hurriedly and looking for what must be done to save lives and the economies of the whole world. To this end, Okike (2020), indicated that the scientists and health professionals are working day and night, tirelessly to limit COVID-19 from further infections. Adding that as scientists and health professionals searching for solutions to COVID-19 related information and resources to them, especially as most people may not come to the library or because the library may be closed during the COVID-19 pandemic.

The Origin of COVID-19 Pandemic

Accordance to Kondola (2020), noted that the recent outbreak of pandemic began in Wuhan, a city in the Hubei Province of China. Adding that the reports of the first COVID-19 cases started in December, 2019.

The COVID-19 pandemic in Nigeria is part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus-2 (SARS-COV-2). The first confirmed case in Nigeria was announced on 27 February, 2020, when on Italian citizen in Lagos tested positive for the virus, (PM News, 2020). Then on 9 Month, 2020 a second case of the virus was reported in Ewekoro, Ogun State, a Nigerian citizen who had contact with the Italian citizen – Wikipedia,(2020). According to the WHO (2020) the common symptoms of COVID-19 include fever, dry cough, fatigue, loss of appetite, loss of smell, difficulty in breathing, body ache, headache, sore threat cold etc. Adding that COVID-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization. Also, people with mild symptoms who are otherwise healthy should manage their symptoms at home.

Library Contribution in COVID-19 Era

Undoubtedly, the libraries and librarian have great, immense functions to play in the wake of the deadly disease termed COVID-19 pandemic, which is a threat to the inhabitants of the earth today.

According to Kennedy (2020), noted that COVID-19 is an unprecedented pandemic for most of us and that the research libraries have rapidly responded to the shifting needs of their communities and worked collectively to adapt, alongside public health officials, senior administrators, and city officials, senior administrators and city officials, as well as research communities.

Furthermore, Kennedy (2020) opines that in our favour, technological, advancements have made information more easily accessible than ever before, and global collaboration is already part of everyday research.

The Association of Research Libraries (ARL) is a non-profit membership, organization of libraries and archives in major public and private universities, Federal Government agencies and large public institutions in Canada and the U.S. As leading institutions attracting millions of users every year, ARL members are uniquely positioned to champion change by proactively addressing the control information challenges and opportunities now facing research and learning communicates (Kennedy (2020). At thus juncture, the contributions of libraries in the wake of COVID-19 pandemic include:

- ARL libraries continue the convene as research library leaders to learn more about the virus’s behaviour and its impact on their constituents and share its collective knowledge on its website and social media.

- Libraries work with public policy and institutional decision-makers to ensure research integrity open access and intellectual property insights so that critical information is available as needed.

- As new knowledge about COVID-19 emerges and as the number of reported access spreads, research libraries are partnering with scholars and with senior administration in federal agencies, cities and higher education to ensure their expertise and the information they provide is available.

- As students in their final year continue with graduation plans, and as scholars and researched necessarily continue their investigations or dive deeply into solving this COVID-19 emergency research librarians and staff are quickly moving to optimize their service.

- Research libraries and librarians provide virtual service in the internet, that is, online to their communities. While the situation is very fluid still, that is changing, some libraries continue to provide open building hours, particularly for those individuals who have nowhere to go for those without internet access, for those need to borrow networked devices, and for those who seek safe social distancing spaces.

- Never before how research information been more available than today. The National Library of U.S. of Medicine (NLM) provide access to over 5.9 million Health Science articles, including COVID-19 clinical studies.

- This is a global health crisis and Association of Research Libraries and its members are actively engaged in ensuring access to trustworthy COVID-19 knowledge and many more.

- Controlling the spread of COVID-19 in the country over Covid-19. Or Safe Handling of library materials during the COVID-19 pandemic.

This deadly disease is a very devastating and kills people indisenminately and unexpectedly, therefore the controlling officials' response to it must be painstakingly-oriented, fighting against it by all means. To this end Machovec (2020) asserted that in the North America, all libraries are ordered to close down for the safety of both the staff and information users. Adding that the 2020 COVID-19 pandemic has significantly altered the ways that libraries, consortia (an association of two or more individuals, coys, organisations or governments or any combination of these entities), publishers and vendors provide services to their customers. Another most effective method used by libraries, medical practitioners, NCDC, etc is quarantine method. According to Wikipedia (2020) a quarantine is a restriction on the movement of people and goods which is intended to prevent the spread of disease like COVID-19. It is used to preventing the movement of the who may have been exposed to a communicable disease, but do not have a confirmed medical diagnosis.

Wearing of face masks alone will not protect against COVID-19 but must be combined with physical distancing, hand-washing regularly with soap, running water and sanitizer –NCDC-Nigeria. Face masks may help slow the spread of the coronavirus.

According to Ajide and Alimi (2020) states that ennaated policy message centres on the need to direct efforts toward ensuring total compliance to the lockdown rules as it holds the key to keeping the coronavirus (COVID-19) under check. Adding that the exercise entails the closure of all activities based centres such as schools, hotels, clubs and religious houses that could make a sizable number of people come together. This apart directives such as social distancing, banning of congregation of more than 20 persons, and compulsory usage of the face masks particularly, in public places were all forcefully enforced (NCDC, 2020; CDC, 2020; WHO, 2020). In the same vein, Kitara and Ikoona (2020) indicates, as SARS-COV-2 is rapidly spread across the globe short-term modelling forecasts provide time-critical, information for containment and mitigation strategies. Adding that global projection had so far incorrectly predicted large number of COVID-19 cases in Africa and that it health systems would be overwhelmed significantly higher COVID-19 related mortality were expected in Africa mainly because of its poor socio-economic determinants that make it vulnerable to public health threats, including diseases of epidemic potential. Surprisingly as SARS-COV-2. Swept across the globe causing tens of thousands of deaths and massive economic disruptions Africa has so far been largely spared the impact that threw China, USA and Europe into chaos. To date, 42 African countries imposed lockdown on movements and activities.

Economic Impact of COVID-19 in Nigeria

The implementation of lockdown measures all over the world, including Nigeria has grossly affected the economy of the whole world, and Nigeria inclusive from the foregoing. Google (2020) noted that Nigeria's economy is facing collapse as it largely depends on oil exports. Adding that the oil markets have been on downward trend as COVID-19 has crippled demand. According to Ozili (2020) economic downturn in Nigeria was triggered by a combination of declining oil price and spillovers from the COVID-19 outbreak, which not only led to a fall in the demand for oil products but also stopped economic activities from taking place when social distancing policies were enforced.

Moreover, more of this impact of COVID-19 on the economy of Nigeria is that many workers in some establishments were downsized, for example, the Access Bank Ltd Nigeria sacked a good number of its staff members about eight hundred workers this year 2020. Unemployment is on the increase.

Economic Recovery Strategy in COVID-19

The outbreak of COVID-19 pandemic has made the economy of the whole world to crumble substantially in every sector of economy. The root cause of this unpleasant situation is attributable to the lockdown measures adopted all over the nations of the world.

During the lockdown, schools, colleges, universities, industries, markets etc are closed down. To substantiate my foregoing assertion, Cox (2020) noted that in early March 2020 COVID-19 blindsided academic libraries. With little time to plan, we closed our library facilities at Clemson University to protect the safety of our patrons and employed and moved to online services only and work from home.

However, many nations effected economic rehabilitation by rendering some kind of finance assistance to certain developing nations like Nigeria government. On this account, Florizone (2020) admitted that the COVID-19 pandemic is first and foremost a humanitarian crises, that efforts to contain the virus and support those directly impacted are of utmost importance. Adding that at IISD, that means our first focus has been on the health and safety of our staff and our own effort to flatten the curve.

Currently, some developed nations of the world have resorted to giving federal stimulus packages to help some states and universities, some organizations and individually owned companies are in the business of rendering some stimulus packages to their governments, Nigeria is not an excercise.

To this end, UNESCAP (2020) has to say that as the novel coronavirus (COVID-19) pandemic is having far reaching economic and social consequences for the Asia-Pacific region with strong cross-border spillover. These effects cuts through trade, tourism and financial linkages according to a new report by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). Adding that as governments respond to the unprecedented health crisis and introduce economic stimulus packages, the report estimated that Asia-Pacific developing countries should increase health emergency spending by $880 million per year, and the survey also calls on Asia-Pacific, countries to consider establishing a regional found to respond to future health emergencies. Thus, Nigeria governments should gear up its effort to emulate the developed countries of the globe.

CONCLUSION AND RECOMMENDATIONS

COVID-19 pandemic has more or less had a negative impact on the economy of Nigeria. Many people actually lost their lives in the wake of the dangerous and deadly disease. More than this poverty is on the increase, to the extent that many families find it very difficult to eat three square meals a day, to pay hospital bill if they happen to go to the hospital in the event of any sickness is in very challenging markets, the costs of the essential commodities have drastically skyrocketed, many graduates are made unemployed the workforce in different establishments has collapsed and many more.

Furthermore, in the library industry, the fund being given to them as the allocation due for them, their parent institutions are no longer fit to render. This has now crippled the library staff and information experts to carry out their duties of sustaining the economy of the country- Nigeria. On this note, this study has to recommend that the government of Nigeria in collaboration with the libraries should gear up their efforts to ameliorate the ugly or unpleasant economic situation of all Nigeria by cutting down the price of all these essential commodities, and also reduce the school fees being imposed on the parents.

That the governments in partnership with the libraries working in different libraries working in different libraries in the country should in an attempt to restore the economy, have to introduce entrepreneurship education and making it compulsory for all newly admitted students into tertiary institutions in Nigeria.

Again, that the libraries in collaboration with the government of Nigeria, should devise the stimulus packages and disburse to the graduates who are job-seekers so that they would use it to establish their own personal enterprises as they have obtained entrepreneurial skills and competencies in their different disciplines.

Moreover, libraries should disseminate information through existing and digital media platform to educate users. For better dissemination of information especially in a time of great need for accurate health-related information resources in an ever-increasing digital environment. So when the government decide to cope with these above stated recommendation, undoubtedly the nation's economy must be reactivated.

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EFFECT OF WORK STUDY ON ORGANISATIONAL EFFICIENCY AND PRODUCTIVITY

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Abstract

This study examines the effect of work study on organisational efficiency and productivity. The study drew participant from Julius Berger Construction Company along Lagos Ibadan Expressway, Ogun State. The research instrument used in collection of data was a structured questionnaire. The study selected a sample size of fifty (50) respondents through quota sampling technique. Data obtained was analyzed using Pearson product moment correlation coefficient (r) with the use of Software Package for Social Science (SPSS version 20). The results showed that work study significantly affect organisational productivity. The study also revealed that lack of work study implementation, resistance to change, and negative perceptions employees attach to work changes affect productivity. Therefore, the study suggests that scientific approach of time study should also be used to access the work practice.

Keywords: *Work Study Efficiency, Productivity and Time study*

INTRODUCTION

All manufacturing companies aspire to succeed in their operations, and those in the construction companies are no exception. Road construction requires the implementation of innovative management systems in production processes in order to meet order deadlines, reduce lead times, and optimize material use, with the ultimate goal of being competitive. In business, organizations have to be constantly aware of their competitors' products, prices, and quality output, as these are important success factors. Since these factors affect the outcome of the operations, Khan (2014) states that the strategy employed by an organization to gain a competitive edge is crucial. Strategies vary and may either lead to the maximum output through increasing the sales volume or increasing the maximum profit by reducing cost.

Paneru (2011) asserts that traditionally-operated construction industries face problems such as low productivity, longer production lead times, high re-work and rejection, poor line balancing, and low flexibility of style changeover, among numerous other problems. Such is the case of Nigeria construction companies, which are facing many challenges, resulting in poor performance and, in turn, downsizing by some, and closure of operations by others.

In order to improve the efficiency in productivity, engineers in Julius Berger in Nigeria have to carry out an analysis of their operations to see where the overall costs incurred in the production line can be reduced. This should allow for the manufacture of a competitive product that can penetrate the international market. Several methodologies have been tried and tested in improving manufacturing processes. These include the Kanban system, lean manufacturing, just in time (JIT) and Toyota production system (TPS). Work study had also been found to be a solution to manufacturing challenges, as evidenced in the success stories of Bangladesh, India, China and South Africa (Ramdass, 2007).

According to Khan (2014), China is the largest producer and exporter of clothing and textile products in the world. Its success is attributed to the work study movement, which was initiated by Shizeing in 1908 intending to transform the Chinese into informed citizens. The Chinese were compelled to go and work in France, where they formed the nucleus of the future skilled working class there. Their return marked the diffusion of the industrial skills of European civilization to which they had been exposed (Démurger, 2010). China has achieved great rewards by using work study techniques and has set standards that other countries, world over, are emulating. Fouts (1997) attributed the growth and success of manufacturing in China to the fusion of work study into their school curriculum and the fact that they placed more emphasis on labor. In the view of the Chinese, work study serves not only an ideological purpose but also meets a vocational need.

Kanawaty (1992) averred that work study is a management tool that can be applied in manufacturing formulation. Its essence lies in seeing operations done procedurally, in the best way possible, timorously and by the most skilled individual(s). Masson (2007) asserts that manufacturers are still seeking ways of reducing costs and maintaining or improving profit margins. Fredrick Taylor introduced scientific management in 1910 intending to develop a science, promoting specialization, ensuring work is done according to principles and balancing operations (Turan, 2015). Work study improves an entity's competitiveness and the entire production process through techniques that optimize production (Chary 2009, Tanvir & Ahmed, 2013). Singh and Yadv, (2016) also opined that work study results in increased production by improving efficiency, workflow, work layout and the quality and time standards that are applied in the processes involved.

Statement of the problem

Construction companies are faced with the dual challenges of constructing at full capacity and remaining competitive. They cannot withstand the pressures emanating from the local market or, worse still, international markets. Such company's entities have resorted to downsizing, operating below capacity, and working on selected number of days a week, while some have closed down completely (Nyoni, 2016). Closing and downsizing have destroyed investor confidence, resulted in job losses for the majority of Nigerian, and has ruined the country's economy. Locally-construction items have become very expensive on the market when compared to imports, prompting consumers to prefer the latter. This study proposes work study as a means of investigating the challenges faced by construction companies, and ultimately turning around their fortunes by reducing waste, removing winding procedures, improving production systems, and managing excess time to achieve lower production costs.

Objectives of the Study

The specific objectives of this research are:

1. To examine how work study can be applied to improve production in Julius Berger Construction Company
2. To know if work study affect organizational efficiency and productivity in Julius Berger construction company
3. To evaluate the extent to which construction companies are using lean principles in their organizations.

Research question

1. Does work study affect organizational efficiency and productivity in Julius Berger Construction Company?
2. Does work study helps to improve organizational performance?

Significance of the Study

This study will enable the management of Julius Berger Construction Company and other similar construction companies in Nigeria and to identify key work study techniques which could be employed to bring improvement in organizational productivity. The study will also help management of the company to identify ineffective work practices that exist in the company and how to remedy these ineffective practices. The study will offer management the opportunity to know whether ineffective work study practices affect quality performance at the Company.

Scope of the Study

This research was limited to study work practices of Julius Berger Construction Nigeria. The management did not request for the study and as such they are not obliged to implement the recommendations of the study. Considering the volume of work one semester was too short for the research work. The questionnaire was based on the general opinion of staff of Intravenous Infusions limited which is not verifiable to some extent and hence could limit the findings of the research.

Literature Review

Conceptual Framework

Work study is a technique employed to gain an understanding of how a task can (should) be accomplished. Through method study, a logical recording and critical analysis are carried out of existing and suggested methods of carrying out operations to develop and effective methods and reduce costs. The improved efficiency is achieved through improved layout and workplace design, improved and efficient work procedures, effective utilization of human resources, machinery, and materials, and generally improved design or specification of the final product. Within the garment industry, there are certain repetitive actions, which could be reduced through method study, smoothening material flow with minimum backtracking (Rathod, Jadhav and Babar, 2016). Work measurement, meanwhile, is the application of techniques to determine the amount of time taken to do effective physical and mental work producing units for specific tasks (Moyo, Mangore, & Chigara 2014). Patel (2015) has pointed out that the strength of this application lays in its ability to measure work value, its measuring abilities where work value is assigned. Singh and Garg, (2011) have affirmed that without work measurements, there can be no effective management, since work measurement sets down allowed standard times for operations in the construction industry, confirming its reliability as a measuring tool.

Time Study and Motion Study

The time study technique seeks to measure how long the average worker takes to finish a task at a normal pace. Originally proposed by Frederic W. Taylor in 1881, the classical stopwatch study is still the most widely used time study method. Using an experienced or trained person, the time study procedure involves timing a sample of the worker's performance and using it to set a standard for the particular task (Heizer & Render, 2000). Within the garment industry, it is important to determine the average time it takes a person to complete a task. The experience of the person carrying out the time study is a key variable as it can affect the whole production system, and according to Paneru (2011), this is one of the major problems usually faced in time study. Motion study is designed to determine the best way to complete a repetitive job. Motion study improves production methods as it measures the distance one has to move to do a job, and how much one gets done within a certain period of time. In contrast to, and motivated by, Taylor‘s time study methods, the Gilbreths applied scientific perceptions to inculcate a method of study based on work motions. The filming of the workers' activities provides a visual record of how operations are done and assists in training workers about how best to perform work. The Gilbreths aimed to improve work practices, reduce costs, clear schedules or plans, and improve the safety of workers (Price, 1989). Time and motion studies are used together to achieve rational and reasonable results and find the best practice for implementing new work methods. Within the garment industry time variation is a must since the garments are made by different machine operators. For this reason, Khatun (2014) emphasizes the need to set a standard target for different products, thereby making time and motion studies mandatory. The conceptual model of the relationship between work study and productivity

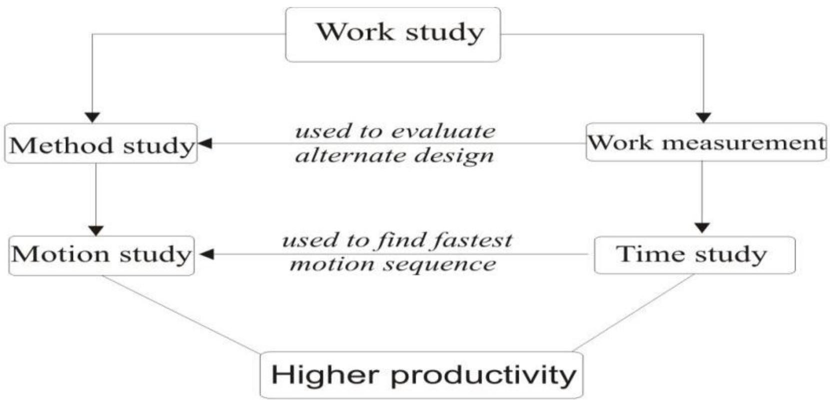

Fig1 Conceptual model:Relationship between work study and productivity

Empirical Framework

Work Study and Organizational Productivity

This definition applies in an enterprise, a sector of economic activity or the economy as a whole. The term"productivity" can be used to assess or measure the extent to which a certain output can be extracted from a given input (Kanawaty, 1992). Productivity has been generally defined as the ratio of an extent of output to the unit of all of the resources used to produce this output.

Operational efficiency is used as an indicator that reveals the level of effectiveness in using production resources such as raw materials and supplies, manpower, land, building, machine, equipments and energy. As is known, the production process uses other production inputs besides manpower. Hence, knowing efficiency levels of other inputs, which determines relationship between these inputs and production, as well as manpower, and observing trends of these inputs under various conditions and replacing one or several of these inputs by changing their qualities and quantities enable businesses to achieve the maximum level of production through the optimum input combination (Dogan, 1989).The economic growth of a country is usually measured by its increase in production or the gross domestic product (GDP), which comes from two sources: a larger quantity of production factors used(inputs) and/or an increase in productivity. Productivity is therefore considered to be a component of growth (Galarneau and Dumas, 1993).Work study then aims at examining the way an activity is being carried out, simplifying or modifying the method of operation to reduce unnecessary or excess work, or the wasteful use of resources and setting up a time standard for performing that activity. The relation between productivity and work studies thus obvious. If work study results in cutting down the time of performing a certain activity by 20 per cent, merely as a result of rearranging the sequence or simplifying the method of operation and without additional expenditure, then productivity will go up by a corresponding value, that is by 20 per cent. To appreciate how work study acts to cut down costs and reduce the time of a certain activity, it is necessary to examine more closely what that time consists of (Kanawaty, 1992). Work study can be divided into method study and work measurement. It is used to systematically study and improve human working methods by considering all factors that affect the working efficiency and conditions. After the job of interest has been selected, time study can be examined by 1) recording all information about the job, 2) breaking the job down into elements, 3) examining those elements and determining the sample size, 4) recording the time to perform each element using a stop-watch, 5) assessing the speed of working, 6) converting the observed time to basic time, 7) determining the allowances, and 8) determining the standard time (Pisuchpen and Chansangar, 2014).

Work Study is the generic name of methods study and work measurement. It was the most important basis technique in industry engineering, which was developed on the basis of action study of Gilberth and time study of Taylor. The most obvious character is using less investment or no investment to increase the production efficiency and benefit, reduce the cost and to strengthen the competition ability through improving the operating process and method, implementing the advanced and reasonable working quota, fully utilizing the human resources, material resources and financial resources inner the enterprise. Work study includes method study and work measurement. Method study mainly on searching efficiency working method, whereas work measurement is to determine the scientific and reasonable working time quota of each operating (Lan,, 2009). Work Study is the systematic methodology of carrying out different yet related activities such as to improve the efficient use of resources and to set up standards of performance & quality for the activities to be carried out. Work Study generally is classified in two areas: Method study (Motion study) and Time study (Work measurement) (Kulkarni Tsirikas and Bani, 2014). Method study is essentially concerned with finding better ways of doing things. It adds value and increases the efficiency by eliminating unnecessary operations, avoidable delays and other forms of waste.

