Multidisciplinary Journal of Academic Research and Development

Vol. 3. No. 2 November 2023

MJARD- Publication of Bayelsa State Polytechnic, Aleibiri

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A GOOGLE BASED INTRANET FILE SHARING SYSTEM FOR ORGANISATION

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Abstract
Nowadays, many staff members of different organizations work remotely. To be able to work efficiently and effectively, it's crucial for remote teams to be on the same page. It is against this background that Google based intranet sharing system is very vital for an organization in this current world of internet of everything. An intranet is a private computer network used within an organization. It is used to improve communication between the employees of an organization, providing a platform for sharing data as well as allowing employees access to organizational resources. The intranet adopts the same information technology that the Internet utilizes for network processing, with the exception of system boundaries. Moving corporate systems into an intranet environment will increase the data traffic within the corporate network. In order to smooth out data traffic in the network, adopting a high-quality management process for the intranet is needed. This article discusses the costs and benefits of adopting the intranet, tool availability and selection criteria, and some management issues for developing an intranet. This is important to ensure efficient and effective collaboration between departments and personnel. With a Google-based intranet, staff of organizations, both small and large, can collaborate seamlessly among themselves and have access to important documents wherever they are. Prior to this, a Google-based intranet information sharing system was developed. With the current system of information distribution manually, documents being printed out in hard copy format with a high cost of printing materials and carried from place to place, the need to build a secured real-time information sharing system can never be overrated. This paper focuses on developing a Google-based intranet system that will enable the easy sharing of information, store files, grant easy access to information, enhance communication, be mobile-driven, ease real-time collaboration within departments and outside, and have security of authentication before staff have access to a shared file.
Keywords: Design and Development, intranet, file sharing system, google sites

INTRODUCTION

Organizations are rapidly starting to grow their own infrastructures with information and communications through the use of internal communication systems called intranets. Intranets are used by a large number of companies worldwide to tackle internal communication. Therefore, these platforms are seemingly important for organizations in their everyday work to help their employees accomplish their tasks.

Although intranets are usually accessed through a computer, this makes it impossible for employees who are out in the field to access them. This is where mobile intranet applications come in. With mobile-enabled intranet applications, employees can access the intranet from their smartphones. A Google-based intranet file sharing system for organizations is an effective solution for managing and sharing files within an organization. With Google Workspace (formerly G Suite), organizations can utilize various tools like Google Drive and Google Sites to create an intranet environment for internal file sharing.

Google Drive allows users to store, access, and collaborate on documents, spreadsheets, presentations, and other files within the organization. Additionally, Google Sites enables the creation of custom intranet pages where employees can access important information, documents, and announcements. These tools provide a secure and efficient way for organizations to centralize their files and promote collaboration among team members. The intranet allows organizations to increase productivity and efficiency while reducing overhead costs. By providing a central platform for communication and information sharing, organizations are able to quickly access and update data when needed, drastically reducing the amount of time spent searching for information. This allows for better decision-making, faster project completion, and better customer service.

Intranets improve internal communication and collaboration within an organization department. One of the most successful and recognized brands in the technology industry is Google. Google originally started as a search engine. Right now, one of their most recognized products is the Google Workspace. Google Workspace allows real-time collaboration within and outside departments in an organization; communication and

collaboration are made easier and more efficient. The Google Workspace has some applications embedded in it, which are Google Chat, Google Drive, Google Calendar, Google Docs, Google Sheets, Google Forms, Google Slides, Google Sites, Google Meet, Gmail, and Google Keep.

Google based intranet has been shown to be a safe and secure platform for organizations to make use of. With Google, an organization, whether small or medium scale has the ability to decide on what type of access a staff of a particular department will have. Roles are assigned and permissions are given to staffs to access some files. A staff can be assigned to edit or view a specific document. This will prevent unauthorized staff to change or update the organizational/departmental documents. Google allows a single sign-on feature and your data is still secured.

The great thing about implementing a Google-based intranet is that staffs of an organization will not need intensive and time-consuming training just to learn how to work with a Google-based intranet. The applications are user-friendly and easy to learn. Google Workspace makes staffs adoption a smooth process. Google accounts like Google Drive and Gmail are familiar interfaces for most firms. Once a staff member has been introduced to an organization's Google intranet, they will use the same (URL) unified resource language link given to them by the administration of the Google intranet for the organization intranet and Google Workspace, which gives them access to the entire Google spectrum.

Statement of the Problem

The problem today in most organizations is that staffs do not have access to real-time working on the field. This can result to denial of the staff of important information that they need to take part in or that they cannot complete certain tasks that require urgency. An intranet-based file sharing system that enables them to store files, have easy access to information, and enhance communication among the staff of organizations can provide real-time collaboration within the department on a Google-based system. The followings are challenges faced by most organizations.

The problems are as following below:

1. **Unavailability of real time**: They cannot easily reach out to the department with important information. Therefore, they wanted to be able to reach out through push notifications to their smartphones and laptops.

2. They have problems with getting information from the department from a remote area when not being close to the department.

3. **Manually distribution of files**: There is a problem with their manual document carrying. It has a big workload due no google-based intranet platform accessible to them.

4. The department does not have any information about emergency contacts available to them, which they want them to have.

5. **Possibility of data losses:** Some departmental computer system being given to the staffs used in saving information might crash and that they currently do not have any safety measures if something happens.

These are the most pressing problems regarding communications and distribution of information within the department.

Google intranet sharing system is a very table tool to overcome the challenges list above. With an increasingly distributed workforce, modern intranets are the link that keep organizations workforce connected together real time. it ensures that everyone can communicate, collaborate, interact, and engage from wherever they are and whenever they're working. Not only do intranet help people work better and therefore enhance productivity, but it also improves employees experience. It does so by creating a sense of consistency between the physical and digital workspaces. Huler, (2023).

Aim and Objectives of the Study

The aim of the paper is to review and share the features and benefits of an intranet-based file sharing system using Google site intranet. In achieving the goal of this study, the following research objectives are to be realized.

- **Central repository.** Intranets become the main repository where important information and organizational data are stored.
- **Collaboration.** These internal networks provide a way to share information within the organization, that makes it easier to work together.
- **Personalization.** The system (Intranets) provides personalized content to staff based on their role within the organization.
- **Communication.** The system (Intranets) will make staff directories, organization news and departmental charts readily available, improving internal corporate communications.
- **Easy access to information.** It will (Intranets) provide easy access to information about the organization/departmental policies, benefits and updates.

- **Social elements.** Social media features let staff create an account, post content and status alerts and browse a newsfeed.
- **Automation.** Intranets streamline everyday activities by helping to automate repeatable tasks.
- **Easy to edit information.** Google continuously integrates its applications, which makes staffs to collaborate and edit documents in real-time without having to open another tool or switch tabs.

Significance of the Study

The Implementation of a Google-based intranet will significantly enhance internal communication within the departments of academic institutions. With a comprehensive suite of tools and applications at their disposal, the staffs of departments of academic institutions can effortlessly connect and collaborate, fostering a productive work environment. Moreover, the intranet provides convenient access to forms that facilitate the seamless forwarding of requests or training sign-ups to designated staffs of organization's department for swift approval. This streamlined process ensures efficient communication flows and enables prompt handling of tasks, promoting effective teamwork and reducing bottlenecks.

The ease of maintenance and usability of an intranet is a crucial consideration for many. Fortunately, with a Google-based intranet, managing and updating content becomes effortless due to its free nature, eliminating the need for staffs to acquire extensive knowledge of complex coding languages.

The user-friendly interface and intuitive features of Google empower staffs to easily add and manage content, ensuring a seamless experience without the hassle of intricate technical requirements. The ease of maintenance and usage enables the department to maximize productivity and focus on core operations; while reaping the benefits of an efficient and user-friendly intranet solution.

The Google-based intranet system will enable staff work from remote areas. To be able to work efficiently and effectively, it's crucial for remote teams to be on the same page. With Google-based intranet, staffs can collaborate seamlessly with other staffs and have access to important documents wherever they are, it's user-friendly and easy to implement. Remote staff can use the tools or applications instantly without spending a lot of time training and navigating.

Google continuously integrates its applications, which makes staffs to collaborate and edit documents in real-time without having to open another tool or switch tabs. A fully integrated intranet increases the productivity in a workspace and at the same time, it allows staffs to gain access to vital information. The last thing you want your staff to experience is spending too much time learning or navigating on the intranet tools.

A smooth and easy to use intranet will deliver the best staff experience no matter what device they are using. For examples, mobile phones or laptops, palmtops, desktops can easily be hooked up to the system to enable staff work remotely. With a Google-based intranet, staffs can effortlessly find relevant documents and navigate seamlessly. The basic configuration of mobile gadgets to the intranet for use is presented in Fig, 1.1

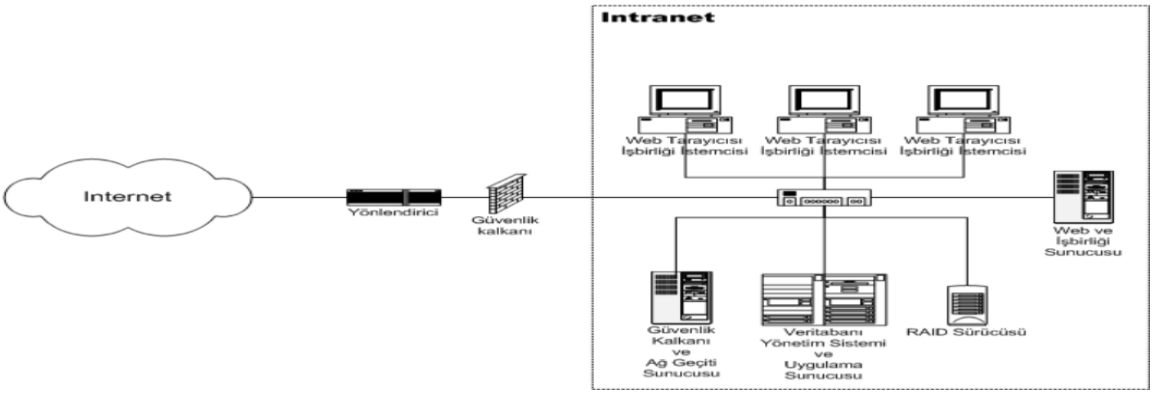


Fig.1.1: Configuration of intranet sharing system

2.0 Concept of Internet/Intranet

Today, information and communication are increasingly being stored, exchanged, and conducted via the internet. Hills et al, (2014): Organizations are rapidly starting to grow their own infrastructures with information and communications through the use of internal communication platforms called intranets. Therefore, these

platforms are seemingly important for organizations in their everyday work to help them accomplish their tasks.

In order for an organization to succeed, all players must understand its goals. Everyone needs to be working toward common goals, which correlates well with the use of intranets. The use of intranets is important for organizations to increase the performance of their staff. Although intranets are usually accessed through a computer, this makes it impossible for employees who are out in the field to access them. This is where mobile intranet applications come in. With mobile intranet applications, staff can have access to distributed information on the intranet from their smartphones.