The just in time Concept as it relates work study and productivity

The just in time (JIT) concept implies producing the right part in the right quantity at the right time, thus reducing manufacturing waste. JIT was first developed and perfected within the Toyota manufacturing plants by Taiichi Ohno as a means of meeting consumer demands with minimum delays (Goddard, 1986). It is for this reason that Taiichi Ohno is frequently referred to as the father of JIT. JIT forms part of the lean concept as it is focused on efficiency, while lean manufacturing is focused on using efficiency to add value for the customer while reducing "muda" or waste in the course of the manufacturing process. JIT can be implemented on its own or as one step in the lean manufacturing process. The JIT system comprises the kanban system, production leveling or "heijunka," the single minute exchange of dies (SMED) and cellular manufacturing (Hodge, Ross and Jonies 2011). As the global apparel industry is confronted by the era of fast fashion, implementing JIT can be the best response that an organization can make in its efforts to remain competitive, as JIT enables the internal processes of a company to adapt to the sudden changes in demand patterns that are characteristic of this era. The kanban system seeks to harmoniously control and indicate what must be produced at what time and in what quantity. JIT reduces the amount of money stuck in inventories of direct material and finished goods, as these are liabilities and need a lot of investment to maintain. It also helps to minimize the storage costs of finished products and reduce the cost of reprocessing of defected inventory (Khan 2014). A number of authors agree that there is a significant correlation between an organization's level of JIT implementation and its level of financial success (Inman & Mehra 1993; Callen, Morel, & Fader, 2005; Duarte,, Brinto and Serio, 2011). Implementing JIT in the garment industry implies that it is possible to change the physical plant layout and make some organizational changes. The physical aspects will relate to issues of ergonomics and the implementation of cell manufacturing and group technology.

Methodology

In this research, qualitative descriptive survey method was used with the collection of data from limited number of subjects to represent the whole population. The cross-sectional survey method was employed because it is impracticable to study the entire population due to its large size, thus, a large sample size was selected form the whole population. Therefore, the finding was generalized to the whole population. The relevant data is collected from the primary source specifically through self-administered questionnaires. The questionnaire is designed in such a way to provide the respondents the opportunity to provide first hand data relating to the objectives of the study. The population of this study is the entire population of staffs of Julius Berger Construction Site along Lagos Ibadan Expressway which is estimated to be ninety two (92) staffs in total. From the population a sample size of fifty (50) staffs would be selected from the selected company in total. The sampling technique used for this research is quota sampling technique. The instrument that is used in this study is a questionnaire form, which consists of questions intended to generate information relating to the variables of the study. The questionnaire form is divided in to two (2) sections (A and B). Section A contain questions about the personal characteristics of the respondents while Section B contains questions relating to finding answers to the research questions the validation of hypotheses. The method to be used in presentation of the data is the sample percentage method with tabular presentation. The Pearson's Correlation Coefficient is used to analyze the data and test the formulated hypotheses of the research. These analyses shall be done through the use of the Software Package for Social Sciences (SPSS).

Data Presentation and Analysis

The following data presentation is based on the data retrieved from the administered for the purpose of the study.

Work study has a significant effect on construction efficiency of Julius Berger Company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	7	13.5	13.5	13.5
	Agree	33	63.5	63.5	76.9
	Undecided	2	3.8	3.8	80.8
	Disagree	4	7.7	7.7	88.5
	Strongly Disagree	6	11.5	11.5	100.0
	Total	52	100.0	100.0	

Above table shows that 69.2% of the respondent strongly agrees that Work study has a significant effect on construction efficiency of Julius Berger Company, 59.6 % of the respondent agrees, 13.5% of the respondent disagree while 17.3% of the respondent strongly disagrees. This implies that majority of the respondent strongly agree that work study has a significant effect on construction efficiency of Julius Berger Company.

Teams are rewarded for high productivity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	5	9.6	9.6	9.6
	Agree	31	59.6	59.6	69.2
	Disagree	7	13.5	13.5	82.7
	Strongly Disagree	9	17.3	17.3	100.0
	Total	52	100.0	100.0	

The above table shows that 69.2% of the respondent strongly agrees that the teams are rewarded for high productivity 59.6 % of the respondent agrees, 13.5% of the respondent disagree while 17.3%of the respondent strongly disagrees. This implies that majority of the respondent strongly agree that team are rewarded for high productivity.

Work Study In This Organization Helps To identify problem associated with Productivity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	8	15.4	15.4	15.4
	Agree	32	61.5	61.5	76.9
	Disagree	7	13.5	13.5	90.4
	Strongly Disagree	5	9.6	9.6	100.0
	Total	52	100.0	100.0	

The above table shows that 76.9% of the respondent cumulatively agrees that work study in this organization helps to identify problem associated with productivity, 22.8% of the respondent disagrees. This posits that majority of the respondent agrees that work study in this organization helps to identify problem associated with productivity.

Test of Hypotheses

H_{01} Work study has no significant influence on organizational efficiency and productivity

Correlations

			Work Study	Productivity
Spearman's rho	Work Study	Correlation Coefficient	1.000	.526**
		Sig. (2-tailed)	.	.000
		N	52	52
	Productivity.	Correlation Coefficient	.526**	1.000
		Sig. (2-tailed)	.000	.
		N	52	52

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation coefficient of the relationship between work study and organizational productivity is 0.526 with 0.000 probability of error. This implies that there is a significant relationship between work study and organizational productivity. The implication of this is that the hypothesis, which states that there is a significant relationship between work study and organizational productivity, cannot be rejected.

Hypothesis Two

H_{02} Work study has no significant effect on organizational efficiency of Julius Berger

Correlations

			Work study	Efficiency
Spearman's rho	Work Study	Correlation Coefficient	1.000	.251*
		Sig. (2-tailed)	.	.019
		N	52	52
	Efficiency..	Correlation Coefficient	.251*	1.000
		Sig. (2-tailed)	.019	.
		N	52	52

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation coefficient of the relationship between work study and organizational efficiency is 0.251 with 0.019 probability of error. This implies that there is a significant relationship between work study and organizational efficiency. The implication of this is that the hypothesis, which states that there is a significant relationship between work study and organizational efficiency, cannot be rejected.

Conclusions

The analysis of data collection from the survey as well as summary of findings above, it can be deduced that organizational efficacy and productivity is a result of effective work and time study. Based on the findings of this empirically effective work study is a key factor that influences organizational efficacy towards greater productivity. It goes without saying therefore, that the way work is evaluated makes and how new approaches \are introduced makes work easy and helps to reduces stress at monotony at work. The positive confirmation of the relationship between work study and firms productivity has many managerial implications.

Recommendations

Having known the result of the effect of work study on efficiencyand productivity it is hereby recommended that:

- For the Julius Berger construction company to achieve success, implementation of work study techniques is highly recommended to increase production capacities for the firms
- It is also suggested that firms should from time to time evaluate their current work practices so a to keep improving efficiency and productivity
- The study furthermore suggests that scientific approach of time study should also be used to access the work practice.
- Finally, actual time and standardized time is compared and as a result it is aimed that measuring inevitable times and take necessary precautions against them

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COVID-19 PANDEMIC AND RELIANCE ON THE TECHNOLOGY OF THE INTERNET IN THE FORMATION OF CONTRACTS IN NIGERIA

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Abstract

This paper examined the concept of electronic contract through the use of the internet as an alternative to traditional paper based contracts against the backdrop of the Covid-19 pandemic. The theoretical framework for this paper is predicated on the theory of freedom of contract, cyber libertarianism, exploitation theory and consumer protection theory. To achieve the aim of this paper, the doctrinal method of research was adopted involving the retrieval of primary and secondary materials relevant to the subject matter in question. The major advantage of electronic contract was shown to be the absence of geographical barrier thereby obliterating the need for the parties to be in the same vicinity. Some of the legal issues identified to be of major concern to for advocates of electronic contract include questions as the validity of such contracts, admissibility of computer generated document, privacy and data protection, choice of law and jurisdiction, et cetera. It was shown that these legal issues can be addressed in Nigeria through the instrument of law as has been done in other countries. On the bases of the above findings, the paper recommended, *inter alia*, the enactment of Data protection laws, both at the federal and state levels and the draft Electronic Transaction Bill into law. Also recommended is that more awareness should be created on the merits of electronic contract.

Keywords: Contract, Electronic Contract, Internet, Technology, Pandemic

Introduction

The coronavirus COVID-19 pandemic has been described as "the defining global health crisis of our time and the greatest challenge we have faced since World War Two" (UNDP, 2020). The wide spread panic generated by the outbreak of the pandemic is not just about the health crisis, but the fact that it has brought about an unprecedented socio-economic crisis. With the requirement of maintaining social distancing, as a means of stemming the spread of Covid-19, it has become imperative to encourage more people to explore the option of entering into contract on the internet.

Objective of the Study

To determine whether the existing laws and regulatory institutions in Nigeria provide adequate legal backing for contractual relationships formed with the aid of the technology of the internet.

Research Questions

The questions this study sought to find answers to are as follows;

1. To what extent has the Covid-19 pandemic impacted on electronic contracts in Nigeria?
2. Are there areas where electronic contracts have an edge over traditional face-to-face transactions?
3. What are the legal issues associated with electronic contracts in Nigeria.
4. Are the current laws in Nigeria adequate to address the legal issues trailing electronic contracts?

Theoretical Framework

This paper recognises that there are several debates and theories as far as the issue of electronic contracts or transactions is concerned and they are;

1. The Classical Contract
2. The Classical Economic Theory
3. The Theory of Cyber-libertarianism
4. Theory of Asymmetric information,
5. The Exploitation Theory and;
6. The Consumer Protection Argument

The Classical Contract Theory, the Classical Economic Theory and the Theory of Cyber Libertarianism, advocate the absence of government interference in economic and contractual matters as well cyber space (Ilobinso, 2017).

The Classical Economic Theory, also called the free market theory, propounded by Adams Smith classical economic theory stressed the importance of competition (Nolen, 2019). Cyber-libertarianism propounds that individuals, in whatever capacity they choose to act whether as citizens, consumers, companies, e.t.c, should be at liberty to pursue their own tastes and interests online (Thierer and Szoka, 2009) without undue interference form the government. The arguments in favour of government regulation of the internet cite consumer confidence and exploitation as justification for the involvement of government in internet based transactions (Jessah, 2019a). This paper takes cognisance of these theories in reaching its conclusion and explores the possibility of having a fusion or hybrid of these two theories having regard to the peculiar nature of the internet and some of the legal issues associated with contractual relationships on the internet.

Research Method

Being a theoretical paper, data were obtained from primary sources, particularly statutes, and secondary sources, particularly published work of other scholars relevant to the subject matter.

Literature Review

Thierer and Szoka, (2009), Ilobinso (2017) and Nolen (2019) expound on the various theories on the regulation of the internet particularly where it involves transacting business with consumers with Ilobinso. On the issue of formation, attestation and validation of contractual documents vide the internet, Chow, Contreras and Hamel (2001) have expressed the opinion that determining the validity of contracts entered into in cyberspace is complicated because the contracts are paperless; and as such, digital signatures are important in assisting to facilitate the promotion of e-commerce because they insure that all parties have inserted their symbol a binding contractual arrangement.

On the extent to which an electronic signature is considered as valid and its effect on contract documents, Mu'azu and Junaidu (2015), are of the view that electronic signatures are equivalent to handwritten signatures. On the issue of cybercrime, fraud, identity theft and fear of security of information communicated via the internet between the buyer and the seller, Akomolede (2008) observed that the openness and accessibility of the internet and the protection of data transmitted has become a source of concern for internet users and thereby constituting a constant threat to e-commerce. Akintola, Akinyede and Agbonifo (2011) identified one of the security objectives that relate to internet transactions to be; confidentiality. Gabrosky, Smith and Dempsey (2001) highlighted some examples of cybercrimes.

Ha (2011) has also asserted that concerns about security on the internet involve two issues, data security and payment security. Edwin and Agwu (2015) highlighted some of the ways fraud on the internet is perpetrated. On the issue of the acceptable mode and manner of leading evidence in proof of a sale of goods transaction conducted over the internet, Reed (2005) classified computer-generated evidence falls into two categories. On the method and system for paying for goods electronically in lieu of physical cash. Akintola, Akinyede and Agbonifo (2011) identified some of the different types of electronic payment (epayment) methods currently in use worldwide. This of course exposes the seller to great risk of loss. Azam (2007) highlights the two leading principles on the bases of which international law divides judicial jurisdiction among the countries of the world.

Covid 19 Pandemic, Maintaining Social Distancing while Entering into Contracts using the Technology of the Internet

A lot of countries affected by the Covid-19 pandemic, including Nigeria, adopted extreme measure to combat the virus, such as putting the entire country on lock down with prohibition of public gatherings and restriction of movement. Most businesses were shut down except for those deemed to be providing essential services like health/medicals, food, fuel, electricity e.t.c. This forced a lot of persons to stay at home and have recourse to the internet in transacting their businesses. This fact can be supported with data from Okafor (2020) which shows that the number of internet users in Nigeria increased by 14% year-on-year in May 2020. This increase put the total active internet subscribers in Nigeria at over 141 million. This figure is very significant when viewed against the backdrop that Nigeria's population as at 2019 according to data from the World Bank (2020) stood at approximately 208,000,000.

Using the internet to do business, during the Covid-19 lock down, is an attractive option. The reason for this is not far-fetched. MacGregor, cited by Agwu and Murray (2015) has observed that, the most obvious and commonly cited advantage of using the internet for commercial transactions, which is perceived to be the most important, is the possibility of transacting online at anytime from anywhere and, as pointed out by Kumar (2018), transactions can be made on the internet twenty four hours a day. The view expressed by MacGregor finds support in the submission of Kareem, Owomoyela and Oyebamiji (2016) that the internet has dramatically reduced locational importance and retailers are now able to sell their goods all over the world which has the potential of increasing their revenue and customer base. Adebayo and Kekere (2016) have also stated that the removal of geographical barriers to e-commerce has made it possible for consumers from all over the world to now have access to goods and services which, prior to the emergence of e-commerce, was out of their geographical reach. With the internet, contracts con be conveniently entered into, while at the same time complying with the notion of social distancing to avoid the spread of the Covid-19 pandemic.

Notwithstanding how attractive the removal of geographical barrier is, some concerns have been expressed on some legal issues that have trailed contractual transactions on the internet. Some of these legal issues are highlighted hereunder.

Legal Issues Associated with Entering into Contracts using the Technology of the Internet

Some of the major issues of concern that have been raised with regard to electronic contracts include the issue of validity of the contract, computer generated documents and its authenticity, cybercrime, fraud and identity theft, privacy and security of data, choice of law and jurisdiction *et cetera*.

Validity of Electronic Contract

Thus Adam (2010) posited that the problem with sale of goods on the internet is that they are usually based on electronic documents and they cannot be signed, hence while it is easy to establish the uniqueness of a person's signature on a paper based contract, that of electronic based contracts posed some difficulty until the invention of digital signature which may be in the form of Personal Identification Numbers (PIN), or an advanced digital signature which may involve the use of some encryption system to test the validity of such signature. The general consensus, from the various electronic transaction laws of most countries like Canada, the European Union, Ghana, Singapore, South Africa, the United States of America et cetera, is to the effect that a contract is not to be denied legal validity simply because it is not in paper form (Jessah, 2019b). In other words, that an electronic contract is valid. Unfortunately, Nigeria is yet to enact an electronic transaction law in order for this issue to be settled once and for all, hence recourse would be had to principles of common law equity for the purpose of determining the validity of electronic contract (Jessah, 2019b).

Computer Generated Document and its Authenticity

The fact that the contractual documents in electronic contracts are not usually in paper form was initially perceived as problematic. Reed (2005) has stated the reason why computer-generated evidence is viewed with scepticism to be mainly because; the evidence is not original; it is regarded as hearsay evidence; some rule of law or evidence prevents such evidence from being adduced. In Nigeria, the introduction of section 84 in the Evidence Act 2011 has given statutory backing to the admissibility of computer-generated documents.

Concern about privacy and security of data

According to Ha (2011), security of online payment is one of the main reasons consumers are discouraged from shopping online. In the course of transacting on the internet, data exchanged may be compromised and may lead to one of the parties, or even both, suffering losses. Some of the different types of electronic payment (epayment) methods currently in use worldwide have been identified by Akintola, Akinyede and Agbonifo (2011), to include credit cards, debit cards, electronic fund transfer, direct debit/standing orders, automated teller machines, point of sale terminals, loyalty cards, *et. cetera.*

Chow, Contreras and Hamel (2001) have stated emphatically that the vast majority of e-commerce payments are done by credit card. They also pointed out one of the major problems associated with mode of payment as being the insecurity revolving around such payments, that is, the inability of the internet to guarantee the safety of such payments as well as the likelihood of duplication of payments and using the computer to forge bank notes.

Akintola, Akinyede and Agbonifo (2011) identified one of the security objectives that relate to internet transactions to be; confidentiality to ensure that only people who are authorized to have access to information are able to do so, and in this way, only the people who are intended would be allowed access to valuable information. Another objective identified by these authors is integrity, which is geared towards ensuring that the value and state of information is maintained and protected from unauthorized modification or destruction, while a third objective is availability to ensure that information and information systems are available and working when they are needed.

Cybercrimes -Fraud and Identity Theft

Some examples of cybercrime highlighted by Gabrosky, Smith and Dempsey (2001), include extortion, defrauding governments, fraud, deceptive advertising and other unwholesome business practices, industrial espionage, misappropriation and unauthorized use of personal information. Agwu and Murray (2015) have shown some of the ways fraud on the internet is perpetrated to include where fraudsters; illegally use genuine credit card details to purchase goods and services online, or set up fictitious websites selling products which do not exist in order to get the credit card details of consumers.

Jurisdiction and Choice of Law

On the issue of jurisdiction, Geist (2000) has postulated that the question of jurisdiction lurks in the background of virtually every internet law issue. This is also applicable to contracts entered into on the internet. The fact that the parties to an electronic contract are domiciled in different jurisdiction poses a unique problem for the enforcement of the contract in the event of a dispute arising. This is because traditionally, as noted by Azam (2007) international law divides judicial jurisdiction among the countries of the world based on two leading principles; the territorial principle and the personal principle. While the territorial principle gives jurisdiction to the country that has territorial connection to the matter or the parties, the personal principle gives jurisdiction to the country that has connection to the parties or the issue in dispute. Cases may arise where the courts of different countries may have concurrent jurisdiction over the subject matter of the same contract. If the parties fail to expressly agree on the particular country whose court should have jurisdiction to resolve their dispute, this could prove problematic, especially for a consumer buyer.

Closely related to this is the question of choice of law or applicable law. By the principle of party autonomy. The parties to a contract have the freedom to choose the law of which country should apply to their contract. Where this is done, it is usually understood that the agreed law should be applied in the event of a dispute. It is where the parties fail to so agree that it becomes problematic.

However, Johnson, Crawford and Jain (1999) have expressed the view that the basic principle of "party autonomy" which recognizes the right or freedom of parties to choose what law would apply to their contract as well as the court in which any dispute between them would be heard, may be disregarded in certain circumstances such as; where there is no reasonable justification for the parties' choice, such as where the choice reflects some significant imbalance in bargaining power and where the choice contradicts a fundamental public policy of jurisdiction which has a materially greater interest in the dispute than the forum chosen by the parties.

Addressing the Legal Issues through the Instrument of Law

Apart from having electronic transaction laws, the countries earlier highlighted have enacted data security and privacy laws and laws on the issues of jurisdiction and of choice law, admissibility of computer generated documents and cybercrimes laws. In the case of Nigeria, while commendable effort has been made to tackle cybercrimes through the Cybercrime (Prohibition, Prevention e.t.c) Act 2015, and to provide for the admissibility of electronic or computer generated documents through the Evidence Act 2011, there is however no specific law on data security and the issue of jurisdiction and choice of law as it relates to electronic contracts. These issues were highlighted in the draft Electronic Transactions Bill, but the said Bill has been in the National Assembly for about 10 (ten) years without overcoming the hurdle of receiving presidential assent in order to make it law. It is argued here that the enactment of law is necessary to address the legal issue associated with electronic contracts as has been done by other countries and by so doing make electronic contract more attractive as an option for contractual relationships. This is even more imperative to ensure that there is compliance with the requirement of social distancing for people in third world or developing countries as a means of arresting the spread of the Covid-19 pandemic. The intervention of law in this area would not unduly interfere with the theories of freedom of contract or cyber libertarianism and would in fact ensure that people transacting on the internet have more confidence to do so without fear of their interest being unduly prejudiced.

Conclusion

This paper has explored the concept of electronic contracts through the use of the internet as an alternative to traditional paper based contracts against the backdrop of the Covid-19 pandemic. The major advantage of electronic contract has been shown to be the absence of geographical barrier thereby obliterating the need for the parties to be in the same vicinity. It has been shown that the legal issues which have been the object of concern for advocates of electronic contract can be addressed in Nigeria through the instrument of law as has been done in other countries. In the light of this some recommendations are suggested.

Recommendations

- The Nigerian government should be proactive in its approach to making online/electronic transactions safe and boost the confidence of the parties to such transactions. This requires enacting laws, particularly and Electronic Transaction Act, Laws should be enacted, particularly the Electronic Transaction Act to give remedy to persons who wish to sue as a result of unwholesome acts such as fraud, identity theft, breach of data security *et cetera*.