The Internet, which is a distributed and open system, provides access to diversified information created by various organizations and individuals and is geographically distributed worldwide. The Internet, a hypermedia system, is commonly used as the first source of information because downloading text, audio and graphical information is so convenient, Malrey Lee et al, (2011). Corporate intranet users need to develop systems to share information in virtual space through the Internet without risking the security and integrity of their data. Many enterprises share and reuse information through the intranet. Kang, S. G. (2003),

An intranet is a private network. It is used by organization for the purposes of helping staffs communicate with each other, securely store information (forms, manuals, documents, shared folders, etc.) and facilitate collaboration. **Modern intranets** are cloud-based so that remote staffs can access the platform as easily as workers in the main office. It is a staff-**oriented network that relies on staffs** to share questions and comments up and down the organization lines of communication. Anyone connected to the intranet can post content they feel is interesting or informative to share with their colleagues as well.

File Sharing

According to Swann, (2019), File sharing is the public or private distribution of digital media, including files, folders, images, videos, audio, eBooks, or computer programs, from one device to another over a network or the internet. Chou (1998), Moving corporate systems onto an intranet environment will increase the data traffic within corporate network. In order to smooth out data traffic in the network, adopting a high-quality process to the intranet is needed.

The concept of Google Site

Google intranet file sharing system is the solution to any organization having problem communicating internally. Sharing files, scheduling meetings, and communicating both internally and externally seamlessly is an efficient way organization staff collaboration. Google Sites is the perfect solution! Google Sites is a free website-building program created by Google. The app is a part of Google Workspace, formerly G-suite. All that's required is you have your own Gmail account.

As long as you have a Google account, you have a Google Workspace account, and from there you can create your intranet on Google Sites. The best part is you don't need to be a tech wizard to use it! By building a company intranet using Google Sites, you'll be able to share documents like spreadsheets or calendars with other websites on the platform, making them easily accessible by all employees.

Not only will this bring everyone in your organization under the same umbrella, but it will also add value to professionalism collaboration among colleagues. More so, you will have all the collaboration tools you need right at your fingertips. Imagine not having to email or call someone for the least of everything. Especially in the modern work environment, organizations with remote employees need a company database with unlimited cloud storage that is accessible just about anywhere.

The necessity of Google Sites

The best thing about Google Sites is that you don't have to be a coding wizard to publish your own intranet. It is all about drag and drop. All you need to do is figure out how you want your intranet to look like, and Google Sites will do all of the hard work for you. You will have so much fun with it that you will want to edit websites more often.

When it comes to workplace communication, there was never a time when passive communication was really a thing. You always had to directly tell team members about important news and upcoming events. With Google Sites, you just upload the information you want your colleagues to see and your job is done. Things will fall into place themselves. That is what makes Google Sites the best intranet platform. The security Google Sites offers for the digital workplace is unmatched. Nobody will be able to see the intranet except for those to who you give access. The enterprise-level security will ensure that there is no unauthorized access to any file that is above someone's paygrade.

Google Workspace

Unless you have been living deep in the jungle completely cut off from civilization, you are familiar with Google. The company originally started as a search engine and has grown into one of the most recognizable brands in the tech world. Google Workspace is one of Google's most successful products. Originally named Google Apps, Google Workspace was called G Suite from 2016-2020. At that point, G Suite was rebranded and Google Workspace became available. **The latest version has made**

collaboration between users easier and more efficient. It allows users to generate content and work on documents with guests in chat rooms. This makes working with staffs of a department virtually an easy and convenient process. Google Workspace includes the following applications:

a. **The Gmail:** The Gmail gives staffs an easy way to attach files to email (and access to unlimited storage)
b. **Google Calendar**: The Google calendar creates public calendars and coordinating schedules for the department.
c. **Google Chat**: the Google chat is used for direct messaging and group chat
d. **Google Drive**: The Google drive is used for storing files
e. **Google Docs**: The Google docs is used for word processing functions and file sharing to Google Drive
f. **Google Forms** is used to create and share surveys
g. **Google Hangouts** used for video conferencing
h. **Google Keep** is a handy note-taking app with tools for making lists, capturing text, voice, and images
i. **Google Sheets** is used to create and share spreadsheets with staffs in Google Drive
j. **Google Slides** is used for creating, collaborating on, and storing presentations
k. **Google Sites** allows the administrator of the Google site to create and edit websites without having to learn IT or coding skills.

Given that organizations understand the value of introducing an intranet for their departments and that Google offers a suite of staffs-friendly applications (listed above), it makes sense to combine both in a Google-based intranet. This option works for departments of all sizes, from small-to-medium sized-departments. A cloud-based Google Workspace intranet is completely scalable. It grows with the organization.

2.2 Review of related works

Aru and Nnamdi (2021), presented research on the development of an intranet-based file transfer and distribution system with multi security layers sing PHP code. PHP (Hypertext Pre-processor) is currently one of the most popular programming languages, widely used in both the open-source community and in industry to build large web-focused applications and application frameworks. It is a flexible dynamic scripting language that executes in client browsers. (Ravi., Chugh., Jeffrey and Meister (2009). In their research, an intranet-based file transfer and distribution system was developed. With recent development in information security where hackers have developed sophisticated applications and program to hack even seemingly secured systems, the need to build more security walls can never be overrated.

Information security is of great importance and interest to everybody in the world of technology today, whether you are a mobile phone or a personal computer user, this is why information security is of the most importance in our everyday life, and in the technology fields, (Mohammed and Alexander (2017). This article focuses on intranet-based system that has multi security layers of authentication before a user will have access to a shared file.

(Mohammed and Alexander (2017) under studied several organizations to understand and identify possible points of loophole; identify necessary measures and strategies which were employed in the development of the design algorithm used in building the different modules. Being a module by module-based software design the research was done with the water fall model which allows for stepwise development of these modules. But the different thing about this research is that it was never organization centered based.

Sanjay et al. (2003) presented a study to design and implement the Google file system, a scalable distributed file system for large distributed data-intensive applications. It provides fault tolerance while running on inexpensive commodity hardware, and it delivers high aggregate performance to a large number of clients. While sharing many of the same goals as previous distributed file systems, their design was driven by observations of application workloads and technological environment, both current and anticipated, that reflect a marked departure from some earlier file system assumptions.

This has led them to reexamine traditional choices and explore radically different design points. The file system has successfully met their storage needs. It is widely deployed within Google as the storage platform for the generation and processing of data used by their service as well as research and development efforts that require large data sets. The largest cluster to date provides hundreds of terabytes of storage across thousands of disks on over a thousand machines, and it is concurrently accessed by hundreds of clients.

The intranet usage is continuously growing, but many companies have yet to advance to mobile intranet solutions for employees who work out in the field. Also due to this, many of the existing mobile intranet solutions are not designed with the office user experience in mind, who would benefit most from the mobile intranets. The objective of this study was to find a mobile intranet application concept that furthermost considers the office user experience. In the study, intranet, mobile intranet and design for intranets were investigated. Furthermore, in the study, guidelines of mobile design for iOS and Android were examined. The evaluation of three current mobile intranet applications was reviewed.

2.3 Disadvantages of the Existing manual system.

The existing system has the following drawbacks:

1. Mishandling information and lost paperwork
2. Slow retrieval of information time waste
3. Security issues and privacy law
4. Disorganization and compliance complain
5. Massey office and lack of space
6. Loss of document due to flood

2.4 Advantage of Google based intranet file sharing system

1. Safe and secure
2. Familiar tools
3. Single sign on access
4. Improve internal communication
5. Easy to maintain and use
6. Increase collaboration among staffs
7. Fully integrated
8. Provides an excellent staff's experience
9. Improve time management
10. Document security

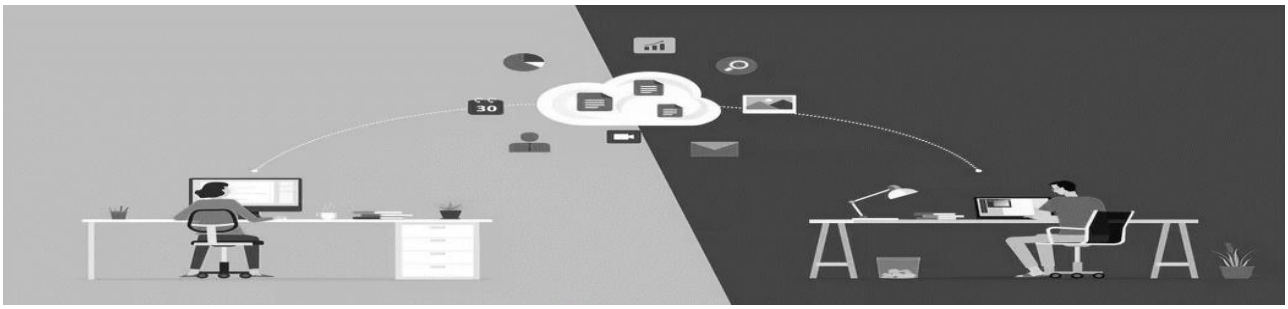


Fig.3.1: Conceptual framework of Google based intranet sharing system.

3.0 IMPORTANT FEATURES OF GOOGLE SITES

The following are key features of Google Sites:

Integration

How often do you switch between different Google apps? Imagine the time you will save if every service was in one convenient location. That is the basic idea behind Google Sites. Google Sites is a complete intranet solution that offers total suite integration of all your other Google Applications onto one platform. It enables you to have everything in your Google Drive–from Google Forms to Google Calendar to Google Maps–in one easily accessible place.

One feature that really helps this integration is the add-on functionality, which allows you to add new features to Google Sites with just a few clicks. Another great way Google integrates its services together is through sharing! Whenever you are logged into any of your Google accounts, you can see what documents are being shared by others and even edit documents. By enabling file sharing, you can create shared folders that allow your employees to work together on any given task.

Communication

Google Sites comes preloaded with most of the standard communication tools needed for an internal network like Instant Messaging and Blogs (all powered by Google+). It creates a virtual bulletin board that acts as a central location for everyone to post announcements, job openings, or the latest sports scores.

With Google Calendar, you will be able to craft public calendars to help your crew stay on top of tasks and shift assignments. Or for sensitive information, you can create a private forum where posts are publicly available in a viewable-only format. With a Google Sites intranet, collaboration levels in organization or company will skyrocket. Say goodbye to long emails and tedious, unnecessary meetings! Just say the word and it will be done without having to direct someone.

Security

Obviously, security is a major concern for those looking to build a company intranet. Google Sites makes your intranet fully secure. You can share your content with a selected group of people or make it completely private.

Additionally, Google Sites offers an added level of protection by encrypting the entire information flow.

Another security feature Google Sites offers is that it's fully customizable. You can select the most important people/departments and build a portion inside the intranet that only they can access. This way, you will have full control over who sees what.

4.0 IMPLEMENTATION TOOL

The system is developed using certain tools and in specific environment. These tools are briefly discussed in this section. The Google based intranet file distribution system is a web-based platform that is hosted in a remote server.

Google Sites is an online platform for creating easily accessible websites and workspaces. It is a powerful tool for creating simplified websites and makes it easy for users to share information in a secure online environment. It can be used to create collaborative websites for teams and organizations to share resources and ideas through documents, spreadsheets, and other forms of media.

5.0. CONCLUSION/ RECOMMENDATIONS

5.1 Conclusion

Google Sites has become a valuable resource for many organizations and businesses due to its range of features. It is free to use and provides an easy-to-use interface for anyone interested in creating a website. Additionally, Google Sites offers support for a wide range of applications that can be used to customize websites, such as Google Docs, Sheets, and Forms for document collaboration.

Overall, Google Sites is an invaluable tool for creating simple, accessible websites and workspaces. It has a wide range of features and offers support for various applications and SEO features that help users reach a wider audience. As such, it is a powerful tool for any organization or business looking to create a platform and take advantage of the many benefits of online collaboration.

In conclusion, the importance of intranet cannot be overstated. It provides a platform for improved communication, increased efficiency, and enhanced security. The use of Google Sites intranet is essential for the academic institutions, which will help the process of communication, information sharing and storage of all departmental results and other related information.

It is free to use and provides an easy-to-use interface for anyone interested in creating a website. Google Sites is a mobile-friendly website, which are important for improving user experience and reaching a wider audience.

5.2 Recommendation

Based on the benefits flexibility and strong security Google intranet sharing system provides it is recommended that departments in tertiary institutions should embrace this innovation, to enhance information sharing and storage of data in the cloud for feature use.

REFERENCE

Aru Okereke Eze and Nnamdi Henry I (2021). Development of an Intranet Based File Transfer and Distribution System with Multiple Security Layers Using Php Code. *IOSR Journal of Computer Engineering* (IOSR-JCE). 23(1):1-9. Available at iosrjournals. org

Chou, D.C. (1998), "Developing an intranet: tool selection and management issues", *Internet Research*, Vol. 8 No. 2, pp. 142-148. https://doi.org/10.1108/10662249810211601

Hills, M. & P. Klint (2014) " Design and implementation of an online/intranet office chat application system, ," IEEE, pp. 454- 457, 2014

Huler (2023). *How to Build a Modern Intranet for Employees in 2023*. (2023, February 14). https:// huler.io/blog/modern-intranet

Kang, S. G.—Park, J. S.: Web Security Technical. Journal of Korea Information Processing, Vol. 7, 2003, No. 2, pp. 23–30.

Malrey Lee et al (2011) "Design and implementation of an intranet Security and access control system in ubi-com" Computing and Informatics, Vol. 30.

Mohammed M. A, Alexander A Q (2017) "Information Security in an Organization" International Journal of Computer (IJC)

Ravi Chugh, Jeffrey A. Meister, (2009). "Staged information flow for JavaScript". Programming Language Design and Implementation. (PLDI)

Sanjay Ghemawat, Howard Gobioff, & Shun-Tak Leung (2003) The Google File System

Swann, (2019) *Sociolinguistics*, *23*(1), 105–109. https://doi.org/10.1111/josl.12321

EMPIRICAL MODEL OF MUNICIPAL DRAINAGE BIOSLUDGE ENHANCED BIOREMEDIATION OF PETROLEUM HYDROCARBON POLLUTED SOIL

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Abstract
Bioremediation is recognized as efficient, economical and environmentally friendly pollution treatment technology. This technology takes advantage of the natural ability of microorganisms such as bacteria and fungi to biodegrade organic pollutant to smaller harmless molecules. The aim of this study is to investigate the bioremediation of crude oil polluted soil simulation potential of municipal drainage biosludge. Dewatered municipal drainage biosludge was added in varying quantity to a constant amount of crude oil polluted soil as a supplement to enhance natural attenuation. The result of TPH biodegradation in each experimental set was fitted into a linearized Kinetic model, $lnC_t = lnC_0 – kt$. The value of the rate constant K is represented by the slope of each curve. Experimental set up A had a degradation rate constant of 0.0056, set up B had degradation rate constant of 0.0054, set up C had degradation rate constant of 0.0055, set up D had 0.0059, 0.0062 for set up E, 0.0058 for set up F, 0.0073 for set up G, set up H had degradation rate constant of 0.0085; while control set I had TPH degradation rate constant 0.0006. The rate constant is a measure of how fast the TPH degradation progressed. The result of the model shows 92% biodegradation prediction accuracy. It is concluded that municipal drainage biosludge obtained from the Niger Delta has demonstrated effectiveness in the biostimulation of degradation of crude oil in polluted soil.
Keywords: Polluted soil crude oil, petroleum hydrocarbon and bioremediation, stimulation.

1.0 INTRODUCTION.

1.1 Background of the study

The importance of unpolluted environment to human health and wellbeing cannot be overemphasized. This is due to the identified problems associated with environmental pollution. For instance, environmental pollutant can cause health problems such as respiratory illness, heart diseases and other types of health problems like cancer.

Oil pollution is a major type of environmental pollution with diverse effects on the ecosystem and human health. Environmental oil pollution is cause by oil spillage arising from human errors during oil exploitation and production activities, oil tanker accident in seas and ocean, leakage of oil bearing tanks in tank farms as well as rupture of oil pipelines either due to corrosion or sabotage.

Crude oil and its related products cause birth defects in humans. Benzene, a volatile organic compound present in crude oil is known to cause leukemia in humans (Hussein *et al.*, 2016). Akpofure *et al.,* (2000) also reported that crude oil pollution in soil has gross negative effect on land and aquatic organisms. A lot of investigations on the negative effects of hydrocarbon pollution in soil have been undertaken. Abi and Nwosu (2009) reported that crude oil negatively affects soil agricultural productivity and soil organisms. Aghalino, (2000) reported the unpleasant consequences of petroleum hydrocarbon on bush animals, the grass and bush environment. Ue -Bari and Amadi (1992) reported that crude oil pollution significantly impaired useful soil properties. Agbogidi *et al*., (2007) reported that crude oil pollution reduced plant germination and productivity. A study by Wokocha *et al*. 2011) showed that crude oil spillage also increase acidity of soil. The study by Daniel and Pepple *(*2006) also revealed that crude oil pollution had impact on plant height, leave size and plant dry weight. The prestige oil spill in the coast of Galicia (Northern Spain) was also discovered by Andrade *et al.* 2004), to have significantly changed physicochemical characteristics of soil around the polluted area.

Benzene in petroleum hydrocarbon is among the most toxic compound to plants and animals when spilled into the environment (Robert, 2002). Concern for the occurrence and distribution of polynuclear aromatic hydrocarbons (PAHs) has also increased in recent times because of their potential harmful effects to the health of human beings (Selina and Banfor, 2005). Polynuclear aromatic hydrocarbons (PAHs) is one of the primary component of crude oil. PAH cause reproductive, neurologic and developmental effects (Blanton et al., 1986, 1988; Dasgupta and Lahiri, 1992; Hahon and Booth, 1986; Malmgren et al., 1952; Philips et al., 1973; Szczeklik et al., 1994; Yasuhira, 1964 and Zhao, 1990)

Bioremediation has gain prominence as the most popular and efficient petroleum hydrocarbon pollution remediation technology because of its efficiency, low cost and environmental friendliness. Bioremediation by stimulation of microbial growth and activities in polluted media (biostimulation) is the most effective bioremediation approach or method.

Different organic materials have been investigated on their potential to stimulate bioremediation of petroleum hydrocarbon in soil, sediments and groundwater. Some of the organic materials include, rice husk, saw dust, grass straw, cow dung, poultry litter etc. The focus of this study is to model petroleum hydrocarbon bioremediation stimulation rate by municipal drainage biosludge. To scientifically prove the veracity of the result of the study, the following

research hypothesis were put forward and tested for significance.

Hypothesis

(1) Null hypothesis (μ= 0): There is no significant difference in Total petroleum hydrocarbon (TPH) removal (biodegradation) in the test set ups and control set up

Alternative hypothesis ((μ ≠ 0): There is significant difference in Total petroleum hydrocarbon (TPH) removal (biodegradation) in the test set ups and control set up

2.0 MATERIALS AND METHODS

2.1 Area of sample collection

Samples of crude oil polluted soil were collected from oil spill site around an oil manifold in Ikarama community in Yenagoa Local Government Area of Bayelsa State. Unpolluted soil sample (control sample) was also collected from the same community. Drainage biosludge was collected from concrete drainage in Emeyal 2 community in Ogbia Local Government Area of Bayelsa State. Ikarama is geographically located in 05°09'16" N, 06°27'11 E within Okordia/Zarama district in Yenagoa Local Government Area of Bayelsa State. The community is a host to the Shell Petroleum Development Company oil Manifold. This manifold gathers crude oil from oil wells around Biseni and joinkarama number (JK 4) i.e Edagberi community in Ahoada West Local Government Area of Rivers State also connecting the Adibawa Flow station. The position of the area of the soil sample collection in Bayelsa/Nigeria map is shown in the Fig 2.1

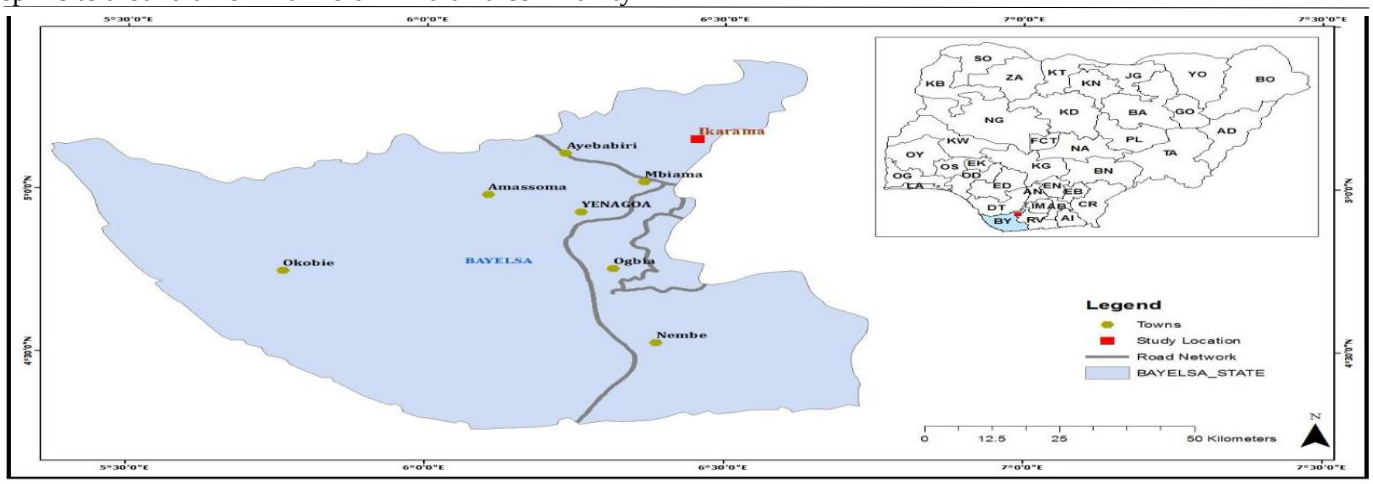


Figure 3.1: Map of Bayelsa State showing location of Ikarama community (**Source:** Paul *et al.*, 2015)

2.2 Sample collection

Soil samples were collected with garden trowel at a depth of 0-30 cm in the oil spilled site into polythene plastic bags. The various samples collected were thoroughly mixed together and a composite sample for the study was obtained. A visit to the spilled site revealed that grasses and trees in the site have been destroyed and few standing palm trees have their leaves turn brown due to the impact of the spill. The soil surface is also coated with dark brown colour of the oil as it can be seen in the photograph (Fig 2.2).