- Data protection laws, both at the federal and state levels, should be enacted similar to what obtains in the United States. In view of how use of the internet has become increasingly popular, having only a federal legislation in place would not adequately address the problem of data insecurity.

- More awareness should be created on the merits of electronic contract.

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IMPACT OF LIBRARY ROLE IN PANDEMIC MANAGEMENT ON SUSTAINABLE DEVELOPMENT IN NIGERIA (A STUDY OF SOME SELECTED LIBRARIES IN OGUN STATE)

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Abstract

The outbreak of corona virus, known as Covid-19 by the world health organization has thrown the global community into fear and anxiety. While the developed countries are test-running their techno-medical prowess in effort to develop drugs and measures to curtail much spread. The non-developed countries like Nigeria have found the pandemic a herculean task to contend with due to poor advancement in technology and information management. This study highlighted information on how disaster management has affected national income and how emergency have in one way affected nation's human capital. The study is an empirical investigation conducted through a self-administered survey questionnaire which was used to elicit information among some selected libraries in Ogun State. Data obtained from survey were analyzed and presented through the use of ordinary least regression inferential statistical technique. Data obtained from survey were analyzed and presented through the use of ordinary least regression inferential statistical technique. Findings from the study revealed that; disaster management is a function of crime national income ($R = 0.656$, $R_2 = 0.423$, $P < .05$). Also, emergency management is a function of nation's human capital ($R = 0.641$, $R_2 = 0.411$, $P < .05$). The study concluded that if Nigeria improves on disaster management planning then there will also be a rapid improvement in her economic activities as well as human capital development.

Keywords *: Covid-19, libraries, disaster management, national income, emergency management*

Introduction:

The novel Coronavirus (Covid-19) pandemic broke out in Wuhan, China in December 2019 (Kandola, 2020). Scientists and health professionals are working day and night, tirelessly to limit COVID-19 from further infections. COVID-19 is a new strain of coronavirus that has not previously been seen in humans with symptoms such as fever, cough, loss of smell, tiredness, muscle pain and mostly difficulty breathing.

According to the World Health organization (WHO), as of 24 April 2020, there were close to 3 million confirmed cases globally and since then has risen substantially. As scientists and health professionals search for solutions to COVID-19, librarians have the important role of disseminating COVID-19–related information and resources to the public through various virtual media channels available to them, especially as most people may not come to the library or because the library may be closed during the COVID-19 pandemic.

The fast spread of this virus has called the attention of the world to quickly take all the necessary measure fight and control the spread of the virus, it has killed more than eighteen thousand individuals within the first fifty days of the epidemic (Wang, 2020). Presently, the global community is ravaged by the pandemic while the end to the COVID-19 pandemic is remains unknown due to variations of its spread among the countries.

Social media network sites are online platforms through which individuals, groups and organizations create presence and share information through texts, photos, music videos etc. The more worrisome aspect of the social media is its potency to be used to spread fake news with its significant negative effects on the society and on people's decisions and behaviors. Fake news comes in various forms such as comedy for fun, however, a type of fake news which succeeds in convincing people of an untrue message is obviously quite worrisome.

The potentials of the libraries and its associates to acquire, evaluate, package, store and disseminate information, especially to the information poor society has placed a huge demand on it to intervene in critical situation such as COVID-19 pandemic era.

The roles of the Nigerian libraries and the associations are more crucial in the face of the prevailing global pandemic. It is apparent that fake news and misinformation have created confusion and subsequently, posed greater challenge to every effort to curtail the spread of the virus. In this regard, academic, special and public libraries in Nigeria can provide and share information quickly, efficiently and in real- time as strategies in response to COVID- 19 pandemic through their social networking pages like Facebook, Twitter, Instagram and LinkedIn. They can provide a platform for gathering and disseminating information to promote awareness of the current situation. Bello and Aghadiuno (2019) summarized information dissemination as the channel through which facts are linked to the rightful individual seekers and organizations. All these may not be achieved without the necessary technology in place.

Technology has impacted the way we access and handle information resources, thereby improving quality of information we have at our disposal. According to Shonhe and Jain (2017), potential library users have positive attitudes towards technology; they have competent skills to use mobile technology and they access information daily using mobile technology. It is observed that changes in user information needs have put more pressure on the delivery of library services. According to Verma and Verma, (2014), today's libraries are operating in a more advanced technological era, and hence the need to remodel library resources and services to fit into the 21st century era. However, this study considers the role of library in pandemic management for a sustainable development in Nigeria.

Statement of Problem

The outbreak of corona virus, known as Covid-19 by the world health organization has thrown the global community into fear and anxiety. While the developed countries are test-running their techno-medical prowess in effort to develop drugs and measures to curtail much spread. The non-developed countries like Nigeria have found the pandemic a herculean task to contend with due to poor advancement in technology and information management. This study highlighted information poverty as a resulted of dependence on social media as information source which has left the country managing and circulation fake news. Fake news and conspiracy theories, population and hunger, religion, doctor to patient ration, social gathering ignorance have provided challenges to the fight against the pandemic. Dhawan (2018) notes that information dissemination is a proactive information service designed to educate and inform various groups of users on social, economic and educational issues, problems, and opportunities of interest to them. It requires systematic planning, collection organization, and storage of information for its delivery to the target.

(Pal, 2013) notes that today's librarians don't always acquire new psychological, praxeological, social and professional capabilities. COVID 19 pandemic has affected the nation's economy and human capital of a country like Nigeria adversely. This occurred as a failure from the government to proactively engage the role of library in pandemic management in the area of disaster and emergency Management respectively.

No nation can grow or develop when there is no adequate provision for center of virus spread and where societal can not get the necessary information on how to control or reduce the spread of disease to a reasonable point. In order to be more steadfast in pandemic management as it damages and crumbles the development of a nation, there is need to involve use of library and educate people on how to good library users as it stands to be medium to obtain the required information that will put end to the spread of an outburst virus in the community. Hence, this study examine the role of library in pandemic management for a sustainable development in Nigeria.

Research Questions

1. To what extent does disaster management affect national economic?

2. How does emergency management affect nation's human capital?

Research Hypotheses

Base on the research objectives raised above, the following null hypotheses were formulated for the study:

1. Disaster management has no significant impact on national economic.

2. Nation's human capital is not affected by emergency management.

Literature Review

Concepts Clarification

The role of libraries in disseminating information during Covid-19 Pandemic

Public services have been paralyzed, academic activities and classes have restricted to online due to closure of colleges. Community need information on how to cure themselves against coronavirus, scientist and researchers are highly engaged to control the situation. In this time, libraries have a role to play in the provision of access to information resources and services.

The roles of the Nigerian libraries and the associations are more crucial in the face of the prevailing global pandemic. It is apparent that fake news and misinformation have created confusion and subsequently, posed greater challenge to every effort to curtail the spread of the virus. In this regard, academic, special and public libraries in Nigeria can provide and share information quickly, efficiently and in real- time as strategies in response to COVID- 19 pandemic through their social networking pages like Facebook, Twitter, Instagram and LinkedIn. They can provide a platform for gathering and disseminating information to promote awareness of the current situation.

Dhawan (2018) asserted that information dissemination is a proactive information service designed to educate and inform various groups of users on social, economic and educational issues, problems, and opportunities of interest to them.

Okike and Adetoro (2019) confirmed in their study that it is pertinent that librarians re-tool and up-skill themselves in information and communication technology to ensure secure information systems.

Libraries can strengthen online services to provide access to their resources. Recently, National Digital Library of India (NDLI) has initiated of specially designed collections of e-resources for specific group of students to help the student community in the difficult situation rising out of the suspension of physical classes and closure of physical libraries arising out of COVID-19 lockdown. The services are provided through the library social networking pages.

Academic Libraries

Academic libraries have a vital role to play in the provision and dissemination of genuine information to cure and fight coronavirus to their respective users through social media. However, the closure of academic activities necessitates most of class to operate online. Libraries also can provide online services to assist students with access to materials for assignments, selection and dissemination of information resources on COVID-19 to researchers, virtual research help, virtual instruction, online reference services, access to e-books and e-journal, linking users to health institutions and organization on information relating to coronavirus, publish a pamphlet and handbills for safety measures against coronavirus. Recently, Information Technology (IT) and internet companies such as Google, Microsoft have provided free teaching and learning tools to support students and teachers learning at home.

Special Libraries

Special libraries especially those at health centers and research centers can work extensively with medical professional to enlighten their communities via social media about coronavirus and self-protection measures. They can provide access to databases, websites, e-books, e-journal and repositories to health workers, scientists and health agencies on how to tackle coronavirus. They can also work with public health agencies and research centers, and in the broader health sector, are very active, helping to manage information and support efforts to strengthen understanding of the developments.

Public Libraries

Public libraries have a vital to play in the situation of public health emergency. Public libraries can provide services to the public on coronavirus pandemic by providing current information and reliable resources for understanding and responding to the COVID-19 on their websites. This led to the development of blog to support learning from home. The information guide should include information on what coronavirus is all about, how the virus spreads, steps to for self and family protection, steps to protect other in the community. They should also provide information on travel information, government announcements, accurate and up-to-date information that can change or evolve the virus rapidly. Public libraries can also provide free online homework and school assignment help to students, access to a wide range of online e-books, audio books, news sites, magazines and streaming videos to help people get through the COVID-19 pandemic. They can also explore distance learning resources for schools affected by pandemic

Sustainable Development

Development is the gradual growth of a situation that becomes more advanced and strong than previous one. Development is intended to bring a positive change for human being and its surrounding.

Stoddart ,2011 define sustainable development as the development that meets the needs of the present without comprising the future generations to meet their own needs. Albeit somewhat vague, this concept of sustainable development aims to maintain economic advancement and progress while protecting the long-term value of the environment. The overall goal of sustainable development is the long-term stability of the economy and environment; this is only achievable through the integration and acknowledgement of economic, environmental, and social concerns throughout the decision making process.

Sustainable Development Goals

As stated by the United Nation□s Commission on Environment and Development (UNCED), sustainable development is defined as "developments that meets the needs of the present generations without compromising the ability of future generations to meet their own needs." As presented by the United Nations, the 2030 Agenda for Sustainable development are;

1. To totally eliminate all forms of poverty.
2. Terminate hunger, food security is achieved and the promotion of sustainable agriculture.
3. The health and well-being of everyone is ensured.
4. Lifelong education is promoted.
5. Gender equality and empowerment of all women and girls is ensured
6. Water and sanitation is made available to all
7. Ensure access to affordable, reliable, sustainable and modern energy for all.
8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.
10. Inequality is reduced greatly in all countries.
11. Cities are made safe for human settlement.
12. The sustainability of consumption and production pattern is made sure.
13. Adequate and quick action is taken to eliminate climate change and the impacts it poses.
14. The oceans, seas and marine resources are conserved for sustainable development
15. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

16. Global partnership for sustainable development is ensured which in return strengthens the means of Implementation.

Theoretical Framework

The impact of library role in pandemic management on sustainable development in Nigeria can be investigated from three competing theories . The following competing theories to be examined are; Human Capital Theory and the Three Competing Theory

Human Capital Theory

Human capital theory is concerned with knowledge and experiences of small-scale business owners. The general assumption is that the human capital of the founder improves small firms' chances of survival (Bruederl et al. 1992). Human capital acts as a resource. However, human capital theory studies usually assume that experiences are translated into knowledge and skills. This assumption is problematic, however, because length of experience is not necessarily a good predictor of expertise (Sonnentag 1995). Therefore, it is not surprising that human capital factors, such as length of managerial or industry experiences or education, are not strong predictors of success, although in large-scale studies they usually are significant (Bruederl et al. 1992, Rauch and Frese

Empirical Review

In a study conducted by Shonhe and Jain (2017), most respondents prefer to access library collections or resources through mobile devices. Social media are more appropriate for use on marketing information and delivering personalized information resources to groups of people or individuals. Quick response (QR) codes, two dimensional barcodes that direct users to desired websites, can be used by libraries on a certain topic or subject area.

Echezona (2007) writes that by delivering high quality services, libraries and information centres have contributed immensely to ensure greater access to information resources and also a collaborative emergency planning should be given great attention as it greatly affects human capital development. Shonhe and Jain (2017) observed that publishers presently provide a wide range of eresources that are accessible through mobile technology.

Okike and Adetoro (2019) confirmed in their study that it is pertinent that librarians re-tool and up-skill themselves in information and communication technology to ensure secure information systems.

Sreenivasulu (2000) notes that the ultimate goal of a digital library is to facilitate access to information just in time to the critical wants of end users and additionally to facilitate electronic publishing.

In this era of information explosion where thousands of bits of information are chunked out on daily basis, librarians are expected to collect, organize, store and disseminate the information for consumption of the users. In the current global pandemic, there are new ways to deliver information both real and fake; it is left for librarians to sort out the real information for their users to avoid misinformation. It is expected that librarians work independently to deliver

service-oriented, researcher-centered applications, instructional programmes, projects and services. Tait (2016) note that the tools and resources used to supply required information and transform it into knowledge have changed, but the librarian's role has remained unchanged.

METHODOLOGY

This study is an empirical investigation as the study was conducted through a self-administered survey questionnaire. This research adopts both descriptive and inferential research design and it is concerned with the collection of data for the purpose of assessing the effect of library role in pandemic management on sustainable development in Nigeria.

Questionnaire was the instrument used to elicit information from the users of selected libraries in Ogun State. The questions were based on a 5-point Likert attitude scaling ranging from Strongly Agreed, Agreed, Undecided, Disagreed and Strongly Disagreed.

Table 3.1: Population of the Study

Name of library	*State library*	***Higher institution library***		*Total Population*
		Federal Poly, Ilaro	***Ogun state university***	
Population	*400*	*500*	*500*	*1400*

Source: Ogun State Libraries

Method of Data Analysis

To analyze the data collected from primary sources, multiple regression analysis via (OLS) Ordinary Lease Square using SPSS version 20 was adopted to assess the effect of library role in pandemic management on sustainable development in Nigeria.

Model Specification

$SD= a_o + b_1DM+ b_2EM + e_t$

For this study n = 2 independent variables

SD= Sustainable Development

a = constant

$b_{1,}$ $b_{2,}$ = they are the beta coefficient

DM = Disaster Management

EM= Emergency Management

e= error

A priori expectation: The following a-priori expectation relationship are postulated for the estimated results. $B_1<0$, $B_2>0$

Test of Hypotheses

The data collected to test its hypotheses for the study was analyzed using a multiple regression of ordinary least square (OLS) method in order to validate how disaster management and emergency management affect sustainable development in Nigeria**.**

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.656[a]	.423	.49	.588

a. Predictor : (Constant), Disaster management, emergency management.

Source: SPSS Printout (2020)

The table 1 above depicts the model summary which reveals an R value of 0.656 (65.6%). This signifies that there is significant relationship between library role in pandemic management (proxied by diasater management and emergency management) and Sustainable development(proxied by national economic and nation human capital) respectively.. The R^2 value of 0.423 (42.3%) implies that the combined effect of the sub-variables of sustainable development explains 57.37% of variations in sub-variables of library role in pandemic management. Also, a very close Adjusted R Square value of 49.0% signifies a goodness of fit of the regression model and that the model proved to be useful for making inference about the influence of library role in pandemic management on sustainable development.

Table 2: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	66.607	4	16.652	51.616	.000[b]
	Residual	94.524	293	.323		

Total	161.131	297			

a. Dependent Variable: Sustainable Development (national economic, nation human capital).
b. Predictors: (Constant), Disaster Management, Emergency management
Source: SPSS Printout (2020)

Table 3: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.854	.261		3.158	.002
	Disaster management	.296	.054	.289	5.255	.000
	Emergency management	.287	.058	.281	4.862	.000

a. Dependent Variable: Sustainable Development

Source: SPSS Printout (2020)

The table presented above provides more information about the influence of the sub-variables of the independent variable (library role in pandemic management) on the dependent variable (sustainable development). Based on the standardized Beta () obtained in the table, it can be inferred that sustainable development of Nigeria would increase by 85.4% when all other sub-variable of library role in pandemic management are held constant. Sustainable development of the country would increase by 29.6% and 28.7%, when there is an increase in Disaster management, emergency management respectively. Furthermore, the P-value obtained for each of the variables is less than the critical value of 0.05 (5%) at 95% confidence level. Hence, library role in pandemic management has Disaster significant effect on sustainable development in Nigeria.

Discussion of Findings

The study examined the role of library in pandemic management on sustainable development in Nigeria. It was observed that disaster management affect national economic. The second objective revealed emergency management will affect nation's human capital if not being addressed.

The findings can be linked to what Echezona (2007) writes that by delivering high quality services, libraries and information centers have contributed immensely to ensure greater access to information resources and also a collaborative emergency planning should be given great attention as it greatly affects human capital development.

Conclusion and Recommendations

This study has presented a snapshot about the role of library in pandemic management on sustainable development in Nigeria. The current study has concluded base on findings that library role has a very strong relationship to national sustainable development. It was inferred that disaster management and emergency management will affect nation's economic and human capacity respectively.

The study has therefore proffered the following recommendations base on the conclusion:

- Nigeria needs to improve on disaster management planning in order to improve her economic activities.
- A collaborative emergency planning management should be given great attention as it affects human capital development.
- A good resource hub for latest news and update should introduced so as to help reduce nation ecology.

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SUSTAINABLE DESIGN CULTURE: THE ROLES OF ARCHITECTS AND LIBRARIANS IN ACADEMIC LIBRARY BUILDINGS

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Abstract

The dynamic development in library services and its apparent influence in all areas of human endeavour has stimulated the provision of current information to the right kind of users in the right format and at record time in a serene environment. Information dissemination in a composed and users' friendly environment is sound judgment and right decision making any library can make; therefore, the subject of library space design has become a wide and interesting field. The design of a library is importantly inclined to suit the purpose, mission, and vision of the parent body or the organization, with consideration to the advantage of a natural outdoor environment as well as promoting the healthy indoor condition of the library. This can be achieved using innovative strategies and technologies to avoid an adverse effect on the natural state of the air, land, and water. The library structure should also be designed to maximize the benefits of natural heat, cooling, ventilation, and illumination for sustainability. Should there be a need for expansion or modifications to suit the existing environmental condition, then the services of a professional architect who executes pre-design, design and post design stages of the building are needed. The architect also considers the sustainability trend before the library is finally completed and occupied by library staff and users for various services. This paper, therefore, examined the professional roles of both the architects and the librarians in designing sustainable academic library buildings that would last longer and provide for effective and efficient library services both for the present and the future generations.

Keywords: Design, Building, Architects, Librarians, Sustainability

Introduction

A library is defined as a place where relevant, current and up to date books and other information materials of different formats are methodically selected, acquired, processed, organized, stored, preserved and disseminated to users at suitable time to meet their information needs for teaching, learning, research, recreational, wellness, safety, cultural and aesthetic purposes (Abiolu, 2010). Library information materials are collections such as hard copies (books, periodicals, journals, encyclopedias, dictionaries, maps, gazetteers, indices, abstracts and government publications) and soft copies (CD-ROM, databases, internet resources, audio materials, video materials, microforms, etc.). A library could be a physical building or room, or a virtual space, or both.

According to Ode and Omokaro (2010), the library is a designated building where information in prints and other formats are collected, organized, carefully prepared according to some specific or definite plan, and made accessible for reading and consultation by all ages and interests. In like manner, a library is simply an institution of books collection and other informational materials made available to people for reading, study or reference. It is also seen as a citadel of learning which collects, organizes, preserves and provides access to knowledge and information. Libraries are of different types, they come in all shapes and sizes depending on the conceptual development evolved primarily to balance both functionality and aesthetics, this is in line with the opinion of Denny, 2004 who claimed that library as a building, is more than a collection of books; it serves as an interactive multimedia centre designed to support learning and social cohesion.

The design of a new library building or remodeling an existing one requires the consideration of many complex and interrelated factors that involve the skills of architects and librarians. The architects are to suggest the most suitable requirements in terms of space, rhythm, site location, expertise, materials finishes and construction methods. The library environment has a significant influence on students' learning and growth, with a major facet of their educational, social, ethical and emotional development. Professionally, a well-designed and accommodating school environment encourages users to concentrate on their studies, become less violent, with less delinquent behaviour. Arul (2012) opined that the school environment enriched with modern facilities makes the students feel comfortable in their studies which results in high academic performance.

Before the building construction starts, there must be proper expected design spelled out to describe the library building and its potential usability as well as the workability to conform to its purpose considering the structure, the infrastructure, equipment, their placement, and arrangement. Jakovleva (2011) stated that planning library buildings revolve around the intersection of architectural and library science; each of them with its theoretical and philosophical level and is broadly divided into two factors namely integrated library factor and integrated architectural factor. The former consists of library functions, library technologies and the form of information media available in the library, the latter, however, consists of planned –spatial solutions on the area for user service, storage (space for information media and area for the staff). However, the two factors complement each other towards the evolution of a sustainable library building. Design is the creative part of any job: identifying the objective, exploring the possibilities, picking a course of action and testing and improving until we get it right (Jackson, 2010).

Literature Review

An academic library is a library attached to higher institutions of learning to provide for the information needs of students, academic staff, researchers, and other community of users (Anuuobi and Okoye, 2008). It is at the centre of the academic excellence of all educational institutions making available all the relevant information resources required to support the vision, mission and core values of the parent institution. An academic library is attached to higher education institutions for two complementary purposes: to support the school's curricula and the research of faculty and students (Curzon and Quinonez-Skinner, 2009). The educational health, intellectual vigor and value of the educational institutions in producing academically robust graduates into the labour market is directly proportional to the quality of information resources available in their libraries to support research activities. According to Yacom (2011), Academic libraries are institutions that are established to take care of the information needs of students, lecturers, researchers and other community of scholars. The academic library also serves as a device for intellectuals' freedom and economic development; a gate-way to political, economic and social bliss and survival. It connects man to the world in the actualization of its functions as a repository for knowledge in all forms and shapes.