Fig2.2: Photograph of the crude oil Polluted soil and vegetation at the site of sample collection.

Municipal drainage biosludge sample collection

Municipal drainage samples were collected from concrete drainage with shovel. The collected biosludge was rake on the road side and allowed to dewater before scooping in the sack bag with trowel. The biosludge was dark in colour when still wet but turned grayish green as the water was drained. The texture is a combination of fine sand, slushy mass of mud and some other particles such as stones, bottle covers beads, that were sorted out.



Fig. 2.3: photograph of the collected biosludge for the study

2.3.1 Characterization of samples

The method adopted for this study is laboratory bioremediation of crude oil polluted soil. Primary and secondary data were collected for the purpose of this study. Primary data collection was the main focus of this study. Physicochemical characteristics of the collected soil and biosludge samples were analyzed according to standard procedure contained in the America Soil science society analytical guideline. Parameters analyzed include Total Petroleum Hydrocarbon (TPH), Polycyclic Aromatic Hydrocarbon, and Total Nitrogen, Phosphorus, Organic carbon, pH and electrical conductivity.

Total Petroleum Hydrocarbon (TPH) and Poly Aromatic Hydrocarbons (PAHs) in the polluted soil, biosludge and control soil samples were analysed with Agilent 6890N Model of gas Chromatography with flame ionization detector (GCFID). pH was determine pH meter (H18424N Model), heavy metals in the samples were analyzed with Thermo-elemental atomic absorption spectrophotometer (S471096 model)

2.3.2 Experiment

One kilogram of the crude oil polluted soil sample was weighed with analytical balance in nine replicates into nine perforated plastic vessels which were labeled A, B, C, D, E, F, G, H and I. The polluted soil sample in vessels A to H were treated with different quantities of dewatered biosludge of 100, 200, 300, 400, 500, 600, 700 and 800g respectively, while the soil sample in Vessel I was kept as a control (untreated). Water was periodically added to the content of each set up and thoroughly mixed to ensure good aeration of the soil and distribution of water to every section of the soil since moisture play critical role in the survival and metabolic activities of microorganisms. Analytical sample was collected from each of the experimental set ups monthly for laboratory analysis during the study period of five months. The analyses were conducted following the same procedure conducted for the polluted soil/control soil sample and the biosludge. The experimental setup for the study is shown in Fig 2.4

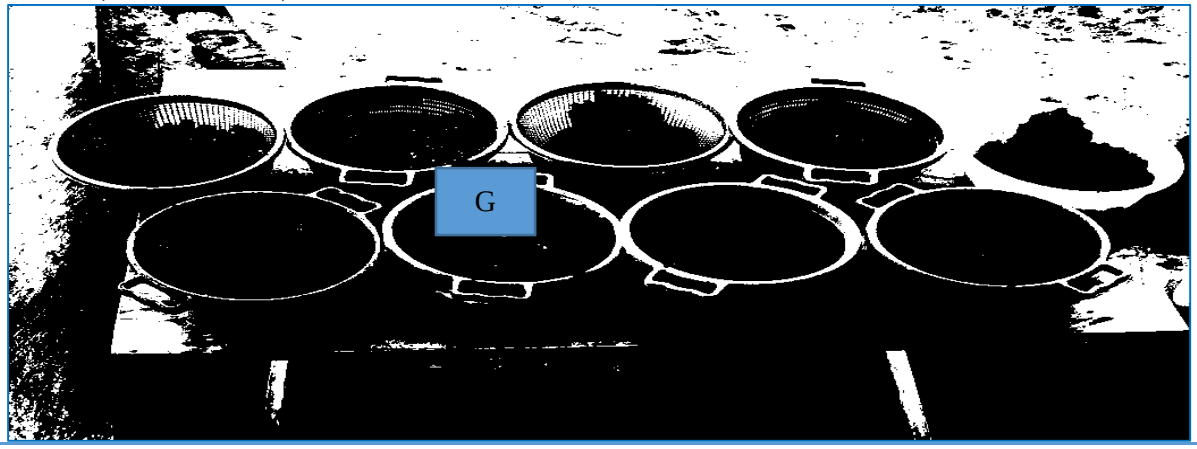


Fig 2.4: Experimental Set up for the study

3.4 Data analysis

3.4.1 Pearson Product moment correlation analysis

Product moment analysis using Pearson product moment Equation (3.6) was conducted to determine the relationship between the rate of Petroleum hydrocarbon degradation in the experimental set ups and time in months.

$$r = \frac{n\sum xy - \sum x\sum y}{\{(n\sum x^2)-(\sum x)^2\}\{(n\sum y^2)-(\sum y)^2\}]\text{^}1/2} \qquad (3.1)$$

Where N = number of data set, x = Time (days) and y= Residual TPH concentration (ppm), r = product moment correlation coefficient.

3.4.4 Analysis of the efficiency of biosludge enhanced bioremediation

The efficiency of the biosludge treatment on the degradation of total petroleum hydrocarbon (TPH) in each treated soil sample was analysed using the Equation of Samuel, et al. (2015)

$$\text{Eff} = \frac{\%TPHtr - \%TPHct}{\%TPHtr} x\ 100\% \qquad (3.2)$$

Where

Eff is efficiency of TPH biodegradation. (removal due to biosludge application)

$\%TPH_{tr}$ is percentage of TPH degradation in treated soils

$\%\ TPH_{ct}$ is percentage of TPH degradation in untreated soil

3.4.6 Biodegradation kinetic modeling

The biodegradability of petroleum hydrocarbon with respect to the biosludge treatment in this study was modeled using first order kinetics Equation. The Kinetic analysis is very important for the understanding of pollutant degradation process, measurement of degradation rate and for the development of reliable and efficient remediation of petroleum hydrocarbon polluted environment. The information that can be derived from bioremediation kinetic analysis can also help environmental researchers or remediation engineers to know and determine the concentration of the pollutant remaining in a contaminated soil at any given time and makes the prediction of the level of pollution in the foreseeable future possible. Biodegradation of crude oil is usually expressed by the first order kinetic (Samuel et al., 3015) and this given as equation

$$Ct = C_0e^{-kt} \qquad (3.3)$$

Linearizing equation (3.3)

We have, $\ln C_t = \ln C_0 - kt$ (3.4)

C_t. is TPH concentration in the soil at any time t.

C_0 is initial TPH concentration at time zero

t is time in days.

K is the crude oil biodegradation rate.

Plotting a graph of $\ln C_t$ against time t, we have a striaghtline graph with slope as the biodegradation rate k and the intercept on the vertical axis is the initial TPH concentration (C_0) at time zero.

3.0 RESULTS AND DISCUSSIONS

3.1 Results

The result of the chemical characterization of the soil and municipal drainage samples are presented in Table 3.1

Table 3.1: Physicochemical characteristics of the polluted, unpolluted soils and biosludge samples

Test parameter (ppm)	Samples		
	Polluted soil	**Control soil**	**Biosludge**
TPH	16970.57	6697.25	94869.68
BTEX	0.0000	0.000	0.0000
PAH	5448.52	1335.51	3548.62
TOC(%)	23.68	6.08	28.25
N(%)	1.62	0.680	2..25
P(%)	0.317	0.326	0.324
C/N ratio	14.62	8.941	12.60
Pb	1.483	0.663	0.829
Hg	<0.001	<0.001	< 0.001
Cr	2.273	0..632	1.673
V	0.012	<0.001	0.008
As	0.004	<0.001	0.002
Co	0.027	0.003	0.014
Ni	5.542	1.369	3.743
Cd	0.026	0.036	0.024
Cu	0.625	0.371	0.052

pH	5,29	6.32	6.39
EC (µS/cm)	60.00	65.23	72.51
Temperature	25.20	27.00	24.60
% Moiture content	22.50	20.12	28.00

Result of correlation analysis conducted is presented in Table3.2

Table 3.2: Results of Pearson product moment correlation analysis

experimental set up	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
Coefficient of correlation	-0.9821	-0.9133	-0.9878	-0.9923	-0.9951	-0.9914	-0.9962	-0.9982	0.9979

Results of the kinetic modeling of Total Petroleum Hydrocarbon biodegradation rate are presented in Figs 3.1, 3.2 and 3.3 below.

Appendix 4l: Graph of lnC_t against Time in days, for experiment A, B and C during the study

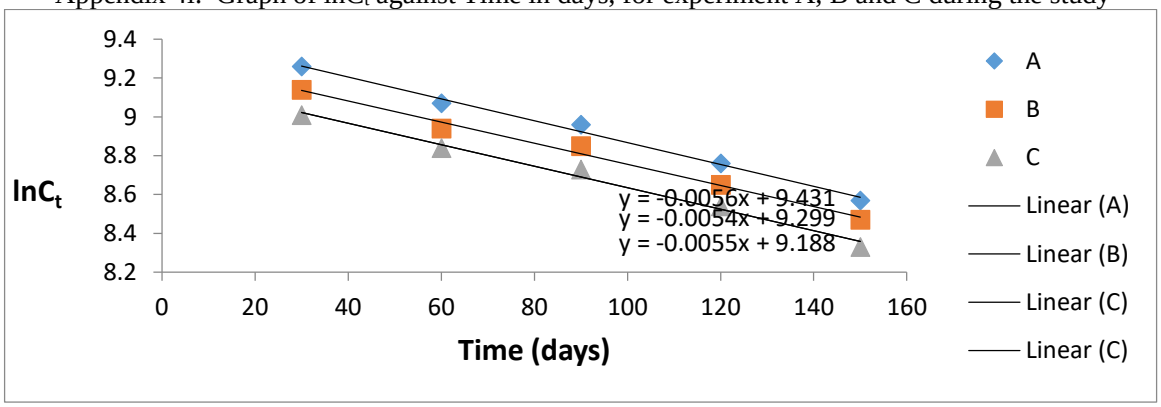


Fig 3.1: Graph of lnC_t against Time in days.for experiment A, B and C during the study

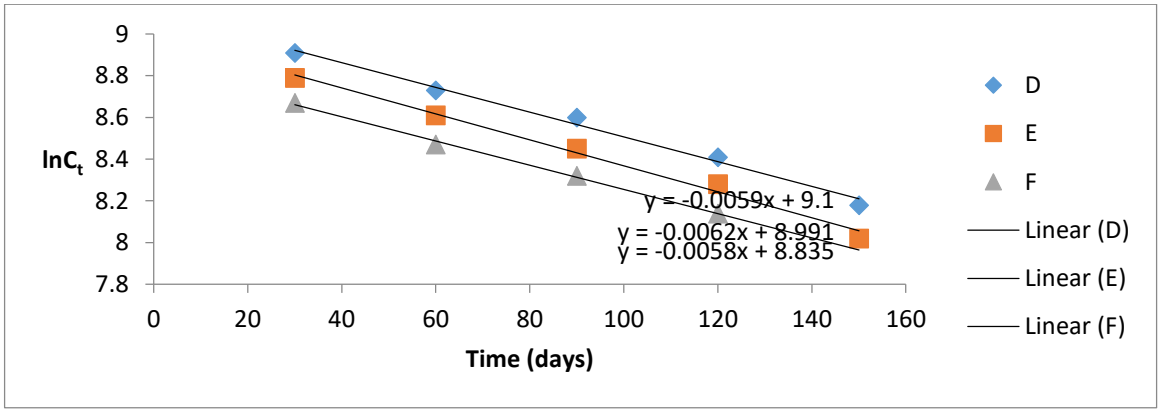


Fig 3.2: Graph of lnC_t against Time in days.for experiment D, E and F during the study