Library buildings, if professionally designed in line with the specifications given by the architect, will result in users' satisfaction and productivity. However, wrong design often leads to waste of time, money, creative energy, frustration, and discomfort. A building with poor environmental qualities (acoustics, lighting, ventilation, etc.) can generate discomfort and dissatisfaction among users and thus, decrease library use (Brown, Cole, Robinson and Dowlatabadi, 2010). The process of achieving the right design involves a series of activities and the techniques required are sequential as a step leads to the next step. The evolution of the right design is a skill with several principles involved and techniques developed to aid good designers in implementing these principles. Also, the design is a process; demanding a place to start and steps to follow (Jackson, 2010).

According to Jackson, 2010, the process of achieving the right design applies to adaptation in all design codes and contexts. The following are the steps to follow for achieving the right design.

- **Problem definition**: This involves the demanding for the identification of the product or project and concepts intended for design.

- **Measurement of the need and set of targets:** This step involves making a statement of the product/project and its fundamental requirements and also developing measurable performance targets.

- **Exploring the design space**: There might need to modify the initial product to meet all of the requirements already identified. This stage requires brainstorming and application of other techniques to conceptually explore the range of design possibilities.

- **Optimizing design choices**: Having explored the design space, some workable integrated concepts from which to choose emanate. Hence, the need to compare the integrated concepts with other perspectives in which selection can be made, thereby, setting parameters to optimize trade-offs.

- **Developing the architecture**: This step stems from the definition of product in greater detail, identifying the components or subsystems and defining how these components will work together to achieve the product behaviours. At this stage, all the physical constraints that each component must satisfy to meet the product level targets must be identified.

- **Validation of the design**: At this stage, a master plan is developed to ensure that the product will meet the needs for which it was designed. Similarly, the identification of the risks of the projects and developing a strategy for mitigating those risks are paramount.

- **Execution of the design**: This demand for the development of a plan towards bringing the project to a successful, desired and timely conclusion.

- **Iterating the design process**: For simple design problems, the preceding steps should be sufficient but the complex system must be designed in layers. Here, one learns how the design process is adapted and repeated for the next layer of detailed design. Also, one will understand the need for information tools to manage the explosion of detail and to ensure that the complex product will meet the needs for which it is being designed. Iteration is also required when you hit a roadblock in the design; thereafter, one can learn to close out every design cycle with a system's view of accomplishments.

Designing A Better Academic Library Building

Designing an academic library requires suitable accommodation for its employees, users, and resources. For instance an academic library must cater for reading space that facilitates teaching, learning, and research; its location must be central for ease and convenience of access through decent and unobstructed network of roads, in a serene environment furnished with aesthetic purposes using good landscaping system; through an organized set of strategies for spaces, function, structure, biodiversity, urban ecology and iconicity, climate sensitivity, vertical circulation wind and ventilation. Partoub (2007) opined that factors such as the library complex, its growth rate, number of potential and actual users, library sections (catalogue, reference, borrowing, study, etc.), furniture and equipment, the way services are offered, physical conditions (climate, user comfort, consideration of their physical and cultural conditions, maintenance of the library complex, humidity, heating-cooling systems, light, noise, etc.) and other elements should be considered in library building design. Achieving these, therefore, would involve the collaborative efforts and professionalism of the librarians and other building design professionals such as architects. Librarians' Registration Council of Nigeria (LRCN) Minimum Standards and Guidelines for Academic Libraries in Nigeria has the following recommendations on space requirements, floor requirements and furniture (Jankowska & Marcum, 2010) as listed below:

Space Requirement: The space requirement for academic library includes but not limited to the following:

i. Provision of sufficient space for staff offices and their conveniences;

ii. Provision of sufficient accommodation for at least 20% of the total user population;

iii. Provision of adequate accommodation for collections, including books and other materials;

iv. Provision of suitable accommodation for Information Communication Technologies (ICTs) and other multimedia facilities;

v. Provision of conducive individual study space for research and presentation;

vi. Provision of adequate space as common room/conference for users;

vii. Provision of adequate space for toilet facilities;

viii. Provision of adequate space for snacks and coffee room;

ix. Provision of adequate cooling systems and adequate cross-ventilation;

x. Provision of sufficient lighting through natural and artificial means;

xi. Provision of suitable relative humidity;

xii. Provision of rooms that allow users to be loud as they wish without disturbing other library users, allowing activities like music and television; and

xiii. Provision of adequate space for ICT laboratory that can accommodate at least 5% of the user population (Sannwald, 2006).

Floor Requirement

i. The library building should be friendly to the physically challenged without any form of discomfort;

ii. The building should meet the acoustic requirement by being noise-free and maintenance culture;

iii. Each study space shall occupy between 2.5 and 4 square meters depending on the users' category;

vi. Each stack area for books shall be at least 10.75 square meters;

v. The library shall provide spaces for the collection, display, reading, meetings, electronic workstations, multimedia workstations, viewing rooms, staff working areas including staff lounges and kitchenettes, space for special use, preservation and conservation, such as bindery.

It is important that the library building is provided with sufficient energy and communications facilities for lighting and internet connectivity respectively as this will aid the frequency of users.

Furniture and Equipment

There is a need to provide library-fitted furniture and equipment for academic libraries. The use of local furniture and equipment that are of international standard should be employed mainly for availability and ease of maintenance; adequate equipment should be provided for computer laboratories, and learning facilities and resource rooms; this library furniture and equipment should be provided in adequate measures: shelves, journal display racks, circulation desks, reading tables and carrels, reading chairs, catalogs cabinets, kicks- steps, trolleys, pick up vans/ trucks, periodical racks, OPAC translators.

Fig. 1 Use of Local Furniture within the reading section of Salawu Abiola Memorial Library, MAPOLY, Abeokuta, Ogun State, Nigeria

Source: Internet Google Search

Fig. 2 Approach view of Salawu Abiola Memorial Library, MAPOLY, Abeokuta, Ogun State, Nigeria; showing imminent need for total restoration towards achieving sustainability

Source: Researcher's field work

Design fundamentals for a sustainable library building

Academic library buildings do exist for various purposes such as private, public, institutional, community, office, etc. What is important is to create value for information and its processors and ensure its even dissemination to the user community in a good environment. In his appraisal of library sustainability, Marcum, 2009 discovered that librarians play an important role in the Internet space, protect and organize knowledge to facilitate the design of educational environments. The learning environment is shaped by designers, it must be noted that how comfortable and conducive the environment is, directly leaves an imprint on the performance of its users (Ogbadu and Arong, 2010; Chukwuemeka, 2013). However, in designing any type of library, some considerations are to be made during the planning stage towards achieving sustainability of the library building in the long run.

In recent times, issues of sustainability of library structure are becoming progressively imperative. Now and for the future, sustainable design must be part of library planning, operations, collection developments and service provision (Jankowska and Marcum, 2010). This is because sustainable buildings that are environmentally friendly and energy-efficient designed requires implementing a holistic approach to decrease the negative impacts the failure of undertaking the approach would have on users and the environment (Ali and Al-Nsairat, 2009). Sustainability is altering typological assumptions as well as detailed architectural approaches, leading to libraries that offer greater user satisfaction, thus, are better places to read, meet friends, or study (Edwards, 2011). The most vital spaces in school buildings are mainly three, they are instructional spaces, recreational spaces, and facilities (Changu & Maida, 2005; Isaac & Musibau, 2009; Peter & Yufan, 2009). Instructional spaces are the ones where formal learning and training occur; they are specifically designed and prepared to suit that purpose. They include classrooms, library, workshop, laboratory, school farm, etc. Peter, Yufan, Fay & Lucinda, 2015 submitted three principles to be considered in the design of school buildings and they are naturalness, individualization, and level of stimulation. Naturalness is associated with factors that affect the health, emotions, and mood, visual, acoustic and thermal comfort of people within a space. Individualization involves factors that affect student‘s safety, privacy, free space, ease of use of spaces and satisfaction with their learning environment. The level of stimulation encompasses the factors that affect how the school environment supports its users by the serenity, balance, fitness, beauty, and information it gives. Therefore, to engage sustainability, the academic library should adequately supply solutions to the following questions at its design stage.

- **Where will the library be?** This simple request for an accessible location to all users. The wrong location affects the sustainability of any library building.
- **Is natural light always the best?** This should be adequately provided for, as daylight has been proven to boost students' achievement in the library.
- **Should there be multiple flooring types for activities and acoustics?** Consideration for various floor finishes for different activities and acoustics purposes should be made.

- **Is it necessary to have mobile walls that enable visual supervision and acoustics for direct instruction, performances, and presentations?** This is necessary to allow groups of different sizes to utilize space at the same time.
- **Which furnishing, equipment, casework, and shelving will be mobile?** Consideration for the location of these items should be made either as fixed or mobile ones.
- **Should technology be part of the considerations?** The location for technology-based items or devices such as the internet, copiers, printer, video, audio, etc. should be appropriate.
- **What about the plumbing?** Consideration for sinks and floor drains in terms of quality and quantity should be included in the design.
- **Any need for electricity?** As an alternative form of light provision, it must be properly considered in all spaces. Online service is aided by electricity.
- **What type of ceiling finishes should be used?** Most importantly, the functionality of these ceiling materials with little or no cognizance for aesthetics should be considered. Those that will be resistant to heat transmission should be specified and employed. This allows for optimal cooling during the day.
- **Should landscape architecture be incorporated into the design?** Planting of trees, shrubs, and flowers should be part of the design as it allows for proper aeration and outdoor comfort by the users.

Challenges of Sustainable Design Culture of Library Buildings and Corresponding Solution

However, the sustainable design culture of library buildings may pose certain challenges that must be strategically solved by engaging professional techniques. Tseng (2007) evaluates the professional architecture and design characteristics of Beitou Library in public libraries system in Taipei, and presents possible solutions to meet public expectations. The research findings have shown that creative and unique design and equipment can lead to a new trend in the areas of design in Taiwan which in turn can increase the visits to the library and enhance the visibility and improve the public's attitude toward the library. The challenges may range from low awareness, inadequate funding, lack of required organizational planning as regards equipment and infrastructure to technical know-how. Wilson (2012) examined Washington University Library sustainability in terms of organizational planning, and the findings represent sustainability indices of the library including reconstruction and rehabilitation of existing equipment instead of supplying new equipment, creation of proper virtual and physical spaces, ability to use technology in the new library, create new values for the library with technological choices, user-centered design of spaces and equipment. A similar report was recorded by Brodie (2012), in his study of issues and challenges relevant to the sustainability of a new library in McGuire University in Sydney; sustainable design and library's activities, library, library collection sustainability, reviewing the structure of library and its services were investigated. The results showed that users are aware of the new library and they evaluated it positively. They also addressed the issues relevant to library building and service to improve sustainability.

Fig. 3 Panoramic view of Beitou Public Library in Taipei as evaluated by Tseng (2007) for sustainability
Source: Internet Google Search

Fig. 4 Side view of Beitou Public Library in Taipei as evaluated by Tseng (2007) for sustainability

Fig. 5 Washington University Library as examined by Wilson (2012) before rehabilitation for sustainability
Source: Internet Google Search

Fig. 6 Washington University Library as examined by Wilson (2012) after rehabilitation for sustainability

Conclusion

The use of an academic library can be encouraged through its appropriate design. Academic library users may be unwilling to use the library because the aim and objectives of some academic library buildings are retarded as they lack sustainable design culture right from the pre-design stage. This is because the inputs of both architects and librarians have not been properly interwoven but rather interspersed as a coalition of both integrated library factor and integrated architectural factor were not properly harnessed, conceptualized and implanted. The design of sustainable library buildings for the 21st century, therefore, calls for the mutual understanding and collective roles of both the architects and librarians in their professional practices.

Recommendations

It is therefore recommended that:

1. Architects should be commissioned to discharge their roles in conjunction with librarians while taking tasks on academic library complex designs.

2. There must be provision for adjustments during the design and construction stage as this is paramount when considering the fundamentals required for sustainable academic library building design.

3. Users' satisfaction, easy library service provision, and sustainability should be of paramount consideration in academic library design processes.

4. Academic library design procedure should follow the operational principles of the LRCN minimum standards of academic library building design.

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COVID-19 PANDEMIC INFODEMIC: DANGEROUS EFFECT AND NEGATIVE IMPACT OF MISINFORMATION

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Introduction

There is an Infodemic-too much information on COVID-19. Some are right, some are misinformation and misleading while many more are out rightly fake news, this is not just confusing but has dangerous effect. During the outbreak of novel Corona virus also known as Covid-19 pandemic, the world was suffering from infodemic more than the pandemic which compounded and complicated to so many problem facing humanities which this paper will outline in full. There was no manner of information about covid-19 pandemic we did not hear during the peak which was later found out to be false as of today. The damages caused by those infodemic may not be reversible and redeemable but more worrisome is the sources/channel through which it gets across to the whole world. As Information professional we tend to address this issue urgently as caution to position the world to know access and spread right information.

The concept of Infodemic

Ghebreyesus said (2020) "We're not just fighting an epidemic; we're fighting an infodemic," referring to fake news that "spreads faster and more easily than this virus." Contributing further World Health Organization "explains that infodemics are an excessive amount of information about a problem, which makes it difficult to identify a solution. They can spread misinformation, disinformation and rumors during a health emergency"

In his own Rothkopf (2020) said "what exactly do I mean by the "infodemic"? A few facts, mixed with fear, speculation and rumor, amplified and relayed swiftly worldwide by modern information technologies". Myung Bak (2008) "coined a new word to describe the spread of inaccurate information; he calls it an infodemic" Mercier (2017) "Misinformation is false or inaccurate information, especially when it is deliberately intended to deceive". Merrrian-webster.com "Infodemic is a blend of "information" and "epidemic" that typically refers to a rapid and far-reaching spread of both accurate and inaccurate information about something, such as a disease. As facts, rumors, and fears mix and disperse, it becomes difficult to learn essential information about an issue"

Infodemic can therefore be summarily means but not limited to the following:

- Excessive amount of information/misinformation/disinformation about a problem during health emergencies which create confusion and distrust among people.
- Exaggerated rapid spread of inaccurate information about something such as disease deliberately meant to deceive the people.
- Fast spread of fake news more easily than virus.
- Unreliable too much information, facts mixed with fear, rumor about a problem that makes solution more difficult to achieve.

The Meaning of Corona virus

According to Africa centre for Disease Control and preventing website (https://www.africacdc.org/covid-19). "The corona virus disease 2019 (COVID-19) is a communicable respiratory disease caused by a new strain of corona virus that causes illness in humans. The disease spreads from person to person through infected air droplets that are projected during sneezing or coughing. It can also be transmitted when humans have contact with hands or surfaces that contain the virus and touch their eyes, nose, or mouth with the contaminated hands.

The Dangerous Effect or Negative impact of COVID-19 Pandemic Infodemic

The following Political, Social and economic challenges are associated with COVID-19 Pandemic Infodemic. Rothkopf (2003) observed that Infoedemic "have affected national and international economies, politics and even security in ways that are utterly disproportionate with the root realities.

World Health Organization said "Infodemics can hamper an effective public health response and create confusion and distrust among people".

Spring (2020) went further to disclose the Coronavirus: The human cost of virus misinformation led to mob attacks, mass drug and alcohol poisonings after viral rumors about its curative effects, Arsons, assaults and conspiracies, Racial tensions and violent attacks, ill from conspiracies, lose so many lives"

Mercier (2017) "Misinformation is dangerous because it can cause someone to die, tarnish the image of another, or shake up a lot of hard work. In economics, politics, business, and many other fields, one of the most important things is information, because it allows you to make decisions. Imagine an institution in which decision-makers do not know the importance of verifying the information they receive every day before using or sharing it. Misinformation can cause a lot of damage to the company's image and its relationships with suppliers and/or customers"

Burke (2020) "The pandemic has now led to roughly half the world's population being ordered by their governments to stay at home. Social media facebook, tweeter use has jumped and increased. But all this increased traffic could be harmful. According to a *2018 OECD* report, wider internet access has exacerbated misinformation. The report found that misinformation devalues expert information and can have a 'devastating' impact on public order as governments struggle to correct rumors. The uncertainty surrounding coronavirus means people can fall victim to misinformation online, he says. '(Misinformation) tends to be built around these gaps in our knowledge or build on certain emotions and fears"

More Dangerous Effect or Negative impact of COVID-19 Pandemic Infodemic includes

The following health challenges are associated with COVID-19 Pandemic Infodemi

- ***Anxiety disorder Pain***: Anxiety disorders can cause people into try to avoid situations that trigger or worsen their symptoms. Job performance, school work and personal relationships can be affected. In general, for a person to be diagnosed with an anxiety disorder, the fear or anxiety must: Be out of proportion to the situation or age inappropriate. Hinder your ability to function normally" Anxiety can affect concentration and attention and once this anxiety disorder holds grip of an individual he or she will be demobilized to engage in daily activities which will invariably affect his family, finance and the economy of the world. This anxiety disorder can get hold of a person (s) due to COVID-19 Pandemic infodemics which if the right information is passed across, the victim could have not.

- ***The Bondage of Fear:*** Fear makes the mind dull and breeds illusions. Once you are afraid your mind absolutely withdraws, isolates itself and looks immediately to somebody to help it out, it builds a wall round itself via activity, lies, and every form of activity except facing that fact. A mind that lives in fear is a dead mind, is a dull mind; it is a mind that cannot look, see, hear clearly, directly. Fear exists only in relationship to something else such as COVID-19 Pandemic Infodemic and one of the things that breed fear is wrong Information of event either seen or heard. At the outbreak of the COVID-19 Pandemic event many Fake news, Exaggerated, Inaccurate, and Misinformation was fast spreading thereby creating more problem than the virus itself. Proliferations of Infodemic created suspicion which separate people from been free from Pandemic waves. Once you know the truth from right COVID-19 Information, you will able to face the COVID-19 Pandemic situation with confidence and also become free from suspicious doubts and bondage of fear.

- ***Mental Stress Disorder***: The way and manner the COVID-19 Pandemic Infodemic is spreading can caused a lot of shock, scare on so many people which can cause mental stress disorder which people may suffer and died from more than the COVID-19 pandemic itself. One can also develop mental stress disorder when he/she see through Mass media or learn through social Medias about a COVID-19 pandemic Infodemic event involving actual or threatened death.

- ***Causes of High Blood Pressure:*** COVID-19 Pandemic infodemic can trigger High Blood Pressure due to sleeplessness caused by fear of fake news. Shep (2019) "People who sleep five hours or less a night may be at higher risk of developing high blood pressure or worsening already high blood pressure. It's thought that sleep helps your blood regulate stress hormones and helps your nervous system remain healthy. Over time, a lack of sleep could hurt your body's ability to regulate stress hormones, leading to high blood pressure.

From the health experts submission COVID-19 Pandemic infodemic can trigger some health challenges such as High Blood Pressure, Mental Stress Disorder, The Bondage of Fear, Anxiety disorder Pain, and from political, social and economicdevastating' impact on public order as governments struggle to correct rumors, tarnishes the image of business organization which affects customer demands and supplies, destroys the reputation of social and political organization, led to mob attack and lose of lives, Racial tensions and violent attacks conspiracies, create confusion and distrust among people due to fear of Infodemic about the COVID-19 Pandemic problem facing humanity during this health emergency. Looking critically further to COVID-19 Pandemic Infodemic the following danger/negative impact can be sure or ascertained:

- Makes people lose confidence in the government institutions, agencies and media because it make them paranoid.

- Leads to hysteria which usually is worse than any epidemic/pandemic

Recommendations

The following recommendations are proffered as a milestone to caution the effect/negative impact of COVID-19 Pandemic Infodemic

- Right Information must be made available especially by Government Press, National Orientation Agency, Social media blogs and individuals.
- The health professionals must give the true picture and education of COVID-19 Pandemic.
- Libraries especially National/Public libraries must stock readily available right information resources in printed and non-print forms.
- Individual must maintain psychological balanced behavior during the pre and post COVID-19 era.
- Individuals especially those with risk health conditions must develop confidence in Gods power, have deep breath, exercise frequently, continue taking medications, and always find themselves in Fun/comedy atmosphere.
- Individual need personal researched Information to keep them enlightened, as when one is not rightly informed it will breed deformation.
- Every one need stop, think, reflect, verify and check your sources of information, don't let emotion take over you.
- Every one need to be critical about social media; don't leave information in your online network with questions, if not verifiable answers don't share.

Conclusion

COVID-19 Pandemic is an emerging, rapidly evolving situation which needs rapid attention. We need to get the latest correct, right, accurate, latest, updated, public health and research information from published resources in printed and non-print forms not mere speculations or Infodemics which has damaging effect than the Virus pandemic itself. While as there is restriction of movement, there should not be restriction of COVID -19 right Information. As the coronavirus is spreading, so has misinformation – fueling discrimination and stigma. Information Professionals, Literate individuals, health experts, Media People must promote COVID-19 Pandemic facts over Infodemic fear. It is a task that must be done with all sincerity, fairness and equity.