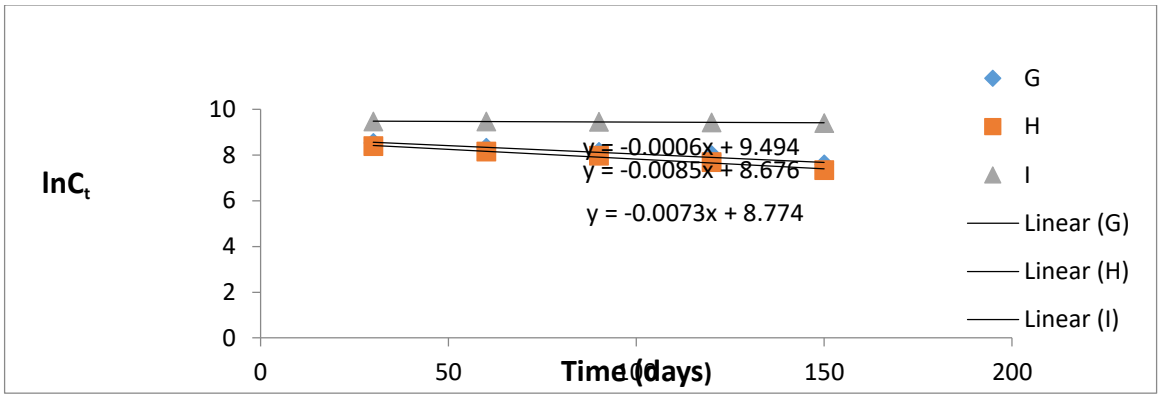


Fig 3.3: Graph of lnC_t against Time in days.for experiment G, H and I during the study

3.2 Discussion

The results of the correlation (product moment) analysis show that there was TPH degradation correlation of -0.9821 in experiment A, -0.9134 in B, -0.9878 in C, -0.9923 in D, -0.9951 in E, -0.9914 in F, -0.9962 in G, -0.9982 IN H and -0.9979 in I. The negative sign is an indication that there was reduction in TPH concentration with time. Set up H has the highest degree of correlation followed by the control set up I.

The TPH biodegradation data was fitted into the first order biodegradation kinetic model (Equation 3.4). The calibration curves are shown in Figs.3.1, 3.2 and 3.3. This was used to determine the rate of TPH biodegradation (removal) in the various treatment options and the control set up. The value of the rate constant K is represented by the slope of each curve. Experimental set up A had a degradation rate constant of 0.0056, set up B had degradation rate constant of 0.0054, set up C had degradation rate constant of 0.0055, set up D had 0.0059, 0.0062 for set up E, 0.0058 for set up F, 0.0073 for set up G, set up H had degradation rate constant of 0.0085; while control set I had TPH degradation rate constant 0.0006. The rate constant is a measure of how fast the TPH degradation progressed.

Hence, the higher the degradation rate constant the faster the rate of biodegradation. The determination of the rate constant is significant because it helped to predict the residual TPH in the polluted soil at any given time. The rate constant derived in this model was used to predict the residual TPH in each experimental set up and results compared very closely with experimental measurements. Root mean square (RMT) equation was further used to evaluate variation between experimental measurements and predicted residual TPH concentration. The result showed 7.78% variation. This indicates that the predictions had accuracy of 92.22%. This means that the probability that the measured value is equal to the predicted value is 92.22% (0.92). This is supported by the work of (Siddique et al. (2008) and Samuel et al. (2015).

Analysis of variance ($p < 0.05$) of various characteristics of the soil under different treatments during the study indicate that there was significant difference in the percentage of TPH degradation in the treated soils and the control (untreated soil). Result of evaluation

Evaluation of TPH bioremediation effectiveness of the biosludge stimulation indicate that percentage TPH degradation in the first month (day 30) was 40.24% in experiment A, 51.00% in B, 58.77% in C, 64.54% in D, 70.06% in E, 74.45% in F, 78.69% in G, 82.32% in H and 23.47% in control (I) and the last (Fifth) month of the study, the percentage cumulative TPH degradation was 70.59% in A, 74.92% in B, 79.17% in C, 82.88% in D, 86.08% in E, 88.98% in F, 91.70% in G, 93.79% in H and 28.33% in control (I). Set up H recorded the highest TPH degradation of 93.79% during the study followed by G, while the control (I) which modeled natural attenuation recorded lowest percentage of TPH degradation.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Bioremediation is recognized as efficient, economical and environmentally friendly pollution treatment technology. This technology takes advantage of the natural ability of microorganisms such as bacteria and fungi to biodegrade organic pollutant to smaller harmless molecules. In this study municipal drainage biosludge was added to crude oil polluted soil as a supplement to enhance natural attenuation. The results of the laboratory analysis of TPH biodegradation in the various experimental set ups were used to model the kinetic biodegradation rate constant. The result of the model show 92% biodegradation prediction accuracy.

4.2 Recommendations

Based on the results obtained from this research, the following recommendations have been made;

i. Further research on the microbiological characterization of municipal drainage biosludge with molecular techniques recommended.

ii. Further pilot field study using municipal drainage biosludge to enhanced bioremediation of crude oil polluted soil is recommended.

REFERENCES

Abi, T. A and Nwosu, P. C. (2009). The effect of oil spillage on the soil of Eleme in Rivers state of the Niger Delta Area of Nigeria. *Research Journal of Environmental Sciences* 3(3): 316 – 320.

Agbogidi, O.M and Eruator, P.G., Akparo, S.O and Nnaji, G.U. (2007). Evaluation of Crude Oil Contaminated soil on the Mineral Nutrient Elements of Maize (Zea Maiys L). Journal of Agronomy, 6: 1881

Aghalino, S. A (2009). Gas Flaring, environmental pollution and abatement measures in Nigeria, 1969 – 2001. *Journal of Sustainable Development in Africa*, 11 (4), 219 – 238.

Akpofure, E.A, Effere, M.L., and Ayauei, P (2005). The adverse effects of crude oil spills in the Niger Delta. Urhobo historical society.

Anadrade, M., Covelo, E.F., Vego, F.A and Marcet, P. (2004). Effect of the Prestige Oil Spill on Salt Marsh Soil on the Coast of Galatia (Northwestern Spain). Journal of Environmental quality.33(6)

Blanton R.J., Lyte M., Myers M.J and Bick. P.H (1986). Immunomodulation by Poly Aromatic Hydrocarbons in Mice and MURINE cells. Cancer Res 46(6); 275-9

Daniel, K.L.A and Pepple, S.F (2006). Effect of Bonny light crude oil pollution of soil on the growth of Dayflower in the Niger Delta, *Nigeria journal of Science and Environmental Management*, 10; 111-114.

Hussein, I., Abdel-Shafy, Mon, S.M and Mansur (2016). A review on poly cyclic aromatic hydrocarbon; source, environmental impact, effect on human health and remediation. *Egyptian Journal of Petroleum*. 25(1): 103 – 123.

Dasupta P.S., Lahiri T (1992). Alteration of brain catecholamines during growth of benzo[a]pyrene induced murine fibrosarcoma. Neoplasm 39(3): 163 -75

Hahon N and Booth J.A (1986). Coinhibition of viral interferone induction by benzo [a]pyrene and chrystotie asbestos, Environ Res 40(1):103-9

Malmgren R.A., Bennison B.E., mClINLEY t.w Jr (1952). Reduced antibody titers in mice treated with carcinogenic and cancer chemotherapeutic agents. Proc Soc Exp. Biol Med 79:484-8

Philips F.S., Steinberg S.S and Marquardt H (1973).In vivo cytotoxicity of polycyclichydrcarbons, in: Loomis Ta, editor. Pharmacology and the future of man: vol 2. Toxicological problems. Proceedings of the fifth international congress on Pharmacology, San Francisco, CA, July23-28, 1952. New York, NY: Kanger. P 75-88

Prasad, M, S, Prasad, P and Sing, D (1987) Some hematological effects of crude oil on fresh water catfish. *Clean soil and Water Journal*, 15. (2): 199-204

Robert, S (2002) Benzene and leukemia. *Toxicology* 32 (302): 402 – 412.

Selina, M and Banfor, .I.S (2005). Bioremediation of Polycyclic aromatic hydrocarbons; Current knowledge and future directions. *Journal of chemical Tecnology and biotechnology*, 80 (7): pp. 723 – 736.

Szczeklik A., Szczeklik J., Galuszcka Z., Musial J., Kalarzyk E and Tarqosz D (1994). Humoral immunosuppression in man exposed to polycylic aromatic hydrocarbons and related carcinogens in polluted environments. Eniron Health Perspect 102(3):302-4

Ue-Bari, Y and Amadi, A (1992). Use of poultry manure for amendment of oil polluted soils in relation to growth of Zea Mays L. *Environmental international Journal*. 18 (5): 521 -527.

Wokocha, G.A., Emeodu,D and Ihenko, S (2011). Impact of crude oil spill on soil and food production in Rivers State, Nigeria journal of Money, *investment and banking*.19: 305 – 315.

Yasuhira K (1964). Damage to the thymus and other lymphoid tissues from 3 methylcholanthrene, and subsequent thymmoma production in mice. Cancer Res 24:567

Zhao X.L (1990). Effects of benzo[a]pyrene on the humoral immunity of mice exposed by single intraapentoneal injection. Zhonghua Yu Fan Yi Xua Za Zhi[Chin J prevent Med] 24(4):220-2

WORKERS MOTIVATION AND FINANCIAL INCENTIVE IN UBA BANK, YENAGOA BRANCH, BAYELSA STATE

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Abstract
This study investigates the interplay between workers' motivation and financial incentives at UBA Bank, Yenagoa Branch, Bayelsa State. This study was undertaken in recognition of the pivotal role of motivation in the demanding banking sector. Focusing on employee benefits and performance-based rewards, the research utilizes a quantitative approach with a structured questionnaire to collect relevant data from 50 employees of the bank. The data collected were analyzed. The results show that there is a strongly positive impact of both employee benefits and performance-based rewards on workers' motivation. The study recommends Bank should enhance its benefits program, incorporating employee feedback, and continually evaluate performance incentives for transparency and effectiveness. Emphasizing intrinsic motivators is advised to align with contemporary theories, fostering a motivated workforce, improving job satisfaction, and ultimately enhancing organizational performance.

1.0 INTRODUCTION

Employee motivation stands as a linchpin for success within the dynamic and demanding landscape of the banking sector. Characterized by high-pressure environments, intricate financial transactions, and stringent regulatory frameworks, the industry requires a motivated workforce to deliver excellent customer service, elevate job performance, and foster job satisfaction.

In the banking industry, numerous factors contribute to employee motivation. Job security, an essential element in the ever-changing economic landscape, provides employees with a sense of stability and assurance. Job content, comprising the nature and variety of tasks, also plays a pivotal role in shaping motivation levels. Employees engaged in diverse and intellectually stimulating tasks are more likely to feel motivated and satisfied in their roles.

In their study, Beretti et al (2013), emphasize that the demands of the banking industry place considerable stress on employees, affecting their job satisfaction and, consequently, their motivation levels. Understanding the specific challenges posed by high-pressure environments and intricate job roles becomes imperative for crafting effective motivational strategies tailored to the banking sector.

Statistics from the World Bank indicate that the global banking workforce has a sizeable and strong population and it is expected to grow as financial services continue to expand globally. In Nigeria alone, the banking sector employs a significant portion of the workforce, contributing significantly to the country's economic development. Understanding the factors that influence the motivation of these workers is not only essential for the well-being of individuals but also for the sustained growth and success of financial institutions.

The Bureau of Labour Statistics (2015) indicated that financial incentives, encompassing both employee benefits and performance-based rewards, serve as powerful motivators in the banking sector. A report by The Bureau of Labour Statistics indicates that 68% of employees in the banking and finance industry cite pay as a significant factor affecting their job satisfaction. This underscores the undeniable link between financial incentives and the motivation of banking professionals (Adeoye & Sunday, 2017).

Employee benefits play a pivotal role in the overall motivation and well-being of workers. Beyond the conventional salary structure, UBA Bank's Yenagoa branch offers a range of non-salary packages that contribute to the financial security and satisfaction of its employees. These benefits include comprehensive health insurance coverage, retirement plans, and other packages aimed at enhancing the overall quality of life for workers (Ayandele & Etim,2020).

According to a survey conducted by the International Foundation of Employee Benefit Plans, 80% of employees consider benefits packages as a significant factor in job satisfaction. In the banking sector, where stress and pressure are integral, the importance of these benefits becomes even more pronounced. The provision of health insurance not only ensures that employees have access to necessary medical care but also alleviates the financial burden associated with healthcare expenses, contributing to a more content and focused workforce (Basu & Kiernan, 2016).

Retirement plans, another crucial component of employee benefits, provide a sense of financial security for banking professionals. With the financial intricacies involved in the banking sector, the assurance of a stable and secure retirement can significantly impact the motivation and commitment of employees (Adeoye & Sunday, 2017).

In addition to traditional employee benefits, performance-based rewards are instrumental in fostering motivation within the banking sector. UBA Bank Yenagoa branch has implemented a robust system of recognition and rewards tied directly to individual and team performance. This includes performance bonuses, incentives, and other forms of acknowledgment for exceptional contributions (Cainarca, et al,2019).

Research from Cainarca, et al (2019) reveals that 67% of organizations use performance-based rewards to motivate their employees. In the banking sector, where competition for top talent is fierce, recognizing and rewarding exceptional performance becomes a critical tool for talent retention and motivation.

The correlation between performance-based rewards and increased productivity is supported by data from a study conducted by (Cainarca, et al,2019). The study by Cheema et al (2013). found that organizations with effective performance management systems experience a 14% increase in productivity. This highlights the importance of aligning individual and team efforts with tangible rewards to enhance motivation and job satisfaction.

Understanding the specific context of UBA Bank's Yenagoa Branch in Bayelsa State is vital for a nuanced exploration of the dynamics between financial incentives and workers' motivation. The branch operates in a region with unique socio-economic characteristics, and the workforce's expectations and motivations may differ from those in other parts of the country (Adeoye & Sunday, 2017).

With a focus on both employee benefits and performance-based rewards, this study aims to dissect the impact of these financial incentives on the motivation, job satisfaction, and performance of workers at UBA Bank's Yenagoa branch.

1.1 Objectives of the Study

The research objectives based on the provided research questions are:

I. To assess the influence of employee benefits on the motivation levels of workers at UBA Bank, Yenagoa branch, Bayelsa State, Nigeria.
II. To examine the impact of performance-based rewards on the motivation of employees in UBA Bank, Yenagoa Branch, Bayelsa State, Nigeria.

2.0 Literature Review

2.1 Employee Benefits and the Motivation of Workers

Employee benefits play a pivotal role in shaping the motivation levels of workers within an organization. This intricate relationship has been widely explored in academic literature, shedding light on the multifaceted dynamics that underlie the connection between employee benefits and motivation. In this comprehensive discussion, we delve into the key aspects of how employee benefits impact worker motivation, drawing insights from various studies and scholarly works.

One fundamental aspect of employee benefits is their role in enhancing job satisfaction, a critical precursor to motivation. Job satisfaction is intricately linked to an employee's perception of the value they receive from their employer, and benefits contribute significantly to this perceived value. A study by Locke (1976) emphasized the importance of job satisfaction as a motivational factor, highlighting that satisfied employees are more likely to be motivated to contribute positively to their work environment.

Moreover, employee benefits contribute to the overall well-being of workers, fostering a positive work environment that is conducive to motivation. Health and wellness benefits, for instance, reward benefits have been shown to have a direct impact on employees' physical and mental health, contributing to their overall job satisfaction and motivation (Berry et al., 2015). By investing in benefits that prioritize the well-being of employees, organizations create a foundation for sustained motivation and engagement.

In addition to individual well-being, employee benefits can also serve as a tool for talent acquisition and retention. A comprehensive benefits package is often a key differentiator in attracting top talent to an organization. A study by World at Work (2018) found that 89% of employees consider benefits as a crucial factor in their job satisfaction, emphasizing the significance of a robust benefits program in talent management. This implies that organizations with attractive benefit offerings are more likely to not only attract but also retain highly motivated and skilled employees.

Furthermore, employee benefits contribute to a sense of financial security, which is integral to motivation. Financial stress is a significant concern for many individuals, and benefits such as retirement plans, insurance, and financial wellness programs can alleviate this stress. A study by Nelson et al. (2016) demonstrated a positive correlation between financial well-being and job performance, emphasizing the indirect impact of employee benefits on motivation through the alleviation of financial concerns.

While the positive relationship between employee benefits and motivation is evident, the effectiveness of these benefits may vary based on individual preferences and organizational cultures. For instance, a flexible work schedule may be a significant motivator for one employee but may hold less importance for another. Therefore, organizations need to tailor their benefits offerings to align with the diverse needs and preferences of their workforce (Kelliher & Anderson, 2010).

2.2 Performance-Based Rewards and the Workers Motivation

The relationship between performance-based rewards and workers' motivation is a critical area of study, particularly in the context of organizations like UBA Bank, Yenagoa branch, Bayelsa State, Nigeria. Performance-based rewards, including bonuses, commissions, and recognition, are designed to recognize and reinforce employees' exceptional efforts, ultimately influencing their motivation levels.

Performance-based rewards serve as a powerful motivator by linking individual or team accomplishments to tangible benefits. One of the primary ways in which performance-based rewards impact motivation is by providing employees with a clear connection between their efforts and the recognition or financial gain they receive. A study by Milkovich and Newman (2016) highlighted that linking performance to rewards fosters a sense of accomplishment and satisfaction, motivating employees to consistently strive for excellence.

Moreover, performance-based rewards create a competitive and goal-oriented environment within the workplace. Employees, driven by the prospect of earning rewards, are more likely to set and pursue challenging goals, contributing to increased productivity and overall organizational performance (Lawler, 2003). This aligns with the goal-setting theory proposed by Locke and Latham (2002), which posits that setting specific and challenging goals can significantly enhance employee motivation.

Recognition is a crucial aspect of performance-based rewards that directly impacts workers' motivation. Acknowledging employees' achievements through awards, public acknowledgment, or other forms of recognition fosters a positive work culture. A study by Grant (2008) found that recognition is a powerful motivator because it fulfills individuals' intrinsic need for validation and appreciation, contributing to a sense of value and belonging within the organization.

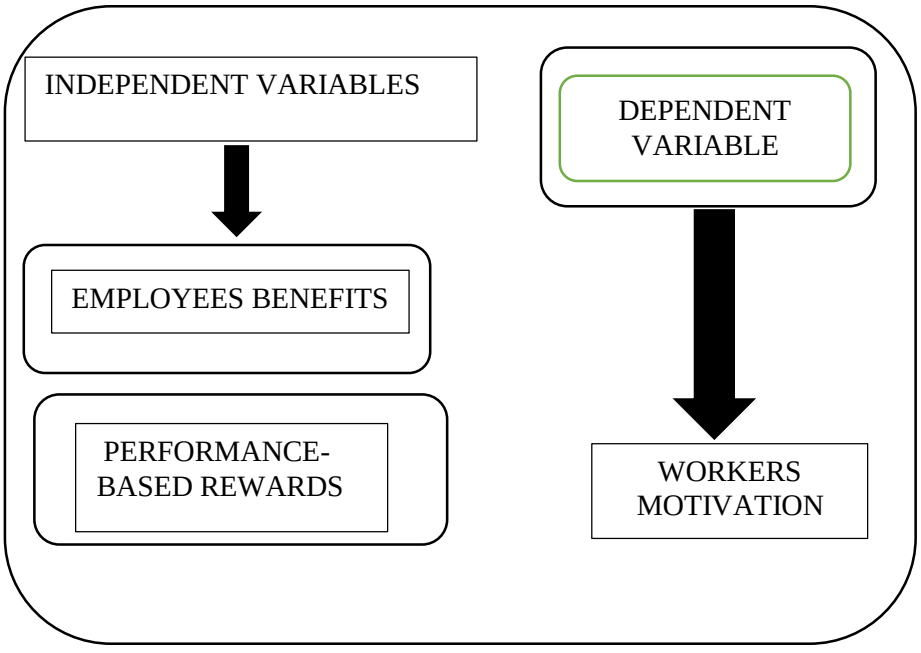
Furthermore, performance-based rewards can enhance the overall job satisfaction of employees. When individuals perceive that their hard work and accomplishments are acknowledged and rewarded, they are more likely to experience job satisfaction, which, in turn, positively influences their motivation (Armstrong, 2012). This aligns with the idea that satisfied employees are more engaged, committed, and motivated to contribute to the success of the organization (Harter et al., 2002).

However, the effectiveness of performance-based rewards in motivating workers is contingent on the fairness and transparency of the reward system. If employees perceive that the reward distribution is biased or inconsistent, it may lead to dissatisfaction and diminished motivation (Colquitt et al., 2001). Therefore, organizations need to ensure that the criteria for performance evaluation and reward allocation are communicated clearly and fairly.

In the specific context of UBA Bank, Yenagoa branch, Bayelsa State, Nigeria, understanding the nuances of the organizational culture and the expectations of the workforce is crucial. Tailoring performance-based reward systems to align with the unique dynamics of the branch will contribute to their effectiveness in motivating workers. This could involve incorporating cultural considerations, such as local recognition practices, into the reward structure.

2.3 Conceptual Framework

The conceptual framework for the relationship between financial incentives and workers motivation based on the conceptual review above is presented in Fig.2.1. as adopted from available literature.