IMPACT OF LIBRARY AND INFORMATION SERVICE DELIVERY AS TOOLS IN MANAGING PANDEMIC FORSUSTAINABLE ECONOMY

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Abstract

Globally, Information service delivery has been witnessing tremendous transformation in the technological advancement of economic development in the world. However, the comparism of African countries with other developed nations of the world shows that the level of exposure of ICT in the African countries including Nigeria is relatively low. As information managers, Librarians in the world must play crucial roles in the new challenges facing the economies of the world most especially during pandemic period. This paper looked at how we can manage the information needed to prevent and eradicate the spread of pandemic for sustainable economies. It also discussed various technological tools and information resources such as Database Resources (JSTOR, EBSCOHOST, Science Direct, MyiLibrarye.t.c), Books, Journals, Reference Sources use as sources of information in managing virus in the world. This paper further examines the issues surrounding the pandemic in order to point out the possible solutions in preventing the spread of the virus. It also brings to our knowledge, some challenges faced by librarians in having effective and efficient service delivery. Equally, the paper also enumerates the benefits and prospects of library and information service delivery in the pandemic period. Finally, it presents recommendation for managing pandemic in a sustainable economy.

Key Words: Library, Library and Information Service Delivery, Pandemic, Sustainable Economy

Introduction

The outbreak of corona virus (Covid-19) by the World Health Organization (WHO) as thrown the entire world into fear and anxiety that led all the countries into unexpected economic chaos. The virus (Covid-19) is highly transmittable and pathogenic viral infection cause by acute respiratory syndrome coronavirus 2 (SARS-COV-2), which emerged in business hubs of Wuhan in China on December 31, 2019. The outbreak killed more than eighteen thousand and infected over seventy thousand individuals within the first fifty days of the epidemic. The origin and transfer to human was not known but study shows that Bats have anti-SARS-COV antibodies suggesting the Bat as a source of viral replication. The common symptoms include fever, dry cough, shortness of breath, tiredness, sore throat, pains and aches and also cause diarrhea, nausea or runny nose in some people.

The disease has been transferred from human to human rapidly which have called the attention of the whole world to put necessary measures to curb and fight the spread of the virus.

The Library as a custodian of knowledge and information plays vital role in providing every necessary measure employed by the government to prevent and curb the spread of pandemic virus in the country through information service delivery. .

According to Adebayo (2012), he opined that for effective development, a public library must have a vital impact on the community, in which it is established and must as a matter of necessity, contribute to the promotion of information literacy and social cultural and educational services. It enhances sustainable development to all the populace of the nation by providing them with various library services to make them good relevant citizens in the community.

It provides non-scholars in the country with information materials like video tapes, audio tapes, video cd and compact cd to help inform and educate them on any medical, social, educational, political and economic issues that might be affecting the economy. The library also delivers or make information materials available directly to the people in the country through public, academic, school, special and virtual library around the nation at all local, state and federal level.

It provides Selective Dissemination of Information (SDI) to non-scholars in the state based on their peculiar information needs. It provides quick and timely response to the readers' enquiries in the state especially the non and semi -literate in the state through the provision of varieties of information carriers in the state. It also provides current awareness service (CAS) to the library users and all the state citizenry through pasting of posters in the library notice board and strategic places in the state to educate andd facilitate their awareness on any current issues in the country e.g. Corona virus, Ebola and Lassa fever, these posters will display the causes and methods of preventing these pandemics.

Abdulsalami, et. al, (2015) opined that the purposes of libraries have been changing over times and becoming more faceted and multifarious.

Libraries are not institutions or repository of materials but are agents of educational, social, economic and political changes or revolutions in the community and their doors are open to all who needs them.

Statement of problem

Today, it was observed that Information service delivery has been beholding great change in the technological advancement of economic development in the globe. However, some African countries with other developed nations of the world shows that the level of acquaintance of ICT in African countries including Nigeria is relatively low.

As information managers, it is expected that librarians in the world must play crucial roles in the new challenges facing the economies of the world most especially during global pandemic period. Therefore, this paper is set to examine the effects of library and information service delivery especially in this digital dispensation in managing the spread of pandemic virus for sustainable economy recovery and development in Nigeri

Objectives of the study

The followings are the intrinsic objectives of this paper;

- to know how we can manage the information needed to prevent and eradicate the spread of pandemic for sustainable economies.
- to find out various technological tools and information resources such as Database Resources (JSTOR, EBSCOHOST, Science Direct, MyiLibrarye.t.c), Books, Journals, Reference Sources use as sources of information in managing virus in the world.
- to examine the issues surrounding the pandemic and to point out the possible solutions in preventing the spread of the virus.

- to point out some challenges faced by librarians in having effective and efficient service delivery.
- Finally, to enumerate the benefits and prospects of library and information service delivery in the pandemic period.

Definition of terms

Library

According to Americana Encyclopedia, the word "Library" derives its meaning from the Latin word **Liber** meaning **Books**. This definition sees library as synonymous with books.

Library is also defined as collection of books and other Library materials kept for reading, studying and consultation.

The Oxford English Dictionary defines library in the sense of being a place where books are kept for reading, study or reference.

The Encyclopedia of Library and Information Science (2003) defines the term "Library" as "an organization or system designed to preserve and facilitate the use of graphic records" A common trend in these definitions is the emphasis on the word Book, even though libraries had existed before the advent of the written word.

A more acceptable definition of the concept sees the library as "a repository or storehouse of books and other materials containing information organized for use". One interesting development of the 21st century is that a Library may or may not have walls; it no longer has boarders in terms of collections especially with the Information and Communication Technology (ICT) that drives the Virtual Library.

On the other hand, a library can be described as an organised collection of information materials housed in a suitable and conducive accommodation for ease of access and use by users under the supervision of a professionally qualified personnel.

Library and information service

Library and information services are professional services rendered by librarians/information scientist to meet the information needs of the universal service agencies such as educational institution, political subdivisions, Government establishments, private industries and businesses e.t.c.

Pandemic Virus (COVID-19)

COVID-19 is pandemic disease that spread through respiratory droplets when an infected person coughs, sneezes or speaks. People can also be infected by touching a contaminated surface, eyes, mouth or nose.

Exposing yourself to the sun or to temperatures higher than 25C degrees DOES NOT prevent the corona virus disease (COVID-19)

Sustainable economy

Sustainable economy is a challenged economy that is characterized under poor utilization of natural resources, low level of income per capital, high mortality rate and poor medical systems; inability to exploit vast arable land for agriculture due to adherence to crude and obsolete agricultural practice, rural-urban migration, shortage of technology and skills, level of literacy, etc

Overview of library and information service delivery

The core role of a library in solving the myriads of problems in a challenged economy is basically information dissemination, enhancement of literacy level and promotion of knowledge. All these are indirect interventions at empowering the citizenry and government during pandemic period.

Sobalaje and Ogunmodede (2015) assert that knowledge has become a critical determinant of competitiveness in the world economy today as a result of globalization and rapid technological change. This is why Todaro (2005) remark that a nation that is unable to provide itself good things of life because of its limited knowledge in science and technology, culture, norms and social organizations is said to be underdeveloped whereas a nation that are in the fore front of acquiring, improving and applying human knowledge, sciences, technology and humanities in making available the highest possible standard of living to its citizens are said to be economically developed.

X-ray of COVID-19 pandemic in the economy (Nigeria)

The novel corona virus, named COVID-19, was first reported in Wuhan, China, on Dec. 31, 2019. It belongs to the corona virus family of viruses that cause illnesses ranging from the common cold to the Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). The World Health Organization (WHO) has issued some guidelines to negate misconceptions among people regarding the current outbreak of the COVID-19.There are currently no drugs licensed for the treatment or prevention of COVID-19, while several drug trials are ongoing. There is currently no proof that hydroxychloroquine or any other drug can cure or prevent COVID-19. The misuse of hydroxyl chloroquine can cause serious side effects and illness and even lead to death. WHO is coordinating efforts to develop and evaluate medicines to treat COVID-19.

Misconceptions of Pandemic Virus (COVID-19)

Some people misconceptions of the on-Pandemic Virus (COVID-19)

Adding pepper to your soup or other meals DOES NOT prevent or cure COVID-19

Hot peppers in your food, though very tasty, cannot prevent or cure COVID-19. The best way to protect yourself against the new coronavirus is to keep 2 metres away from others and to wash your hands frequently and thoroughly. It is also beneficial for your general health to maintain a balanced diet, stay well hydrated, exercise regularly and sleep well.

COVID-19 IS NOT transmitted through houseflies

To date, there is no evidence or information to suggest that the COVID-19 virus transmitted through houseflies. The virus that causes COVID-19 spreads primarily through droplets generated when an infected person coughs, sneezes or speaks. You can also become infected by touching a contaminated surface and then touching your eyes, nose or mouth before washing your hands. To protect yourself, keep at least 2 metre distance from others and disinfect frequently-touched surfaces. Clean your hands thoroughly and often avoid touching your eyes, mouth and nose.

5G mobile networks DO NOT spread COVID-19

Viruses cannot travel on radio waves or mobile networks. COVID-19 is spreading in many countries that do not have 5G mobile networks.

COVID-19 SPREAD AGENTS

You can catch COVID-19, no matter how sunny or hot the weather is. Countries with hot weather have reported cases of COVID-19. To protect yourself, make sure you clean your hands frequently and thoroughly, avoid touching your eyes, mouth, and nose.

Being able to hold your breath for 10 seconds or more without coughing or feeling discomfort DOES NOT mean you are free from the corona virus disease (COVID-19) or any other lung disease.

Library and information service delivery tools

The following are major tools used in carrying out library operations electronically:

Library Software Packages

The following are the various types and Features of Good Library Software Packages and Database Resources:

CDS/ISIS; WINISIS; Software for University Library (SOUL); Alice for Windows;

Lib Info; MIDAS Library Management System; Library Management System; Library System

KOHA; PhPMyLibrary; LibSys; Millennium;Tinlib; Libplus; In-magic; Glas; Newgenlib – New Generation Library (Webbase).

Database Resources

Database resources are information resources that are program electronically in such a way that researcher can download research articles/materials online. Examples are; EBSCO-HOST, Myilibrary, JSTOR, Science Direct, Hinary, e-granary

The library should have the best software for fulfilling the entire activity and to satisfy the users. Besides storage and retrieval, there are other housekeeping functions which should be there in the software. Computerization of operation requires procurement of hardware and software. The first step towards this will be the automation of the individual libraries and information centers and for this each organization has to follow and maintain certain standards. Several options are available for acquiring upgrading a library management system. (*Rowley, 1993)*

1. Buy or license a commercial software package

2. Join or make use of the system of a cooperative

3. Develop own system

Different types of libraries required library software packages with different dimensions and capabilities. For example, The University library where big collections and heavy circulation work has to be performed, a fully integrated software package is required with good response time and strong searching facilities, whereas for research libraries or other special libraries where the collections are limited but the readers have very specific requirement, a software with good searching capability is needed, which will enhance the search and present the result what is exactly required (*Ahmad, 1993).*

Even though, the software directories with the names and commercial details are available, it doesn't help librarian for the critical selection. It is obvious that by looking into the brochure or by the demonstration of the software for picture, inside capabilities and drawbacks of the software cannot be identified. Some of the most important and basic things like, the ease of inputting records, editing, cursor navigation, response time and user friendliness can be experienced only by using the software. The software should be tested by taking actual examples and by entering and manipulating several dozens of records in to the packages (*Ahmad, 1993)*

A software package used for library work and services should have at least the following qualities (Sharma, 1993)

1. Database Management System (DBMS) features

2. High level integration

3. Data entry facility

4. Data updating/editing

5. Search/inquiries

6. Report/Display/Print

7. Menu driven and user friendly

8. Compatibility

9. Reputation of the sponsoring

In a nutshell, all the tools mentioned above is useful in delivery perfect information about COVID-19 and helpful in eradicating the spread of pandemic virus in Nigeria as a whole and the world at large.

Impact of library and information service delivery in managing the spread of pandemic virus in Nigeria

The impact of library and information service delivery in a challenged economy is to bridge the gap in information dissemination, knowledge empowerment, and literacy level by adequate provision of information materials in different formats such as books, journals, virtual or digital collections in addressing the problems of pandemic virus in the economy. The core function of libraries in addressing this challenge is to provide adequate and up to date information on advances, discoveries of solution to prevent and curb the spread of pandemic virus and other challenges of different endeavours. Libraries can also through the provision of data help government as well as stakeholders make relevant decisions on scientific innovations on method to be adopted as remedy to manage the spread of COVID-19.

The Library as a service providing industry need to ensure that librarians who have the knowledge skill and competencies are employed to effectively work in a rapidly changing and complex environments. Thus, Igun (2006) asserts that the changes that characterized the information age are the over increasing capability of knowledge as a driver of economic growth.

The role of the library to adequately inform the public on menace of the pandemic virus through online publications written by scholars and also provide relevant data on modern technological advances and trends in the 21st century which is in the area of growth and development of ICT. Advances in ICT has a multiplier effect on industrialization and automation and brings about more efficient and optimized production systems in all our Government sector.

Benefits and prospects of library and information services delivery in managing the spread of COVID-19 Pandemic in Nigeria

Basically, there are challenges that must be solved before library and information service delivery can be fully utilized in most institutional libraries and research institutes. The following are the prospects of library and information service delivery:

- Young library software developer should be trained and supported with the necessary equipment to perfect service delivery in Library setting in order to manage pandemic in a sustainable economy
- There should be constant supply of electricity at low cost
- Librarians should be participated in electronic or digital workshop on information service at all level
- Increase in manpower training of librarians by attending seminar international conference, workshop in Library and Information Science or service
- During pandemic period, there should be employment of skill librarians with ICT knowledge and compliance so as to perfect library and information service delivery
- The information gather during pandemic period should be secured and forwarded it to necessary place where the information is needed for the eradication of pandemic in a sustainable economy.

Challenges of library and information service delivery

Although Librarian holds great potentials in supporting and augmenting existing library services delivery on well as library and information resources and services in the 21st century, several challenges remain.

However, some challenges faced by librarians in having effective and efficient service delivery are stated below:

- Lack of skilled manpower to manage available library resources to is perfectly
- deliver service to the end user most especially during pandemic period
- Web design
- Digital library application software
- Lack of ability to develop user friendly interface for feedback

Alabi and Sani (2013) also, outline some of the challenges that hinder performance of libraries in a challenged economy.

The problems are not far beyond the followings;

- Inadequate trained personnel in librarianship who can effectively render quality library service.
- Lack of resources, financial constraints to equip our libraries.
- Lack of national policy, norms and standard of library establishment at the grassroot level all through the educational sector.
- Inadequate infrastructure including computer hardware and software, bandwidth /access hinder effective library service delivery in digital age
- Poor distribution of network of libraries.
- Short sightedness of our leaders on the relevance of library.

Conclusion

In conclusion Government must have foresight on the relevance of library to the whole system with this in mind; she will see the need to invest and to develop her library as the information reservoir and national treasure that will better the systems. When value is not placed on the library, abuse and abandonment will be the fate of the library and the general public suffers in adequate information to solve pending pandemic issue and as a result the nation may continue in abject state of development.

Recommendations

Sequel to the problems listed, the following recommendations are proffered:

- There is need to train more librarians who will manage both the human resource and the library resource to enable them offer quality library services toward recovery and development of the economy against the menace caused by the pandemic virus.
- This is the reason why it can be suggested that the National University Commission (NUCJ, as the governing body of universities in Nigeria, should make it mandatory that library schools and the curriculum developers should include library science education in all universities, for this is the only avenue where we can produce professionals in librarianship who will in turn render effective library services.
- For libraries to take its pride of place in society the British University Grants Committee (1929) stated that the character and efficiency of a university may be gauged by the treatment of its central organ - the library - should be considered for adoption. We regard the fullest provision (of funds) for the library maintenance as the primary and most vital... this was an age long conviction by the British University.

- Library networking should be properly coordinated for resource sharing as no library is too rich in terms of material resources and human resources. There is need to depend on each other for exchange of ideas and share resources,

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MINIMISING NON-VALUE ADDING ACTIVITIES (NVAA): STRATEGIES FOR MANAGING RESOURCES ON CONSTRUCTION SITE IN POST PANDEMIC PERIOD

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Abstract

The management of resources on construction sites is paramount to site managers/supervisors, especially during the post-pandemic period. However, the occurrence of NVAA on construction sites negatively affects the management of resources. It is thus, expedient that site managers develop strategies for minimising the occurrence rate of NVAA. The study aims to investigate the strategies for minimising NVAA on construction sites for proper resources management during the post-pandemic period. The study adopts a cross-sectional survey design and employed a questionnaire as a research instrument. Sixty questionnaires were purposely distributed to site managers/supervisors and a total of 54 questionnaires were returned and valid for analysis. The data were analysed using mean score. The results show that there are seven main types of NVAA on construction site and the most common causes of NVAA on site is waiting time. The study, therefore, concludes that the most important strategy for minimising NVAA on construction sites is the avoidance of large travel distance between operations. Construction site managers/supervisors should therefore adopt the strategies in this study for the reduction of NVAA on site during this post-pandemic period.

Introduction

The outbreak of the novel coronavirus and the high transmission rate with the deadly impact on peoples' lives made the World Health Organisation (WHO) declare the virus a pandemic. The novel coronavirus has not only affected people but all aspects of the economy (Centre for the Studies of the Economies of Africa, 2020). To curb the spread of this virus, many countries including Nigeria ordered a total lockdown. This means all economic activities in the country were suspended for a while and gradual easing of the lockdown follow thereafter. The lockdown affected most industries in the country including the construction industry (Awobudu, 2020). The construction industry in Nigeria is known to be a regulator of the economy due to the significance of the industry (Oladinrin et al., 2012). Due to the pandemic, many construction sites were lockdown which affects the project cost and time (Awobudu, 2020). As a result, site managers are faced with the challenge of managing resources on site to achieve the project objectives (Construction Industry Federation CIF, 2020).

Different authors suggested various means of managing resources on construction sites, among which is minimizing non-value adding activities on construction sites. Non-Value Adding Activities (NVAA) are wastes that consume resources without adding to the value of tasks on construction sites (Saukkoriipi, 2004). NVAA have a detrimental effect on construction projects in different ways (Alwi et al. 2002a). Aluko and Iyagba (2012) state that NVAA cause damages which affect project performance, while Ismail and Yusof (2016) concluded that NVAA affect project performance in terms of cost, time, quality and productivity on construction site. Furthermore, Emuze, et al. (2014) posit that the consequences of NVAA include cost overrun and time overrun while Hwang (2009) revealed that NVAA have impacts on rework and contribute the most to cost increase in construction projects. Horman and Kenley (2005) found that as much as 49.6% of construction operative time is dedicated to NVAA. Also, Hanna (2005) concluded that the occurrence of NVAA on construction site negatively impact productivity and increases fatigue and accident which eventually increase the cost and time spent on construction projects. According to Alwi et al. (2002a) and Koskenvesa et al. (2010), if NVAA are left unchecked; they will have a serious effect on the competitiveness of the organisation and by extension, the productivity of the construction industry. Furthermore, if left unchecked, they may have a serious effect on the cost and time of construction projects, especially in the post-pandemic period.

Previous studies focused on different aspects of NVAA. Alwi et al. (2002b) examined the occurrence of NVAA in contracting organisations while Saukkoriipi (2004) focused on NVAA using the concept of lean production, activity-based costing and management and poor quality costing. Nghona et al. (2010) identified the causes of NVAA during the client briefing process. Wu et al. (2012) focused on the identification and reduction of NVAA activities in the precast concrete construction projects in Singapore. Emuze et al. (2014) investigated the impact of prevalent NVAA on project performance in terms of cost and time overruns. Ismail and Yusof (2016) worked on the awareness level of NVAA, causes and effect of NVAA on time, cost, quality and productivity. However, these studies did not consider how the minimisation of NVAA can be used to manage resources on construction sites in the post-pandemic period. Thus, issues relating to how the minimisation of NVAA can be used to manage resources on construction sites in the post-pandemic period have not been adequately explored. The aim of the study, therefore, is to determine the strategies for minimising NVAA with the view to managing resources in the post-pandemic period. Specifically, the study identifies the types of NVAA on construction site, examine the causes of NVAA on construction site and determine the strategies for reducing non-value adding activities on construction site.

Knowledge of the types and causes of NVAA on construction sites will assist construction site managers to minimize waste on sites in the post-pandemic period. Minimising wastes on construction sites will prevent excess costs and time wastage. This will promote the sustainability of construction projects in the post-pandemic period.

Literature Review

Resources Management in the Post Pandemic Period on Construction Site

The resources in the construction industry include materials, machinery, money and human. Managing these resources during the post-pandemic period is important for achieving project goals and objectives in terms of cost, time, quality and safety. Avoiding instances that lead to waste of resources is quite important on construction sites. Proper planning of the resources is also important during the post-pandemic period. Habibi (2018) focused on resource constraint as a means of managing resources on construction sites while Muthuramalingam (2008) worked on resource levelling and smoothening. Pinha and Ahluwalia (2019) proposed a combinatorial mode of tasks, multi-skilled resources and multiple calendars. These methods of managing resources on construction sites are technical and require special skills in utilising them. A less technical method of managing resources on construction site especially during the post-pandemic period is to minimise NVAA on site.

Types of NVAA

The term 'NVAA' has been defined by different authors. Alwi et al. (2002b) define NVAA from the perspective of physical and other types of waste on site. They explain that NVAA is used to describe the differences between physical construction waste and other types of waste that occur during the construction process. While the physical waste refers to materials waste on site, the other waste which is the non-physical waste refers to time overrun and cost overrun (Nagapan et al. 2012). Ismai and Yusof (2016) define NVAA simply as pure waste during the construction process. These definitions, however, are not precise since the waste was not explained in terms of adding value to tasks. Saukkoriipi (2004) and Emuze et al. (2014) gave a clearer definition by explaining NVAA as activities on construction sites that consume resources without necessarily adding value to the completed tasks. NVAA are waste generation activities that consume time and effort without adding values to the client thereby leading to losses of materials, delay and implementation of unnecessary tasks (Nagapan, et al. 2012). In other words, all tangible and intangible activities on construction sites that do not add benefit to tasks are referred to as NVAA.