2.4 Theoretical Review

Herzberg's Two-Factor Theory

Herzberg's theory posits that there are two distinct sets of factors that influence employee motivation and satisfaction in the workplace: motivators and hygiene factors. Motivators, such as recognition, achievement, and responsibility, are intrinsic to the job itself and contribute positively to job satisfaction. On the other hand, hygiene factors, including salary, working conditions, and company policies, are extrinsic to the job and, if absent or inadequate, can lead to job dissatisfaction.

While Herzberg's Two-Factor Theory has significantly influenced the field of organizational psychology, it has not been without its share of critiques. One of the primary criticisms is the methodology used in Herzberg's original research, which involved asking employees to recall instances of satisfaction and dissatisfaction on the job. Critics argue that retrospective self-reports might not accurately capture the complexities of workplace motivation (Smith & Kendall, 1963). Additionally, some researchers challenge the strict dichotomy between motivators and hygiene factors, suggesting that certain factors, like salary, can function as both depending on individual perspectives (House & Wigdor, 1967).

Despite these critiques, Herzberg's Two-Factor Theory has endured and remains influential in understanding employee motivation. Subsequent research has provided support for the theory, and its principles continue to be applied in various organizational contexts. The theory's emphasis on intrinsic motivators aligns with the contemporary understanding that factors beyond material rewards contribute significantly to job satisfaction and motivation (Hackman & Oldham, 1976).

In the context of the study on workers' motivation and financial incentives in UBA Bank, Yenagoa branch, Bayelsa State, Herzberg's Two-Factor Theory offers a valuable framework for analysis. The theory's emphasis on intrinsic motivators, such as recognition and achievement, provides insights into designing financial incentives that go beyond monetary rewards. By understanding that factors like salary and benefits are hygiene factors that can prevent dissatisfaction but may not be sufficient for motivation, UBA Bank can tailor its incentive programs to incorporate elements that tap into employees' intrinsic needs.

Moreover, Herzberg's theory underscores the importance of recognizing the individual nature of motivation. Different employees may be motivated by different factors, emphasizing the need for a customized approach to incentive design. The study can explore how motivators and hygiene factors identified by Herzberg manifest within the organizational culture of UBA Bank, Yenagoa Branch, providing practical insights for optimizing the effectiveness of financial incentives.

2.5 Empirical Review

Kaur and Kaur (2017) conducted a study that explored the impact of financial incentives on employee motivation in the banking sector. Their findings indicated a positive correlation, emphasizing that financial incentives significantly enhance employee motivation. This study provides a foundational understanding of the broader relationship between financial incentives and motivation, laying the groundwork for more specific investigations within the banking sector.

Al-Swidi and Mahmood (2012) conducted a study focusing specifically on the banking sector, investigating the impact of financial incentives on employee motivation. The results indicated a significant positive relationship between financial incentives and motivation, emphasizing the importance of these rewards in the banking industry. This study provides sector-specific insights, aligning with the context of the UBA Bank, Delta Branch.

Ongori and Agolla's (2008) study delves into the factors influencing employee motivation in the banking sector, with a focus on financial incentives. Their findings highlighted that financial incentives are among the most crucial factors motivating employees in the banking industry. This study adds depth to the understanding of how financial incentives impact motivation, aligning with the specific sector under investigation.

The World at Work (2018) study provides a broader perspective on the significance of financial incentives across various industries. It emphasizes the role of benefits in job satisfaction; with 89% of employees considering benefits a crucial factor. While not specific to the banking sector, this study contributes a general understanding of the importance of financial incentives in contemporary organizational settings.

Milkovich and Newman's (2016) research focuses on compensation practices, emphasizing the link between rewards and motivation. Their work supports the idea that the design of reward systems can influence employee motivation positively. While not specific to the banking sector, this study provides generalizable insights into the principles of effective compensation practices.

3.0 RESEARCH METHODOLOGY

3.1 Research Design

For the research design of "Workers Motivation and Financial Incentive in UBA Bank, Yenagoa Branch, Bayelsa State," a quantitative approach was employed. Quantitative methods involve the collection and analysis of numerical data, facilitating a structured investigation into the relationship between workers' motivation and financial incentives. This approach is chosen to ensure the study's objectivity, allowing for statistical analysis to derive meaningful insights from a large dataset.

Quantitative methods are particularly suitable for assessing the impact of financial incentives on motivation, providing a measurable and quantifiable understanding of the variables involved. By adopting this design, the research aims to generate statistically valid findings that contribute to a comprehensive understanding of the dynamics between workers' motivation and financial incentives at UBA Bank, Yenagoa Branch, Bayelsa State.

3.2 Population and Sample of the study

The population for the study comprises employees from diverse hierarchical positions and departments at UBA Bank, Yenagoa Branch. To ensure a comprehensive representation, a stratified sampling method was employed. This approach involves categorizing the population into different strata based on specific characteristics, such as department or job level, and then randomly selecting samples from each stratum. This enables the inclusion of a cross-section of staff, considering various roles and responsibilities within the branch.

The study gathered insights from 50 employees, ensuring a focused yet diverse sample that reflects the organizational structure. This sampling strategy enhances the generalizability of findings, providing a nuanced understanding of how workers' motivation and financial incentives interplay across different segments of UBA Bank, Yenagoa Branch.

3.3 Method of Data Collection

For the data collection phase of the study on "Workers Motivation and Financial Incentive in UBA Bank, Yenagoa Branch, Bayelsa State," a structured questionnaire was employed. The questionnaire encompasses items designed to measure the identified variables—Employee Benefits, Performance-Based Rewards, and Workers' Motivation. Respondents, comprising employees from various levels and departments within UBA Bank, were asked to provide their perspectives on the organization's benefit packages, performance-related rewards.

Additionally, validated scales was used to assess workers' motivation. This quantitative approach aligns with the study's aim to gather numerical data for statistical analysis, ensuring a systematic and objective examination of the relationships between variables. The questionnaire methodology enables the collection of valuable insights into the motivational dynamics at UBA Bank, contributing to the study's overarching objectives.

3.4 Variable measurement and Specifications

Variables Measurement

Independent Variables

Employee Benefits

The extent of employee benefits was assessed through a comprehensive analysis of the benefit packages offered to employees, considering components such as healthcare plans, retirement benefits, and other non-monetary perks as contained in the work of (Smith et al., 2019).

Performance-Based Rewards

Performance-based rewards were quantified by evaluating the correlation between individual or team performance metrics and corresponding monetary or non-monetary rewards, including bonuses, commissions, and recognition programs as adopted from (Brown & Tyler, 2011).

Dependent Variable

Workers' Motivation

Measurement: Workers' motivation was measured using validated scales such as the Job Diagnostic Survey (JDS) and the Intrinsic Motivation Inventory (IMI), capturing both intrinsic and extrinsic motivational factors as contained in the works of (Hackman & Oldham, 1976; Deci et al., 1994).

Model Specification

The relationship between the independent variables (Employee Benefits, Performance-Based Rewards, Effectiveness of Financial Incentives) and the dependent variable (Workers' Motivation) can be expressed through a linear regression equation:

$$WM=\beta 0+\beta 1EB+\beta 2PR++\epsilon$$

Here,

$\beta 0$ represents the intercept.

$\beta 1,\beta 2,\beta 3$ are the coefficients for Employee Benefits, Performance-Based Rewards.

ϵ denotes the error term.

This equation allows for a quantitative assessment of the impact of each independent variable on Workers' Motivation within the context of UBA Bank, Yenagoa Branch, Bayelsa State.

3.5 Method of Data Analysis

The collected data Was subjected to rigorous analysis employing statistical tools, primarily regression analysis and correlation coefficients. Regression analysis was instrumental in quantifying the relationships between the independent variables—Employee Benefits, Performance-Based Rewards, and the dependent variable, Workers' Motivation. This statistical approach allows for a nuanced examination of how variations in financial incentives correspond to changes in workers' motivation levels.

Additionally, correlation coefficients provide insights into the strength and direction of these relationships. By utilizing these robust statistical tools, the study aims to uncover meaningful patterns and associations, offering a quantitative understanding of the intricate dynamics between financial incentives and workers' motivation at UBA Bank, Yenagoa Branch, Bayelsa State.

4.0 RESULT AND DISCUSSION OF FINDINGS

4.1 Results

In this section, the results of the data analysis are presented. The analysis unfolded in two phases. The first stage encompassed examining descriptive statistics related to perceptions of financial incentives and their impact on employee morale and motivation, specifically focusing on Employee Benefits and Performance-Based Rewards. Subsequently, the second stage involved hypothesis testing.

To address general inquiries, descriptive statistics, including frequency counts, percentages, and measures such as mean and standard deviation, were employed. The examination of research hypotheses was conducted through inferential statistics, employing multiple ANOVA analyses with a significance level set at 5%. A total of (50) questionnaires were collected from the field and subjected to thorough analysis to derive meaningful insights. The result of the descriptive statistical analysis is presented in Table 4.1

Table. 4.1: Responses on how intrinsic financial incentives affects employees' motivation in selected UBA in Yenagoa

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Employee Benefits	50	1	6	3.7478	1.52915
Performance-Based Rewards	50	1	6	4.6348	1.37540
Workers Motivation	50	1	6	4.5391	1.284482

Source: Researchers' computation using SPSS version 23.0 software

Table.4.1 provides a comprehensive overview of the impact of intrinsic financial incentives on employee motivation in selected UBA branches in Yenagoa. The variables examined include Employee Benefits, Performance-Based Rewards, and Workers Motivation, with responses from 50 participants.

The mean values suggest the perceived effectiveness of these incentives. Employee Benefits, with a mean of 3.7478, indicates a moderate impact, while Performance-Based Rewards, boasting a higher mean of 4.6348, suggests a stronger influence. The variable of Workers Motivation exhibits a notable mean of 4.5391, highlighting the positive impact of intrinsic financial incentives on overall motivation.

Standard Deviation values offer insights into the dispersion of responses. Employee Benefits, with a standard deviation of 1.52915, suggests a relatively diverse range of opinions, while Performance-Based Rewards, and Workers Motivation show lower standard deviations (1.37540 and 1.284482, respectively), indicating a more concentrated consensus among participants. These findings illuminate the nuanced relationship between intrinsic financial incentives and employee motivation, providing valuable insights for organizational strategies and interventions.

Test of Hypotheses

Test of hypothesis for the study was conducted and the result is presented in Table 4.2

Table 4.2: Model Summary

Model	R	R Square	Adjusted R Square	Std. The error in the Estimate
1	0.848[a]	0.721	0.710	0.317

a. Predictors: (Constant), Employee Benefits and Performance-Based Rewards;

Source: Author's Computation, 2024.

The hypothesis testing results in Table 2 indicate a well-fitting model. The R Square value of 0.721 implies that 72.1% of the variance in the dependent variable is explained by the predictors (Employee Benefits and Performance-Based Rewards). The Adjusted R Square of 0.710 accounts for the model's complexity, showing a robust fit. The Standard Error in the Estimate at 0.317 suggests the average distance between observed and predicted values. The predictors, namely Employee Benefits and Performance-Based Rewards, significantly contribute to the model's explanatory power (R = 0.848). This model summary underscores the effectiveness of these variables in explaining variations in the dependent variable.