Josephson and Saukkompi (2007) state that waste is used to describe NVAA in lean thinking. Ohno (1988) classified waste into seven types namely; correction/scrap, overproduction, waiting, conveyance, processing, inventory and motion. Based on this, considerable authors categorise waste in line with Ohno's (1988) classification of waste; overproduction, inventory, time/waiting, transportation, processing, motion and defect (Pereira, 2009; Simboli, et al. 2014; Ismail and Yusof, 2016). Wu et al. (2012) classify NVAA into two; site layout management and delivery management. Various NVAA related to 'site layout management' and 'delivery management' were stated under each category. Raval et al. (2017) categorise waste into two major types; value-added waste and non-value added waste. Value-added waste was further classified into five material waste, waste due to defect, excessive stock, rework and waste due to changing design. Non-value added waste was also further classified into five; transportation, time, motion, over-processing waste and excess inventory.

Using the concept of 'the seven wastes' where the first five wastes refer to 'flow of material' and the last two refer to 'the work of men', Raham et al. (2012) categorise construction waste as overproduction, defect, material movement, processing, inventory, waiting and motion. Alwi et al. (2002a) eight main categories of waste during the construction process are reworks/repairs, defects, material waste, delays, waiting, poor material allocation, unnecessary material handling and material waste.

This study will, however, consider Ohno's (1988) seven categorisation of waste as types of waste as the other types identified by other authors can be broadly classified into seven types.

Overproduction: This relates to the production of a quantity of material greater than what is required at a certain period or making it earlier than necessary (Domingo, 2013). This is often caused by quality problems when it is anticipated that several units will be lost along the production process. An example of this kind of NVAA is the overproduction of mortar that cannot be used on time.

Inventory: Rahman et al. (2012) describe inventory as an excessive or unnecessary stock of materials on construction sites. Excessive inventory leads to deterioration, robbery, vandalism and monetary losses as a result of capital being tied up. Furthermore, the duo state that inventory is regarded as NVAA because no value is added when keeping excessive stock on site, rather it becomes a liability because it will incur storage costs (Security and insurance).

Waiting Time: Waiting time otherwise known as idle time is a form of NVAA in which there is no action or ongoing work. Rahman et al. (2012) identify various instances that lead to idle time as waiting for raw materials, quality assurance results and schedule of equipment. The time spent waiting is not adding value to the project, therefore waiting time is classified as NVAA.

Transportation: Domingo (2013) defined transport waste as unnecessary materials, tools or equipment movement. This is as a result of poor site layout or poor route planning

Processing: Processing waste is described as unnecessary processing that does not add value to the item produced. It is time wasted due to processing and reprocessing (Raval et al., 2017). It does also relate to the nature of conversion activities in the construction process flow. The most obvious example of over-processing is rework relating to surface finishes (Rahman et al., 2012). Over-processing is adding more value to a product than the customer requires such as painting areas that will never be seen or be exposed to corrosion.

Motion: Domingo (2013) describes motion waste as unnecessary movement and motion of workers. This could be a result of poor site layout, disorganized/distance storage locations, unclear process and materials flow.

Defects: Henderson (2004) describes defect as the simplest form of NVAA on construction site, where the specification of products or components are not met. Defects can lead to rework in construction projects. According to Henderson (2004), the causes of defects on construction sites include poor design and specification, lack of planning and control and lack of integration between design and production. Examples of defects on construction sites include an excessive thickness of plastering.

Methods

A self-administered questionnaire was used to elicit information from 60 purposely selected respondents. The respondents were site managers and site supervisors working in construction companies in Lagos State, Nigeria. The site managers and site supervisors were purposely selected because there is no sampling frame for them. 54 questionnaires were returned and valid for analysis representing a 90% response rate. Demography details are presented in Table 1.

Table 1: Demographic details of respondents

Demographic Details	Frequency	Percentage
Project Types		
Residential	17	31.5
Commercial	21	38.9
Infrastructure Project	16	29.6

Total	**54**	**100**
Position		
Site Manager	30	55.6
Site Supervisor	24	44.4
Total	**54**	**100**
Experience		
0-5 years	16	29.6
6-10 years	27	50
11-15 years	11	20.4
Total	**54**	**100**
Academic qualifications		
OND	1	1.9
HND	17	31.5
B.Sc. / B.Tech.	21	38.9
PGD	9	16.7
M.Sc.	6	11.1
Total	**54**	**100**

Project types were measured based on three types. Residential projects account for 31.5%, commercial projects 38.9% and infrastructural projects 29.6%. This implies that all three categories of construction projects are investigated in the study. 55.6% of the respondents are site managers while 44.4% are site supervisors. This implies that the two sets of respondents in the study are well represented. Concerning years of experience of the respondents, 29.6% have 0-5 years of experience, 50% between 6-10 years and 20.4% between 11-15 years. This shows that respondents have short, medium and long experience. Based on the highest academic qualification of the respondents, 38.9% have B.Sc./B.Tech. as their highest academic qualification, 31.5%, HND, 16.7%, PGD, 11.1% M.Sc. and 1.9%, OND.

7 types of NVAA based on Ohno (1988) types of NVAA were adapted to measure the types of NVAA. Respondents were asked to tick the type of NVAA experienced in the course of executing construction projects. The causes of NVAA were described with 55 statements subdivided into 7 types namely; overproduction (6 statements), defect (11 statements), transportation (5 statements), processing (6 statements), inventory (6 statements), waiting (13 statements) and motion (8 statements). A five-point Likert scale was used to determine the level of agreement of the causes of NVAA on construction sites using 1 to represent ‘strongly disagree’, 2 for ‘disagree’, 3 for ‘moderately agree’, 4 for ‘agree’ and 5 for ‘strongly agree’. The Cronbach Alpha value for the 55 items is 0.953 which is within the acceptance value of ≥0.7 (Field, 2009), thus the instrument is highly reliable. To identify strategies for minimising NVAA on construction sites, 16 statements describing the strategies were made and respondents were asked to state their level of agreement using 1 to represent ‘strongly disagree’, 2 for ‘disagree’, 3 for ‘moderately agree’, 4 for ‘agree’ and 5 for ‘strongly agree’. The Cronbach Alpha value for the 16 items is 0.933 which is within the acceptance value of ≥ 0.7 (Field, 2009). The instrument is highly reliable.

RESULTS

Types of NVAA

To determine the types of NVAA on construction sites for proper resource management on construction sites in the post-pandemic period, 7 types of NVAA were identified from the literature. A list of the NVAA types was then given to site managers and site supervisors on construction sites to identify the types of NVAA on construction sites. Percentage was used in analysing the types of NVAA. The result is presented in Table 2.

Table 2: Types of NVAA on construction site

NVVA Types	Frequency	Percentage
Waiting	43	79.6
Overproduction	42	77.8
Defect	42	77.8
Transportation	42	77.8
Processing	42	77.8
Movement	42	77.8
Inventory	40	74.1

Table 2 shows the percentage of NVAA types identified in construction projects. 'Waiting' accounts for 79.6% while overproduction, defect, transport and movement account for 77.8% respectively. Inventory accounts for 74.1%.

Causes of NVAA on construction site

The causes of NVAA on construction sites were analysed using mean score. The results were interpreted thus, 1.00-1.49 for 1, strongly disagree; 1.50-2.49 for 2, disagree; 2.50-3.49 for 3, moderate; 3.50-4.49 for 4, agree and 4.50-5.00 for 5, strongly agree. The results are presented in Table 3.

Table 3: Causes of NVAA on Construction Site

S/N	*Causes of NVAAs*	*1*	*2*	*3*	*4*	*5*	*Total*	*MS*	*Rank*	*Decision*
A	***Waiting***	***3***	***5***	***9***	***18***	***20***	***54***	***3.85***	***1***	***Agree***
1	*Waiting for instruction – waiting to be told what next to do*	*4*	*1*	*2*	*19*	*28*	*54*	*4.22*		
2	*Waiting for repair of equipment*	*2*	*4*	*3*	*17*	*28*	*54*	*4.20*		
3	*Delays to schedule*	*1*	*6*	*6*	*24*	*17*	*54*	*3.93*		
4	*Waiting for equipment arrival*	*2*	*2*	*11*	*17*	*22*	*54*	*4.02*		
5	*Waiting for Labour*	*11*	*13*	*8*	*12*	*10*	*54*	*2.94*		
6	*Design changes*	*3*	*1*	*19*	*19*	*12*	*54*	*3.67*		
7	*Slow drawing revision and distribution*	*2*	*5*	*7*	*26*	*14*	*54*	*3.83*		
8	*Poor coordination among project participants*	*1*	*7*	*11*	*10*	*25*	*54*	*3.94*		
9	*Poor planning and scheduling*	*0*	*5*	*15*	*14*	*20*	*54*	*3.91*		
10	*Slow in making decisions*	*2*	*5*	*7*	*26*	*14*	*54*	*3.54*		
11	*Too few supervisors/foremen*	*4*	*11*	*15*	*14*	*10*	*54*	*3.28*		
12	*Waiting for information from an engineer or site manager*	*2*	*3*	*1*	*17*	*31*	*54*	*4.33*		
13	*Waiting for a process to be completed before movement*	*2*	*1*	*9*	*15*	*27*	*54*	*4.19*		
B	***Transportation***	***3***	***8***	***8***	***17***	***18***	***54***	***3.70***	***2***	***Agree***
14	*Poor route planning*	*7*	*12*	*8*	*13*	*14*	*54*	*3.28*		
15	*Delay of material delivery to site*	*2*	*7*	*9*	*20*	*16*	*54*	*3.76*		
16	*Poorly scheduled delivery of material to the site*	*3*	*10*	*10*	*11*	*20*	*54*	*3.65*		
17	*Poor site layout*	*3*	*6*	*9*	*17*	*18*	*53*	*3.77*		
18	*Poor placement of material during transportation*	*1*	*7*	*3*	*22*	*21*	*54*	*4.02*		
C	***Motion***	***4***	***8***	***10***	***14***	***19***	***54***	***3.68***	***3***	***Agree***

19	*Poorly arranged space*	*5*	*16*	*8*	*12*	*13*	*54*	*3.22*		
20	*Poor distribution of labour*	*5*	*14*	*16*	*10*	*9*	*54*	*3.07*		
21	*Poor material handling on site*	*6*	*13*	*10*	*17*	*8*	*54*	*3.15*		
22	*Poor equipment choice/ineffective equipment*	*6*	*1*	*7*	*17*	*23*	*54*	*3.93*		
23	*Equipment shortage*	*4*	*5*	*17*	*15*	*13*	*54*	*3.52*		
24	*Outdated Equipment - old version of equipment*	*3*	*3*	*7*	*11*	*30*	*54*	*4.15*		
25	*Disorganized tools and equipment on site*	*1*	*4*	*7*	*13*	*29*	*54*	*4.20*		
26	*Reaching too far for materials and equipment to the work area on site*	*1*	*4*	*6*	*16*	*27*	*54*	*4.19*		
D	***Processing***	***4***	***5***	***12***	***20***	***12***	***54***	***3.58***	***4***	***Agree***
27	*Lack of supervision and poor quality*	*8*	*10*	*9*	*16*	*11*	*54*	*3.22*		
28	*Unclear specification/quality acceptance standards*	*0*	*9*	*22*	*19*	*4*	*54*	*3.33*		
29	*Equipment frequent breakdown*	*2*	*2*	*19*	*20*	*11*	*54*	*3.67*		
30	*Unreliable equipment*	*0*	*1*	*11*	*32*	*10*	*54*	*3.94*		
31	*Poor equipment choice/ineffective*	*0*	*1*	*3*	*23*	*27*	*54*	*4.41*		
32	*Unclear site drawings supplied*	*14*	*9*	*9*	*12*	*10*	*54*	*2.91*		
E	***Defect***	***6***	***9***	***10***	***15***	***14***	***54***	***3.40***	***5***	***Moderate***
33	*Materials does not meet specifications*	*10*	*9*	*7*	*13*	*15*	*54*	*3.26*		
34	*Poor Design*	*2*	*22*	*9*	*12*	*9*	*54*	*3.07*		
35	*Unclear site drawings supplied*	*6*	*13*	*16*	*10*	*9*	*54*	*3.06*		
36	*Unclear specifications*	*6*	*17*	*11*	*14*	*6*	*54*	*2.94*		
37	*Lack of subcontractor's skill*	*13*	*6*	*10*	*12*	*13*	*54*	*3.11*		
38	*Late Supervision*	*15*	*5*	*10*	*13*	*11*	*54*	*3.00*		
39	*Lack of trades' skill*	*2*	*4*	*7*	*22*	*18*	*53*	*3.94*		
40	*Inappropriate construction methods*	*1*	*5*	*5*	*25*	*18*	*54*	*4.00*		
41	*Poor quality of materials*	*1*	*4*	*2*	*19*	*28*	*54*	*4.28*		
42	*Damage by other participants*	*9*	*10*	*19*	*10*	*6*	*54*	*2.89*		
43	*Inexperienced inspectors*	*3*	*6*	*9*	*15*	*21*	*54*	*3.83*		
F	***Inventory***	***10***	***10***	***11***	***17***	***7***	***53***	***3.02***	***6***	***Moderate***
44	*Too much material stock on site*	*16*	*19*	*8*	*7*	*3*	*53*	*2.28*		
45	*Poor quality site documentation*	*15*	*16*	*9*	*12*	*1*	*53*	*2.40*		
46	*Poor storage of material*	*5*	*5*	*14*	*20*	*9*	*53*	*3.43*		
47	*Not adhering to procedures on site*	*3*	*3*	*12*	*28*	*7*	*53*	*3.62*		
48	*Large batch sizes of materials*	*13*	*14*	*12*	*8*	*6*	*53*	*2.62*		
49	*Failure to observe first in first out – stagnant materials*	*5*	*0*	*10*	*25*	*13*	*53*	*3.77*		
G	***Overproduction***	***10***	***11***	***11***	***16***	***6***	***54***	***2.94***	***7***	***Moderate***
50	*Poor provision of information to project participants*	*8*	*3*	*20*	*16*	*7*	*54*	*3.20*		
51	*Design changes*	*13*	*9*	*9*	*19*	*4*	*54*	*2.85*		
52	*Damaged materials on site*	*14*	*10*	*8*	*15*	*7*	*54*	*2.83*		
53	*Inappropriate/misuse of material*	*7*	*21*	*8*	*15*	*3*	*54*	*2.74*		
54	*Too much overtime for labour*	*4*	*16*	*10*	*15*	*9*	*54*	*3.17*		
55	*Misuse of automation*	*14*	*8*	*11*	*14*	*7*	*54*	*2.85*		

MS= Mean Score

The results in Table 3 show that the respondents agreed that 'waiting time' is a cause of NVAA on construction site with a mean score of 3.85, thus it was ranked the highest. This implies that the most causes of NVAA on construction sites are 'waiting time'. Notably among the items of 'waiting time' are 'waiting for information from engineer or site manager' (4.33), waiting for instruction- waiting to be told what next to do' (4.22) and 'waiting for the repair of equipment (4.20). The implication is that the sub-variables of waiting time mentioned are the instances that summed up to make 'waiting' a cause of NVAA.

The second most ranked cause of NVAA on construction sites is transportation with a mean score of 3.70. Respondents agree that transportation is a cause of NVAA. Significant sub-variables of transportation include poor placement of material during transportation (4.02), poor site layout (3.77) and delay of material delivery to site (3.76). This implies that the sub-variables identified above are the common instances that make transportation a source of NVAA.

The last ranked cause of NVAA on construction sites is overproduction with a mean score value of 2.94. Respondents moderately agreed that overproduction is a cause of NVAA. Notably among the sub-variables of overproduction are 'poor provision of information to project participant' (3.20), 'too much overtime for labour' (3.17), 'design changes' (2.85) and 'misuse of automation' (2.85).

Strategies for minimising NVAA on construction site

The strategies for minimising NVAA were analysed using mean score. The results were interpreted thus, 1.00-1.49 for 1, strongly disagree; 1.50-2.49 for 2, disagree; 2.50-3.49 for 3, moderate; 3.50-4.49 for 4, agree and 4.50-5.00 for 5, strongly agree. The results are presented in Table 4.

Table 4: Strategies for minimising NVAA

S/N	*Strategies for minimising NVAA*	*1*	*2*	*3*	*4*	*5*	*Total*	*MS*	*Decision*
1	*Large distance between operations should be avoided*	1	2	7	15	29	54	4.28	Agree
2	*Improve machine and equipment reliability*	3	1	3	20	27	54	4.24	Agree
3	*Reduce cycle times of work operation*	1	1	13	12	27	54	4.17	Agree
4	*Use visual methods of planning combined with daily cell meetings to ensure that everyone is clear what is required for the day*	2	1	5	24	22	54	4.17	Agree
5	*Maintain a well-kept bookkeeping system, either manually or using a computer system;*	3	3	5	19	24	54	4.07	Agree
6	*Reduce the share of non-value adding activities (waste)*	1	2	11	22	18	54	4.00	Agree
7	*Employ a reliable storekeeper, possessing clerical experience and well trained in stores controls*	3	1	11	18	21	54	3.98	Agree
8	*Balance work flow improvement with conversion improvement*	1	2	13	18	19	53	3.98	Agree
9	*Keep a well laid out site with adequate storage space and room for movement*	7	2	2	19	24	54	3.94	Agree
10	*Double signing of delivery notes, particularly ready-mixed concrete*	2	5	8	24	15	54	3.83	Agree
11	*Check thoroughly all deliveries against the delivery notes as the goods are being unloaded.*	4	4	13	14	19	54	3.74	Agree
12	*Build continuous improvement into the process of work*	4	3	12	22	13	54	3.69	Agree
13	*Implement standard operating procedure (SOP) to ensure that standard and method are clear*	3	3	16	24	8	54	3.57	Agree
14	*Simplify by minimizing the number of steps, parts and linkages of work processes*	2	5	20	17	10	54	3.52	Agree
15	*Increase output value through systematic consideration of customer requirements*	0	4	23	23	4	54	3.50	Agree
16	*Focus control on the work to be completed*	4	15	8	11	16	54	3.37	Moderate

MS= Mean Score

The results in Table 4 shows that respondents agreed that all the variables listed are the strategies for minimising NVAA on construction site. The most ranked strategy is 'large distance between operations should be avoided' with a mean score of 4.28. This implies that travel distances between two or more operations should be reduced to eliminate traveling time. The second ranked strategy is 'improve machine and equipment reliability' while the third ranked strategy 'reduced cycle times of work operation'. The last ranked is 'focus control on the work to be completed with a mean score of 3.37.

Discussion of Findings

The study investigated the types of NVAA on construction site, the findings show that waiting time, overproduction, defect, transport, movement, processing and inventory are the types of NVAAs experienced on construction sites. This supports the previous works of Pereira (2009); Simboli, et al. (2014) and Ismail and Yusof (2016) in which waiting time, transportation, motion, processing, defect, inventory and overproduction were identified as the types of NVAA. The results differ slightly from Alwi et al. (2002a) eight main types of NVAA; reworks/repairs, defects, material waste, delays, waiting, poor material allocation, unnecessary material handling and material waste. The importance of this is that site manager/site supervisors must be proactive to avoid or minimize circumstances that lead to these types of NVAA on construction sites in the post-pandemic period.

The most ranked main cause of NVAA on construction sites is 'waiting'. This implies that idleness is the main reason for NVAA on construction sites. Activities that cause idleness include 'waiting for information from engineer/site manager', 'waiting for instruction', 'waiting for the repair of equipment', etc. Alwi et al. (2002b) causes of NVAA differs from the findings of this study. Firstly, the causes of NVAA were categorised as people, professional management, design and documentation, material, execution and external and not according to the types of NVAA. Secondly, the most ranked sub variable of the causes of NVAA is 'design changes' which is quite different from the finding of this study, that is, waiting from information from engineer/site manager. The differences may be due to the study area and method of analysis. Despite this, it is expedient that site managers/supervisors take cognise of these causes of NVAA to prevent wastages and manage resources during the post-pandemic period.

To minimise the occurrence of NVAA on construction sites during this post-pandemic period, some strategies were listed. The most ranked strategy is the avoidance of large distances between operations. Keeping the distances between different operations short will reduce the time of travel and so reduce the timing of undertaken certain tasks. Hossain et al. (2019) suggested the use of the lean methodology. Whatever the strategy suggested, the most important thing is the minimisation or total elimination of NVAA on construction sites for proper management of resources during this post-pandemic period.

Conclusion and Recommendation

Managing resources on construction sites through the minimisation of NVAA on construction sites is quite important during this post-pandemic period. Thus, the study examined the types, causes and strategies for minimising NVAA on construction sites. The results show that there are major seven types of NVAA on construction site, therefore the study concludes that waiting time, overproduction, defect, transport, movement, processing and inventory are the major types of NVAA on construction site. Furthermore, the study classified the causes of NVAA based on the 7 types of NVAA and conclude that waiting time is the major cause of NVAA on construction sites. Lastly, strategies for reducing the occurrence of NVAA were identified. It was concluded that avoidance of large distance between operations, improve machine and equipment reliability, reduce cycle times of work operation are some of the strategies for minimising the occurrence of NVAA on construction sites during the post-pandemic period. The study has contributed to knowledge by identifying the strategies for eliminating wastes on construction sites during the post-pandemic period.

Site managers and site supervisors are encouraged to adopt these strategies to prevent the occurrence of NVAA on construction sites. This can be achieved when these strategies are placed as checklists on construction sites for proper accountability and progress of work during the post-pandemic period. Site managers and site supervisors will be able to manage the human, material, machinery and finance resources effectively when NVAA are reduced or eliminated on construction sites during this post-pandemic period.

Although the findings of this study are based on a survey of a relatively small sample size selected through purposive sampling, it can form a basis for a more comprehensive survey of NVAA in future studies. Furthermore, this study only considers the minimisation of NVAA as a strategy for managing resources during the post-pandemic period, other studies should consider other factors that will assist in managing available resources during the post-pandemic period.

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SMALL AND MEDIUM-SIZED ENTERPRISES IN NIGERIA DURING COVID 19: SURVIVAL STRATEGIES

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Abstract

This study investigated small and medium-sized enterprise in Nigeria during COVID-19 using survival strategies. The study adopted a survey research method. 600 questionnaires were distributed and 549 were returned by the respondents in Yewa South, Yewa North, Ipokia, Ewekoro, Ifo and Obafemi Owode local government areas of Ogun State. Findings shows that SMEs during this period were face with challenges such as low sales, laying off workers, high PHCN bills, unable to pay rents, loan and taxes. Therefore, as a result of the COVID-19 it was concluded that not all business will survive this globally faced COVID-19. The study recommends that those SMEs that collected loan should be given extra grace period to be able to repay the loan and also quick loan opportunities with low interest rates should be offered by the government to some of the SMEs to support their business so as to continue staying in the business. Government should consider tax relaxation on SMEs for the period till businesses start making voluminous sales and put in all survival strategies that will enhance business back on their feet to boost the economy again.

Keywords: *Small and Medium Scale Enterprises (SMEs), survival strategies, COVID-19, business, government.*

INTRODUCTION

The year 2020 has been extremely challenging for the universal community. The spread of the unusual coronavirus, known as COVID-19, has led to an unparalleled health crisis in nations across the world. The catastrophe has had unprecedented and serious effects on all facets of how people communicate, work, produce, trade, consume and live. Due to globalization, there are expectations of spillover effects to unindustrialized and developing nations owing to their dependence on advanced countries for the importation of goods and services (Ozili & Arun, 2020). The lengthy commotion in economic activity due to the pandemic combined with the fall of oil prices and the decline in the demand for Nigeria's oil products are severely impacting Nigeria's fiscal position. The IMF projects that the economy will contract by 3.4% in 2020, a fall from the previously anticipated 2% growth. The total budget, which was set at N10.59 trillion (~$27.3 billion) is in the process of being revised downward by about 15%. Small businesses tend to be vulnerable during an economic crisis, because they have fewer resources with which to acclimatize to a changing context.

Small and Medium Scale Enterprise (SME) has showed to be a vital tool adopted by advanced countries to attain socio-economic growth (Opafunso & Adepoju, 2014). They further stated recently that small scale industrial sector is considered to be the pillar of modern day economy. Historical facts show that prior to the late 19th century, cottage industries, mostly small and medium scale businesses controlled the economy of Europe (Aremu, 2010). In developing nations like Nigeria, the impact of Small and Medium Enterprises on the growth and development can be felt in so many ways. According to Muritala, Awolaja and Bako (2012), SMEs on the growth and development of an economy is felt by ways greater consumption of indigenous raw materials, employment generation, inspiration of rural development, development of entrepreneurship, mobilization of local savings, links with bigger industries, provision of indigenous balance by allocating investments more evenly, provision of avenue for self-employment and providing opportunities for training managers and semi-skilled employees. Consequently, Small and Medium Enterprises have been regarded as the engine of growth (Eze & Okpala, 2015). The ITC COVID-19 Business Impact Survey gathered evidence on how the pandemic affected 4,467 companies in 132 countries. Analysis of this data collected from 21 April–2 June 2020, shows that the pandemic has strongly affected 55% of respondents. Nearly two-thirds of micro and small firms reported that the crisis strongly affected their business operations, compared with about 40% of large corporations. One-fifth of SMEs said they risked shutting down permanently within three months. In Africa, two out of three businesses said they had been strongly affected by COVID-19, mostly involving reduced sales (75%) and/or difficulty accessing inputs (54%). Service companies have been the toughest hit around the world. In accommodation and food services, for instance, 76% of surveyed firms said partial and full lockdowns strongly affected their business operations. Small and Medium Enterprises (SMEs) face trials like no other during the COVID-19 pandemic. SMEs are especially disposed to economic blows due to their relatively low savings capability and will have to sink or swim in the current climate of pandemic induced economic shock and artificial (but necessary) restrictions on the movement of goods and people. Majority of SMEs depend to a large extent on the free movement of goods and people to keep their supply chains and ultimately their businesses running profitably. The outbreak of the novel virus Covid-19 has a great impact on small and medium-sized businesses, especially in developing countries like Nigeria; it is in this light that the article tends to examine the impact of Covid-19 and its survival strategies on SMEs in Ogun State, Nigeria where data collected for the study were extracted. The objectives of this study were: To ascertain the effect of loan on survival of SME's; to find out the effect of digital platform on survival of SME's.

LITERATURE REVIEW

Covid-19: An Overview

The Covid-19 Pandemic was one of the events that have the most impact on modern history. It spread to over 216 nations and territories around the world and induced the most economic downturn since the Great

depression (World Health Organization, 2020; International Monetary Fund, 2020). Covid-19 was first identified in Wuhan, China, in December 2019 and has instigated massive death and has spread to nearly all parts of the world (Akanni & Gabriel, 2020). The first case of Covid-19 was identified in Nigeria on February 27, 2020. According to WHO (2020), as of July 28, 2020, 1 pm (GMT+1), the total number of confirmed cases worldwide was 16,301,736, while there were confirmed deaths of 650, 069 in 216 countries, areas or territories of the world. As of July 28, 2020, the Nigerian Centre for Disease Control (NCDC) reported 41,804 cases, 18,704 discharged patients, and 868 deaths, and the number of tests in Nigeria was 267,842 (in a population of about 200 million people). Apparently, proficient human-to-human transmission is big-scale amplitude of this outgoing virus. A relationship maintains real whether it is consequences of a spread from an individual excess event (SARS-CoV) or from the revolved ascension of a category obstacle (MERS-CoVe) (Munster et al., 2020). However, the cruelty of the illness is a substantial circumstantial degree in the capability of the virus spread, as well as our efficacy to detect the transited situation and take on. Besides, numerous studies propose that older people specifically those above 80 years and suffering from dangerous sickness, for example, respiratory problems, cardiac patients, kidney disease, and diabetes are at the uppermost risk of momentous illness and death (Weiss & Murdoch, 2020). Since 2003, severe acute respiratory syndrome (SARS) was calculated to cost value in the world from $30 to $100 billion (Smith, 2006). The Covid-19 pandemic has previously turned into a global challenge, function such "the pathogen of a century at one time" when the SARS was originally in China. This virus has incurred a large number of calamities in the world economy.

Importance of SMEs

The significance of small businesses is recognized in various African countries such as Togo, Uganda, Ghana, Cote d'Ivoire, Nigeria, Kenya, Malawi, Burkina Faso, as well as others. SMEs generate job opportunities across geographical areas and sectors, engaging broad segments of the work force, including low-skilled employees, and providing opportunities for skills development. Micro enterprises contribute around 30% of total employment, whereas SMEs contribute about 20% and 17% of total employment respectively. Altogether, SMEs contribute more than 66% of total EU employment, the rest contribute large enterprises. Furthermore, from a value added perception SMEs contribute around 57% of total value added with more similarly distributed shares among SMEs (Muller et al., 2017). Encouraging the growth of SMEs in the EU contributes to economic growth and employment therefore reaching the key objectives of the Europe 2020 strategy. They also help support their employees' access to health care and social services. SMEs that create jobs and value added are therefore an important channel for inclusion and poverty reduction, especially but not exclusively in developing and low-income economies. In this regard, promoting productivity in a large population of small businesses, including in traditional sectors and the informal economy, can help governments achieve both economic growth and social inclusion objectives, including absconding from low productivity traps and improving the quality of jobs for low-skilled employees (OECD, 2009, 2017b). Small businesses can also signify an effective tool to address societal needs through the market and provide public goods and services. This is the case of social initiatives, which bring innovative solutions to the problems of poverty, social exclusion and unemployment, and fill gaps in general-interest service delivery (EU/OECD, 2016). In many countries, the economic weight of the social and solidarity economy, in which social enterprises operate, has increased steadily in recent years, including in the aftermath of the global crisis. For instance, in France, in 2014, the social economy accounted for 10% of the GDP. In Belgium, from 2008-14, employment in social enterprises increased by 12% and accounted, in 2015, for 17% of total private employment (EU, 2016). In the United Kingdom, in 2015, 41% of social enterprises had created jobs compared to 22% of SMEs (SEUK, 2015).

Covid-19 and SMEs

The year 2020 has been really challenging for the global community. The spread of the novel coronavirus, known as COVID-19, has led to an unparalleled health catastrophe in countries across the world. The catastrophe has had unprecedented and serious effects on all facets of how people communicate, work, produce, trade, consume and live. The last era's major historical pandemics have usually been connected with subsequent low returns as assets (Jorda et al., 2020). According to Bartik et al., 2020 conducted a study of more than 580 SMEs, between March 28 and April 4, 2020. The result revealed that there were mass layoffs, termination of business, different views about the possible duration of the COVID related commotions, many businesses are financially on the brink, and most businesses planned to seek funding. Many businesses that are not registered with national authorities are small and have little cash on hand to finance themselves when operations are closed down. The ITC COVID-19 Business Impact Survey found that informal enterprises are 25% more likely to say that the pandemic is pushing them towards bankruptcy. COVID 19 has instigated a momentous economic shock (Seth et al., 2020). The economic ramifications of the pandemic swiftly became apparent, and small and medium-sized enterprises (SMEs) have been on the front lines. With employees and consumers staying indoors, and supply chains tested by closures, the small firms that provide 70% of jobs in nations around the world and about half of economic activity have been put under tension. Small companies tend to be vulnerable during an economic crisis, in part because they have fewer resources with which to adapt to a changing context.

Measures taken by Nigerian Government to assist SMEs

Some nations have adopted various measures in assisting SMEs in recovering markets or finding new or alternative markets (OECD, 2020). Governments around the world realize that SMEs act as a lynchpin connecting the pandemic to broader economic recession. In addition to addressing the health calamity, they have scrambled to alleviate the impact of COVID-19 on small businesses; introducing policies to assist them deal with the short-term financial risks and long-term business implications. On 16 March 2020, the Central Bank of Nigeria (CBN) released a circular on its policy reaction to the plague to boost the economy and support businesses. These measures include:

1. A 1 year extension of a moratorium on principal repayments for CBN intervention facilities.
2. The reduction of the interest rate on intervention loans from 9 percent to 5 percent.
3. Strengthening of the Loan to Deposit ratio policy (i.e. stepped up enforcement of directive to extend more credit to the private sector).
4. Creation of NGN50 billion target credit facility for affected households and small and medium enterprises.
5. Granting regulatory forbearance to banks to restructure terms of facilities in affected sectors.
6. Improving FX supply to the CBN by directing oil companies and oil servicing companies to sell FX to the CBN rather than the Nigerian National Petroleum Corporation.

7. Additional NGN100 billion intervention fund in healthcare loans to pharmaceutical companies and healthcare practitioners intending to expand/build capacity.

8. Identification of few key local pharmaceutical companies that will be granted funding facilities to support the procurement of raw materials and equipment required to boost local drug production.

9. N1 trillion in loans to boost local manufacturing and production across critical sectors.

10. The CBN has adopted a unified exchange rate system for Inter-Bank and parallel market rates to ease pressure on FOREX earnings as oil prices continue to plummet.

11. CBN adopts the official rate of NGN360 to a dollar for International Money Transfer Operators rate to banks.

12. For on-lending facilities financial institutions have been directed to engage international development partners and negotiate concessions to ease the pains of the borrowers.

13. Provision of credit assistance for the health industry to meet the potential increase in demand for health services and products "by facilitating borrowing conditions for pharmaceutical companies, hospitals and practitioners". (KPMG, 2020).

It is optimistic that all these will assist reduce layoffs, prevent bankruptcy, and encourage investment and aid economies get back on their feet as soon as possible in the aftermath of the crisis.

Survival Strategies for SMEs during and after Covid-19 in Nigeria

The instantaneous catastrophe entails an immediate response. To navigate this challenging period and help businesses position themselves for the salvage phase, SMEs need to play an important role to ensure their survival.

Building an Attitude for Survival: One of the most demanding issues is addressing SMEs owners' new emotional needs. When confronted with a crisis like the COVID-19 pandemic, SMEs owners can often feel distracted or defeated. This anxiety can lead to business challenges, as they (and staff) face a kind of "analysis paralysis" that averts them from making key decisions. Programs need to address these psychological needs. They can do this by creating a safe space for them to share their experiences and concerns, lifting their moods, and assisting them to concentrate on addressing the most vital hitches they face without endangering their post-crisis future. It's important to create networks for peer support among SMEs, which has revealed to be particularly effective for these purposes.

Financial Management for Resilience: Having a clear picture of a business's financial position and being able to make sound choices based on the numbers are always important skills, and they become crucial in a crisis. SMEs should be help to:

i. Evaluate the financial status of their business in the current situation, with particular focus on liquidity.

ii. Scrutinize the business's break-even point and evaluate the financial impact of different circumstances.

iii. Find prospective measures to increase cash flow to help the business survive, such as cutting non-essential costs, decreasing the mark-up for selected products and services in order to exploit sales, or bargaining more flexible terms with suppliers.

iv. Prioritize these financial measures based on the ease of execution, impact and risk of jeopardizing the future of the company.

v. Gather information about government aid, grants, and deferred tax collection.

vi. Identify bank initiatives to make loan refund terms more flexible and other programs offered by the private sector and civil society to help small businesses. (COVID-19 and Entrepreneurs: Supporting Business Survival and Recovery).

Theoretical Review

Various theories can be used to discuss this study; they include real options theory, events systems theory, resource dependency theory, prospect theory, tournament theory, institutional theory, structural inertia, resources or orchestrated theory, game theory, and institutional theory.

This study therefore will adopt two theories for the study: Institutional theory and real options theory.

Institutional Theory

Institutional theory suggests that firms bow to environmental pressures in an effort to earn legitimacy (DiMaggio & Powell, 1983). Legitimacy in turn is believed to allow a firm to more easily attracts support from external factors such as buyers, suppliers, and governments. As various firms all pursue legitimacy, they start to resemble each other—a process called isomorphism (Meyer & Rowan, 1977). Bank branches, for example, share similarities such as well- dressed employees, conservative décor, and drive- through windows. Within the supply chain context, researchers have examined how expectations of what constitutes legitimate behavior diffuse across supply chains and gradually become shared norms (e.g., Bhakoo & Choi, 2013; Reusen et al., 2020). Institutional theory's emphasis on the creation and demise of legitimacy fuels its value as a lens for understanding supply chain behavior during and after a pandemic (Meyer & Rowan, 1977). During a pandemic, firms are freed from a so- called "iron cage" of expectations (DiMaggio and Powell, 1983), and longstanding ideas of what is and is not legitimate are ignored as firms desperately respond to extreme shifts in supply and demand. For example, during the COVID- 19 pandemic, the "lean" philosophy—a widely adopted, if not sacred, best practice since the 1980s—was called into question amidst rampant stock outs (Jin & Ellram, 2020).

Real Options Theory

Real options theory focuses on how to make better decisions within uncertain situations. Managers are believed to manage uncertainty by creating real options for themselves wherein they have the opportunity, but not an obligation, to make a bolder move as uncertainty is resolved (Myers, 1977). Building a factory using a modular approach, for example, creates an option to expand the facility if demand requires it. Given the inherent uncertainties within supply chains (Flynn et al., 2016), real options thinking has been applied to information technology initiatives (Tiwana et al., 2006; Tiwana et al., 2007), outsourcing (Jiang et al., 2008), and other supply chain projects (Hult et al., 2010).

Pandemics create uncertainty at warp speed due to their scope, spillover, and extreme shifts in supply and demand. In preparation for the next one, managers should consider developing an arsenal of real options for navigating the associated uncertainties. Real options theory offers six primary options—unlocking (aka growth), stage, deferral, scale, switch use, and abandonment (Hult et al., 2010) all of which potentially could be used to cope with the pandemic- induced challenges.

METHODOLOGY

The study was designed to investigate small and medium-sized enterprises in Nigeria during COVID 19. It largely focused on identifying survival strategies of small and medium scale enterprises in Ogun State. The population of the study was the owners of small and medium scale enterprises in 6 local governments in Ogun state. The SMEs areas of focus were six different local governments which were Yewa South, Yewa North, Ipokia, Ewekoro, Ifo and Obafemi Owode. The survey method was adopted for the study. This involved the use of questionnaire to generate data from the targeted respondents. Six hundred (600) questionnaires were distributed to the respondents (SMEs) owners in the six (6) local government area of Ogun State and five hundred and forty Nine (549) were returned. This selection was done based on the convenience and judgment of the researchers. The questionnaire design followed the 5-point likert scale: SA = Strongly Agree-(5); A = Agree-(4); U = Undecided-(3), D = Disagree-(2); SD = Strongly Disagree-(1). The field work was carried out within the space of one (1) month.

To ensure internal consistency or stability of the items used to explain the phenomenon, a reliability test was conducted using the Cronbach's Alpha. A Cronbach's Alpha coefficient of 0.7 and above implies acceptable reliability and it is an indication that the test result shall be consistent over time.

DATA RESULTS AND DISCUSSIONS

Table 1: Enterprises

Business Line	Frequency	Percentage
Agriculture	79	19.5%
Beauty	49	10.5%
Business Centre	16	0.60%
Bookshop/Stationery	20	1.80%
Branding	21	2.10%
Carpentry	23	2.70%
Dry Cleaning	18	1.20%
Education	22	2.40%
Engineering	20	1.80%
Fashion	46	9.61%
Pharmacy	25	3.30%
Photography	19	1.50%
Retail	135	30.63%
OTHERS	56	12.31%

Source: *Authors computation, (2020).*

Table 2: Questions on How COVID-19 Affected Enterprises

S/N	**Statement**	SA (5)	A (4)	U (3)	D (2)	SD (1)	Mean	Std.D
1.	This enterprise has experienced a reduction in sales/work activity/contracts due to the coronavirus outbreak.	300	100	80	40	29	4.53	0.69
2.	This enterprise has reduced the number of workers.	269	91	120	49	20	3.06	1.45
3.	This enterprise was paying workers' salaries in full during the lockdown.	100	150	200	50	49	2.25	0.83
4.	This enterprise plan to recall your lay off workers if business improves.	305	130	78	24	12	3.53	0.91
5.	This enterprise expects to continue in its line of business over the next year.	247	54	133	24	91	4.21	0.87
6.	This enterprise may diversify into another business.	148	193	170	20	18	3.27	1.25
7.	This enterprise plan to change the way it run its business; e.g., make use of electronic/digital strategies, working from home permanently, etc	289	164	10	35	51	2.62	1.19
8.	This enterprise may close it business as a result of the coronavirus.	2	10	60	87	390	2.39	1.31
9.	This enterprise agrees with the government on lockdown and restriction of interstate movement.	37	14	384	64	54	2.61	1.24
10.	This enterprise is aware of Government loan opportunities.	243	162	64	43	37	3.38	1.1
11.	This enterprise has better chances to get loan opportunities from government.	241	109	87	34	33	3.95	1.09
12.	This enterprise thinks that the government has done enough to curtail COVID-19.	106	104	109	108	122	2.22	1.03
13.	This enterprise had difficulty in paying rents during the COVID-19.	178	153	84	56	78	3.09	1.47
14.	This enterprise had difficulty in paying back their loans during the COVID-19.	395	142	6	4	2	3.15	1.67
15.	This enterprise was faced with other challenges such as low sales, the high cost of transportation due to poor road network, running cost, increase in PHCN and fuel during the COVID-19.	390	140	8	4	7	3.95	1.85

Source: *Authors computation, (2020).*

Table 2 above represents the responses of respondents on how COVID-19 has affected their businesses. The table shows the frequencies in terms of the number of respondents that strongly agreed, agreed, undecided, disagreed and strongly disagreed based on the individual questionnaire items. The analysis here is based on descriptive statistics using mean and standard deviation, with a threshold of acceptance of 3 and above. This implies that any questionnaire item with a mean of 3 and above should be accepted as playing out in the businesses of the respondents while the ones with a mean of less than 3 are rejected as not being true. From the analysis, it shows that questionnaire items 3, 7, 8, 9 and 12 were rejected by the respondents, by virtue of their means being less than 3 while questionnaire items 1, 2, 4, 5, 6, 10, 11, 13, 14 and 15 are considered true as their means are above the threshold of 3. By implication, the result shows that the respondents could not pay workers in full during the lockdown. Also, they plan to change the way business is being run and start using other digital means to run their business and working from home too. Similarly, some may close their business as a result of the coronavirus. They also disagree with the government on lockdown and restriction of interstate movement. And lastly, they think that the government has not done enough to curtail COVID-19.

Also, going by the result as presented in Table 2 above, the respondents judging from the mean largely agrees that they experienced reduction in sales/work activity/contracts due to the coronavirus outbreak. They also

had reduced the number of workers. It also shows that the respondents plan to recall their lay off workers if business improves. Similarly, they expect to continue in their line of business over the next year. It also shows that some of the respondents may diversify into another business. Most of the respondents are aware of government loan and they better chances to get loan opportunities from government. Also, the respondents had difficulty in paying rents during the COVID-19 as well as paying back their loans during the COVID-19. They were also faced with other challenges such as low sales, the high cost of transportation due to poor road network, running cost, increase in PHCN and fuel during the COVID-19.

All these responses point to the fact that COVID-19 had affected their business to a large extent which if not looked into may not pass the survival stage.

Testing of Hypotheses

Table 3 COVID-19 has affect the survival of SMEs

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.951a	.912	.911	1.209

a. Predictors: (Constant), Survival Strategy
Source: *Authors computation, (2020).*

Table 3 shows the regression result on the effects of COVID-19 on survival of SMEs in six local government's area in Ogun State. The correlation coefficient of 0.951 shows a strong positive linear relationship between COVID-19 and survival of SMEs. The R-squared value of 0.912 and the adjusted R-squared of 0.911 shows that about 90 percent of variations in survival of SMEs are attributed loan repayment, high expense and non-digital platform to run business in this COVID-19.

Table 4: ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	177.671	1	177.671	81.823	.000[b]
Residual	43.287	548	1.189		
Total	220.958	549	Total		

Source: *Authors computation, (2020).*

Table 4 shows the statistical significance of the result. The ANOVA table tests the null hypothesis to determine if it is statistically significant. The null hypothesis is rejected if the P value is ≤ 0.05. From the results, the model in this table is statistically significant (sig=.000) and hence the null hypothesis should be rejected and alternate hypothesis accepted. This indicates that the COVID-19 has significantly affected the survival of SMEs.

Table 4: Model Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		

(Constant)	.872	.082		12.532	.000
COVID-19	.776	.037	.901	23.152	.000

Source: *Authors computation, (2020).*

Table 4 shows how the variables included in the model predict the behavior of the dependent variable. From the table, it was observed that COVID-19 has high negative impact on SMES. If COVID-19 persist longer that most business may not be able to recover from it. Of the above predictors, the standardized coefficient, β, of 0.901indicates that COVID-19 has higher effect on the survival of SMEs. It indicates that one standard deviation change in COVID-19 produces 0.901 changes in survival of SMEs.

CONCLUSION AND RECOMMENDATION

The outbreak of COVID-19 has brought massive changes in the business world. Large firms are seen to have leverages on survival due to their financial capability whereas the effect is more on SMEs due to the difference in their financial capability. Tucker (2020) observed that with the outbreak of the virus, cases of businesses shutting down and filing for bankruptcy could escalate. Similarly, Naveen and Anders (2020) and Aifuwa, Musa and Aifuwa (2020), showed that there has been a monumental disruption in the free flow of businesses activities in globe owing to the spread of the virus.

Therefore, as a result of the COVID-19 it was concluded that not all business will survive this globally faced COVID-19. The study recommends that those SMEs that collected loan should be given extra grace period to be able to repay the loan. Also, quick loan opportunities with low interest rates should be offered by the government to some of the SMEs to support their business so as to continue staying in the business. Grant should also be given to new start-ups of SMEs. SMEs owners should recall their laid off workers back as soon as they are back on their feet. Government should consider tax relaxation on SMEs for the period till the businesses start making voluminous sales back. And lastly, government should put in all survival strategies that will enhance business back on their feet to boost the economy again.

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INTEGRATED PERSONNEL AND PAYROLL INFORMATION SYSTEM (IPPIS) AND STAFF SOCIAL BENEFITS IN PUBLIC SERVICE.

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Abstract

This study intended to evaluate whether the implementation of IPPIS has significant irregularities in the payment of staff personal emoluments in the public service. Survey research design was adopted by the study. Primary source of data was employed through Likert type questionnaire which were administered to a sample size of 438 teaching and non-teaching staff of the Federal Polytechnic Ilaro. Stratified sampling technique was applied on the population of 967 which consisted of 498 teaching staff and 469 non-teaching staff. The study employed descriptive and inferential statistics using simple linear regression with the aid of SPSS to analyze the data collected. The correlation coefficient (R) of 0.714 and coefficient of determination (R^2) of 0.510 show that there is high positive correlation between IPPIS Implementation and all the variables considered in this research. Similarly, the fitted model showed that 51% of the variation in IPPIS implementation was jointly accounted for by all the independent variables (monthly deductions, staff emoluments and Union check-off dues). The study concluded that, there is significant irregularities in the payment of staff salaries using IPPIS, there are significant delays in the remittance of Union check-off dues, using IPPIS and there are significant negative effects of IPPIS implementation on staff monthly deductions in the public service. It is therefore recommended that when policies of this nature are been formulated, there should be a proper test running before implementation takes place to observe likely loopholes and then make necessary adjustments so as to make the system a perfect one.

Keywords: *IPPIS, staff emoluments, staff check off dues.*

Introduction

Before the advent of Integrated Personal and Payroll Information System IPPIS in Nigeria, staff payrolls were computed by the account department of each Ministries, Departments and Agencies (MDAs). The payment of salaries involved a complex process of issuance of warrants by the Budget Office of the Federation (which must be signed by the Minister of Finance) to the Accountant General of the Federation (AGF) authorizing the AGF to disburse monies specified from Consolidated Revenue Fund (CRF) for the purpose of carrying on the services of the government (Aji, 2013; OAGF, 2011 in Okoye, Janefrances & Amahalu, 2015). The Accountant General of the Federation (AGF) will in turn issue mandate for cash banking to the Central Bank of Nigeria (CBN) to credit the individual MDAs account for payment of staff salaries.

However, gross meagerness was observed in the payroll and personal records of the public service. Out of concern, the Federal Government of Nigeria in a quest to improve the situation conceived the Integrated Personnel and Payroll Information System IPPIS in 2006. The platform of IPPIS was intended to help provided a reliable and comprehensive database for the public service which would help address the shortcomings associated with the old method of salary payment; some of which were excessive personnel cost, payroll fraud, poor storage, update and retrieval of personnel records for administrative and pension processes among others.

Integrated Personnel and Payroll Information System (IPPIS) is a department within the office of the Accountant–General of the federation which is responsible for payment of salaries and wages directly to government employee's bank account with appropriate deductions and remittances of 3rd party payments such as: Federal Inland Revenue Service, State Boards of Internal Revenue, National Health Insurance Scheme, Pension Fund Administrative, Cooperative Societies, National Housing Fund, Bank Loans and Associations Dues (Department of IPPIS, 2012).

The IPPIS is an IT-enabled facility being put in place to establish a reliable and comprehensive database for the public service, facilitate manpower planning, eliminate record and payroll fraud, facilitate easy storage, update and retrieval of personnel records for administrative and pension processes and staff remuneration payment with minimal wastages and leakages. Since the inception of the project, IPPIS have saved the Federal Government of Nigeria billions of Naira by eliminating thousands of ghost workers via personnel verification exercise and salary payment process (Enakirerhi & Temile, 2017).

Idris, Adaja and Audu (2015) in their study on IPPIS Panacea for Ghost Workers Syndrome in Nigeria Public Service (a study of Kogi state local government service commission) using the spearman rank order correlation coefficient to analysis data, asserted that ghost workers syndrome is highly imminent in the public service and it has not only affected employee’s performance but has also threatened the nation’s economy. They therefore recommended the use of IPPIS in the public service to ensure a virile economy through enhanced productivity.

Also, Okoye et al (2015), in their research work investigated the effect of IPPIS on federal government recurrent expenditure in Nigerian Ministries, Departments and Agencies made use of the t-test statistics to carry out a comparative analysis using the budgeted and actual personnel cost of the sampled MDAs in other to determine the savings by IPPIS. They concluded that the Federal Government of Nigeria has been able to save funds as the introduction of IPPIS has eliminated non-existent workers.

Despite the successful implementation of IPPIS in Nigeria, there are still some hiccups in the system which makes it flawed on the part of the public servants who are the main beneficiaries of the system. On this back drop, the study seeks to address the flaws associated with the implementation of IPPIS and staff social benefits in the public service.

The study therefore, seeks to evaluate whether the implementation on IPPIS has significant irregularities in the payment of staff personal emoluments in the public service; to ascertain whether IPPIS delays the remittance of union check-off dues and to investigate whether the implementation of IPPIS has significant negative effect on staff monthly deductions in the public service.

RESEARCH QUESTIONS

The study will therefore answer the following research questions

1) To what extent has implementation of IPPIS resulted in irregularities in the payment of staff salaries?
2) To what extent has implementation of IPPIS resulted in the delay of remittance of union check off dues?
3) To what extent does the implementation of IPPIS have significant negative effect on staff monthly deductions in the public sector service?

RESEARCH HYPOTHESES

The hypotheses are in their null forms as follows:

Ho_1: There are no significant irregularities in the payment of staff salaries using IPPIS.

Ho_2: There are no significant delays in the remittance of union check off dues using IPPIS.

Ho_3: There are no significant negative effects on staff monthly deductions in the public service using IPPIS.

LITERATURE REVIEW

Conceptul Framework

Concept of Integrated Personnel and Payroll Information System

Integrated Personnel and Payroll Information System (IPPIS) is one of the Federal Government Reform Programme conceptualized as a central payment process for all civil servants on the payroll of the Federal Government. The system was planned to run in phases using the World Bank facility to finance the pilot phase. It was fully implemented consequent on the approval of the Federal Executive Council (FEC) in February, 2006 but went life in April 2007 with seven (7) pilot MDAs (Okoye et al, 2015).

Aganga (2011) in Agboola (2018) sees Integrated Personnel and Payroll Information System as one of the Federal Government Reforms Initiative conceived to transform the Nigerian Public Service and make it more efficient and effective in service delivery. The IPPIS initiative is aimed at improving the public financial management and providing a centralized payroll system in the country. IPPIS is designed to enroll into platform, all federal government ministries, departments and agencies, that draw personnel cost fund from consolidated revenue fund. The AGF said when fully functional, the system will help solve the challenges for lack of efficiency lack of central control, lack of central management and lack of rendition of figures. Besides, he said, the elimination of replacement of personnel costs in the country.

El-rufai (2011) cited in Okoye et al (2015) asserts that Integrated Personnel and Payroll Information System is a computerized biometric platform designed to improve the effectiveness and efficiency in the storage of personnel records and administration of monthly payroll in such a way that it will enhance confidence in staff emolument cost and budgeting.

OBJECTIVES OF IPPIS

IPPIS has several objectives among which are to:

i) facilitate planning; that is, having the civil service records centralized in a database in such a way that will aid manpower planning as well as assisting in providing information for decision making.

ii) aid budgeting in the area of accurate recurrent expenditure on emoluments which can be done on a yearly basis.

iii) ascertain actual personnel emoluments and workforce of Federal Government.

iv) monitor the monthly payment of staff emoluments.

v) ensure database integrity so that personnel information will be correct and intact.

vi) eliminate payroll fraud such as ghost workers and multiple payments of emoluments to a single employee. (OAGF, 2012)

CHALLENGES OF IPPIS

The challenges facing IPPIS include the following:

i) Lack of trained manpower in some MDAs.

ii) Continuous deployment of trained IPPIS officers thus hindering the smooth flow of their work in each MDA.

iii) Inaccuracy of data supplied by some staff of MDAs while filling the IPPIS form.

iv) Inadequacy on the part of the IPPIS officers in the process of inputting staff data into the IPPIS database.

v) Poor sensitization and publicity.

vi) Communication gap between IPPIS and some MDAs which often leads to late payment of salaries in the affected MDAs. This has subsequently resulted in the slow implementation of IPPIS by the Federal Government so as to correct this abnormality.

CONCEPT OF SOCIAL BENEFITS

These are current transfers received by households intended to provide for the needs that arise from certain events or circumstances, for example, sickness, unemployment, retirement, housing, Education or family circumstances.

CONCEPT OF PUBLIC SERVICE

Salisu (2011) in Idris et al (2015) sees public service as a paid non-elective office in an executive arm of government; the public service is principally charged with the responsibility of implementing the machinery of governance and is role cannot be over- emphasized. He also viewed the public service to consist of the federal civil service, the 36 autonomous state civil services, and the unified local government services husbanding 774 local authorities excluding the military, the legislative and judicial arms of the state as well as the federal and state parastatals. The public service plays a very significant role in the socio-economic development of the nation.

Okoh (2003) in Idris et al (2015) sees the public service as the major institutional instrument used by government to implements its policies and programmes. Hence, it is the management arm of government charged with the responsibility of driving government machinery to the pre-determined end.

THEORETICAL FRAMEWORK

Technology Acceptance Model (Tam)

The study is based on Technology Acceptance Model (TAM) as cited in Agboola (2018). This is an information system theory which models how users accept and use technology. Kinyeki (2015) in Agboola (2018) asserted that TAM has been proposed in the context of payroll systems with an inclusion of the effects of trust and perceived risk on system used. The theory was developed through a review and consolidation of constructs of models that earlier researchers had employed to explain information systems usage and perceived ease-of-use. TAM has been used in the adoption of ICT. It uses research as a fundamental theoretical framework and has also been combined with other theories and models. Both attitude and subjective norm were found to be necessary determinants of electorate intentions to adopt and use ICTs and thus adoption of Integrated Personnel and Payroll Database (IPPD).

Equity Theory

Equity theory suggests that employee perceptions of what they contribute to the organization, what they get in return and how their return-contribution ratio compares to others inside and outside of the organization, determine how fair they perceive their employment relationship to be (Adams, 1963 in Gerhart, 1994). Perceptions of inequity are expected to cause employees to take actions to restore equity. Unfortunately, some of such actions such as quitting, lack of co-operation evident in the form of fraud may not be helpful to the organization.

EMPIRICAL REVIEW

Agboola (2018) concluded that Integrated Personnel and Payroll Database (IPPD) has led to improvement in reporting the ghost workers on salary administration which is highly sacrosanct in the public service and it has affected the nation's economy and national development in Nigeria. The secondary data revealed the benefits, challenges of IPPIS implementation and outlined some of the prospects of detecting ghost workers from 2007and 2017 through the IPPIS policy. He further stress that if IPPIS policy is properly implemented and managed, it is likely to go a long way in eradicating ghost workers and double-dealings in the Nigeria public service. He recommended that Government should ensure the implementation of payroll policies so as to eradicate ghost workers in Nigeria; payroll systems should never be solely handled by one employee and that there should be proper update of records of staff that have been dismissed, terminated, died or resigned should be done.

Okoye et al, 2015 investigated the effect of IPPIS on Federal Government Re-current expenditure in Nigeria their study revealed that the percentage of fund savings to the budgeted expenditure shows that the implementation of

IPPIS by the federal government has resulted in fund savings to the tune of ₦ 38.094billion from the budgeted expenditure of 7 MDAs taken as a pilot MDAs in the scheme from 2007 to 2012. The study concluded that the elimination of non-existent workers by the introduction of IPPIS has resulted in fund savings from the Federal Government of Nigeria. The study recommended that training of the operators should be technologically compliant and periodic monitoring or verification exercise of the MDAs should be adopted by the OAGF to verify the civil servants that have left the service.

Furthermore, Enakirerhi and Temile (2017) cited in Leyira and Temple (2017) explored the Integrated Personnel and Payroll Information System (IPPIS) in Nigeria by looking critically at the challenges of implementation of IPPIS, benefits to be derived when IPPIS is fully implemented and what the future holds. The study which descriptive in nature outlined that accurate and reliable personnel information, reduction or elimination of corrupt and sharp practices, facilitation of modern scientific and accurate budgeting and forecasting are the major benefits of IPPIS. These benefits are, however, threatened by skills transfer problem, poor supporting infrastructure, technological barriers for infer MDAs transfer, resistance from stakeholders and lack of will for accelerated implementation.

Methodology

The study adopted survey research design because of its flexibility as the research is expository in nature. Primary and secondary data were employed by the study. The primary data were sourced through well-structured questionnaire while secondary data were sourced from related journals, textbooks, magazines, etc.

The study area is the Federal Polytechnic, Ilaro which has a total staff population of 967. This was stratified into 498 teaching staff and 469 non-teaching staff of the study area using stratified sampling technique. Taro Yamane statistical formula was used to determine the sample size of 438. This was experimented as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where: n = sample size
N = Population size
e = error term
1 = constant

Teaching Staff

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{498}{1 + 498(0.05^2)}$$

$$n = \frac{498}{1 + 1.245}$$

$$n = \frac{498}{2.245}$$

$$n = 222$$

Non-Teaching Staff

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{469}{1 + 469(0.05^2)}$$

$$n = \frac{469}{1 + 1.17}$$

$$n = \frac{498}{2.173}$$

$$n = 216$$

Therefore, the total sample size is 222 + 216 = 438

The study employed descriptive and inferential statistics using simple linear regression with the aid of version 23 of Statistical Package for Social Sciences (SPSS) to test the hypotheses.

Model specification

IPPIS = f(SE, UCD, MDd)

$IPPIS = \beta_0 + \beta_1 SE + \beta_2 UCD + \beta_3 MDd + \sum t$

Where β_0 = constant

β_1 β_2 β_3 = co-efficients

SE = staff emoluments

UCD = union check off dues

MDd = monthly deductions

$\sum t$ = error term

Data analysis and discussions

Reliability of the instrument

Reliability Statistics

Cronbach's Alpha	N of Items
.877	15

Tests were conducted for the internal consistency and adequacy of the item contained in the instruments (questionnaire) and the result 78.892% indicated that information gathered from the respondents are valid. The cronbach's alpha (α= .877), which is above 0.50 implies that the questionnaires are reliable and capable of given similar result under similar circumstances.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.714(a)	.510	.507	2.93889

a Predictors: (Constant), MONTHLY DEDUCTIONS, STAFF EMOLUMENTS, UNION CHECK-OFF DUES

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3733.556	3	1244.519	144.091	.000(a)
	Residual	3584.377	415	8.637		
	Total	7317.933	418			

a Predictors: (Constant), MONTHLY DEDUCTIONS, STAFF EMOLUMENTS, UNION CHECK-OFF DUES
b Dependent Variable: IPPIS IMPLEMENTATION

The model summary and ANOVA shows the combine effects of the independent variables (monthly deductions, staff emoluments and Union check-off dues) on dependent variable (IPPIS Implementation). According to the correlation coefficient (R) of 0.714 and coefficient of determination (R^2) of 0.510. It shows that there is high positive correlation between IPPIS Implementation and all the variables considered in this research. The fitted model also shows that 51% of the variation in IPPIS Implementation is jointly accounted for by all the independent variables (monthly deductions, staff emoluments and Union check-off dues). The remaining 49% could be as a result of other factors responsible for IPPIS Implementation but which are not considered in this research.

The F-statistic result gives 144.091 with a significant value of 0.000 which is less than 0.05. This shows that all the explanatory variables (monthly deductions, staff emoluments and Union check-off dues) are jointly significant to the IPPIS Implementation.

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	9.802	.876		11.193	.000
	STAFF EMOLUMENTS	.636	.056	.458	11.396	.000
	UNION CHECK-OFF DUES	.473	.092	.275	5.118	.000
	MONTHLY DEDUCTIONS	.201	.102	.107	1.976	.049

a Dependent Variable: IPPIS IMPLEMENTATION

H_{01}: There are no significant irregularities in the payment of staff salaries using IPPIS.

The regression result indicates that there exists a positive significant relationship between IPPIS implementation and the irregularities in the payment of staff salaries in the tertiary Institutions with regression coefficient of beta .636, $p < .000$. This implies that a unit increase in staff emoluments will lead to 63.6% unit increase in the IPPIS implementation provided all other variables are held constant. Hence, the null hypothesis that there are no significant irregularities in the payment of staff emoluments in the tertiary institution is hereby rejected.

H_{02}: There are no significant delays in the remittance of Union check-off dues, using IPPIS.

The result revealed that there exist a positive significant relationship between IPPIS implementation and delays in the remittance of Union check-off dues with regression coefficient of beta .473, $P < 000$. However, this implies that a unit increase in Union check-off dues will result to 47.3% change in the IPPIS implementation. Since the p-value is less than 5 percent significant value, the null hypothesis that there are no delay in the remittance of Union check-off dues in the implementation of IPPIS in the public service is thereby rejected.

H_{03}: There are no significant negative effects of IPPIS implementation on staff monthly deductions in the public service.

The result indicated that staff monthly deductions do not suffer much significant negative effect, using IPPIS with regression coefficient of beta 0.201, $p < .049$. This means that a unit increase in negative effect on staff monthly deductions will result to 20.1% change in the IPPIS implementation. Hence, it is concluded by accepting the alternative hypothesis that there are significant negative effects on staff monthly deductions in the public service, using IPPIS.

Conclusion and recommendations

From the above analysis, the correlation coefficient (R) of 0.714 and coefficient of determination (R^2) of 0.510, show that there is high positive correlation between IPPIS Implementation and all the variables considered in this research. Similarly, the fitted model shows that 51% of the variation in IPPIS Implementation is jointly accounted for by all the independent variables (monthly deductions, staff emoluments and Union check-off dues). Hence, we conclude that, there is significant irregularities in the payment of staff salaries using IPPIS, there are significant delays in the remittance of Union check-off dues, using IPPIS and there are significant negative effects of IPPIS implementation on staff monthly deductions in the public service. Consequent upon the findings and conclusion, the study therefore recommend the following:

i) That, when policies of this nature are been formulated, there should be a proper test running before implementation takes place to observe likely loopholes and then make necessary adjustments so as to make the system a perfect one.

ii) To ameliorate further possible irregularities, IPPIS should have at least a desk officer in each MDA.

iii) That the preparation of payrolls should be decentralized. That is, each MDA should prepare their payroll which will be sent to the IPPIS desk officer in each MDA (as recommended in (ii) above) who will further send it to the IPPIS headquarters for necessary action. With this, irregularities will be reduced to the barest minimum and Union check of dues and other deductions would have been well taken care of.

iv) The system should be upgraded from time to time to accommodate validation of staff data and variations in monthly emoluments.

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