The results of the analysis of various for the study are presented in Table 4.3

Table. 4.3: Analysis of variance (ANOVA).

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	3.273	2	1.091	10.852	0.000[b]
Residual	23.723	48	0.101		
Total	26.996	50			

a. Dependent Variable: workers motivation;
b. Predictors: (Constant), Employee Benefit and Performance-Based Rewards;
Source: Author's Computation, 2024

Table 4.3 is ANOVA results indicate a significant impact of predictors (Employee Benefits and Performance-Based Rewards) on the dependent variable, workers' motivation. The Regression model explains a substantial portion of the variance, with a Sum of Squares of 3.273 and a significant F-value of 10.852 ($p < 0.001$). The low Residual Sum of Squares (23.723) underscores the model's effectiveness. Overall, the analysis confirms the meaningful influence of Employee Benefits and Performance-Based Rewards on workers' motivation, providing statistical support for the hypothesis that these factors play a significant role in explaining variations in the dependent variable.

The result of regression analysis is presented in Table 4.4.

Table 4.4: Regression coefficients.

Model	Unstandardized Coefficients		Standardised Coefficients		
	B	Std. Error	Beta	t	Sig
(Constant)	1.022	0.156		6.536	0.000
Employee Benefits	0.289	0.040	0.427	7.288	0.000
Performance-Based Rewards	0.144	0.046	0.196	3.147	0.002

a. Dependent Variable: workers motivation;
Source: Author's Computation 2024.

Hypothesis 1: There is no significance relationship between Employee Benefits and Workers' Motivation

Table.4 4 presents the regression coefficients for the first hypothesis examining the impact of Employee Benefits on workers' motivation. The constant (B = 1.022) signifies the expected value of workers' motivation when all predictors are zero. The significant positive coefficient for Employee Benefits ($B = 0.289$, $p < 0.001$) indicates that as Employee Benefits increase, workers' motivation tends to rise. The standardized coefficient (Beta = 0.427) emphasizes the substantial influence of Employee Benefits on the dependent variable. The t-value ($t = 7.288$) further confirms the significance of this relationship.

Overall, the findings strongly support Hypothesis 1, suggesting that enhancing employee benefits contributes positively to workers' motivation.

Hypothesis 2: There is no significance relationship between Performance-Based Rewards and Workers' Motivation

Table.4.4 also provides insights into the second hypothesis, exploring the effect of Performance-Based Rewards on workers' motivation. The constant (B = 1.022) represents the baseline motivation when all predictors are zero. The positive coefficient for Performance-Based Rewards ($B = 0.144$, $p = 0.002$) indicates that an increase in Performance-Based Rewards corresponds to an elevation in workers' motivation. The standardized coefficient (Beta = 0.196) emphasizes the contribution of Performance-Based Rewards to the dependent variable. The t-value ($t = 3.147$) reinforces the statistical significance of this relationship. In summary, the results lend strong support to Hypothesis 2, affirming that implementing effective performance-based reward systems positively influences workers' motivation.

4.2 Discussion and Implication of Findings

The findings in the study, focusing on workers' motivation and financial incentives in UBA Bank, Yenagoa Branch, Bayelsa State, are consistent with established literature in organizational psychology and management. The positive impact of Employee Benefits and Performance-Based Rewards on workers' motivation aligns with various theoretical frameworks and empirical studies.

Studies by Deci and Ryan (1985) emphasize the significance of intrinsic motivation in enhancing employee

engagement and job satisfaction. Employee Benefits, such as health insurance, retirement plans, and other perks, contribute to fulfilling employees' basic psychological needs, fostering a positive work environment.

Performance-Based Rewards, as indicated in the study, have been widely supported by research. Lawler (1971) posited the equity theory, suggesting that individuals are motivated when they perceive fairness in the relationship between their efforts and rewards. Similarly, Locke and Latham (1990) emphasized the positive impact of well-structured performance incentives on employee motivation and goal achievement.

However, it is crucial to consider dissenting viewpoints. Adams' (1963) equity theory contends that individuals may compare their input-output ratios with those of their peers, emphasizing the importance of perceived fairness in rewards distribution. Additionally, Pink's (2009) work in "Drive" challenges the sole reliance on financial incentives, advocating for intrinsic motivators such as autonomy, mastery, and purpose.

The study's implication for UBA Bank in Yenagoa Branch is profound. Recognizing the importance of both intrinsic and extrinsic motivators, the bank could refine its employee benefit programs and performance-based reward systems to align with the specific needs and expectations of its workforce. Strategies that combine financial incentives with opportunities for skill development, autonomy, and a sense of purpose may yield a more comprehensive and sustainable approach to enhancing workers' motivation.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

In conclusion, the findings of the study on workers' motivation and financial incentives in UBA Bank, Yenagoa Branch, Bayelsa State, underscore the crucial role of both Employee Benefits and Performance-Based Rewards in influencing employee motivation. The positive correlations align with established theories, including Deci and Ryan's (1985) emphasis on intrinsic motivation and Lawler's equity theory, reinforcing the significance of a balanced approach to employee motivation.

The study's implications highlight the potential for UBA Bank to optimize its human resource strategies by refining and aligning employee benefit programs and performance-based reward systems. Recognizing the multifaceted nature of motivation, the bank could further enhance employee engagement by incorporating intrinsic motivators, such as opportunities for skill development and autonomy, as advocated by Pink.

Overall, the study contributes valuable insights for organizational management in fostering a motivated workforce. The comprehensive understanding of the interplay between financial incentives and motivation serves as a foundation for strategic decision-making, enabling UBA Bank to cultivate a work environment that not only addresses employees' basic needs but also nurtures their intrinsic motivation, ultimately leading to improved job satisfaction and performance.

5.2 Recommendations

Based on the compelling findings of the study on workers' motivation and financial incentives in UBA Bank, Yenagoa Branch, several recommendations can be proposed to optimize the organization's human resource strategies and promote a more motivated workforce.

Firstly, UBA Bank should consider enhancing its Employee Benefits program by conducting regular surveys and feedback sessions with employees to understand their evolving needs and expectations. Customizing benefit offerings, such as health insurance, retirement plans, and additional perks, can contribute significantly to job satisfaction and motivation.

Additionally, the study highlights the positive impact of Performance-Based Rewards on workers' motivation. To further leverage this, UBA Bank should continuously evaluate and adjust its performance incentive structures. Incorporating clear and transparent criteria for rewards, recognizing individual and team achievements, and providing timely feedback can enhance the effectiveness of these programs.

Furthermore, considering the insights from dissenting perspectives, the bank should adopt a holistic approach to motivation. Integrating intrinsic motivators, such as opportunities for skill development, career growth, and a sense of purpose, can complement the financial incentives. This approach aligns with contemporary theories emphasizing the importance of autonomy and mastery, as proposed by Pink.

To ensure the sustained effectiveness of these recommendations, UBA Bank should foster a culture of open communication and feedback. Regularly soliciting employee opinions on existing incentive programs and organizational policies can help identify areas for improvement and ensure continuous alignment with employee expectations.

REFERENCE

Al-Swidi, A. K., & Mahmood, R. (2012). The Relationship between Total Quality Management Practices and Employee Empowerment, Perceived Organizational Support, and Perceived Job Satisfaction in Banks. Quality & Quantity, 46(6), 1603 1615.

Adeoye, A. B., & Sunday, O. L. (2017). Influence of Motivation on Academic Library Employees' Performance and Productivity in Lagos, Nigeria. Journal of Information and Knowledge Management, 8, 33-47. https://doi.org/10.4314 /iijikm.v8i2.3

Aguinis, H. (2013). Performance Management (3rd ed.). Prentice Hall.

Ayandele, I. A., & Etim, O. E. (2020). Non-Financial Incentives and Staff Motivation in Akwa Ibom State Civil Service, Nigeria. Business, Management, and Economics Research, 6, 88-98. https://doi.org/10.32861/bmer.67.88.98

Basu, S., & Kiernan, M. (2016). A Simulation Modelling Framework to Optimize Programs Using Financial Incentives to Motivate Health Behaviour Change. Medical Decision Making, 36, 48-58. https://doi.org/10.1177/0272989X15585984

Beretti, A., Figuieres, C., & Grolleau, G. (2013). Using Money to Motivate both Saints and Sinners: A Field Experiment on Motivational Crowding-Out. KYKLOS. GlobalBusiness Perspectives, 66, 63-77. https://doi.org/10.1111/kykl.12011

Cainarca, G. C., Delfino, F., & Ponta, L. (2019). The Effect of Monetary Incentives on Individual and Organizational Performance in an Italian Public Institution. Administrative Sciences, 9, Article No. 72. https://doi.org/10.3390/admsci 903 0072

Cheema, F. E., Shujaat, S., & Alam, R. (2013). Impact of Non-Monetary Rewards on Employees' Motivation: A Study of Commercial Banks in Karachi. Journal of Management and Social Sciences, 9, 23-30.

Armstrong, M. (2012). Armstrong's handbook of reward management practice. Kogan Page.

Berry, L. L., Mirabito, A. M., & Baun, W. B. (2015). What's the hard return on employee wellness programs? Harvard Business Review. https://hbr.org/2015/12/whats-thehard-return-on-employee-wellness-programs

Colquitt, J. A., Conlon, D. E., Wesson, M. J., Porter, C. O., & Ng, K. Y. (2001). Justice at the millennium: A meta-analytic review of 25 years of organizational justice research. Journal of Applied Psychology, 86(3), 425–445.

Grant, A. M. (2008). The significance of task significance: Job performance effects, relational mechanisms, and boundary conditions. Journal of Applied Psychology, 93(1), 108 124.

Hackman, J. R., & Oldham, G. R. (1976). Motivation through the Design of Work: Test of a Theory. Organizational Behavior and Human Performance, 16(2), 250–279.

Harter, J. K., Schmidt, F. L., & Hayes, T. L. (2002). Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis. Journal of Applied Psychology, 87(2), 268–279.

Herzberg, F. (1959). The Motivation to Work. John Wiley & Sons.

House, R. J., & Wigdor, L. A. (1967). Herzberg's dual-factor theory of job satisfaction and motivation: A review of the evidence and a criticism. Personnel Psychology, 20(4), 369-389.

Kaur, M., & Kaur, S. (2017). Impact of Financial Rewards on Employee Motivation: A Study of Select Commercial Banks in Amritsar. International Journal of Academic Research in Business and Social Sciences, 7(9), 465-481.

Kelliher, C., & Anderson, D. (2010). Doing more with less? Flexible working practices and the intensification of work. Human Relations, 63(1), 83-106.

Lawler, E. E. (2003). Reward practices and performance management system effectiveness. Organizational Dynamics, 32(4), 396–404.

Locke, E. A. (1976). The nature and causes of job satisfaction. In M. D. Dunnette (Ed.), Handbook of industrial and organizational psychology (pp. 1297-1343). Rand McNally.

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. American Psychologist, 57(9), 705–717. Milkovich, G. T., & Newman, J. M. (2016). Compensation. McGraw-Hill Education.

Nelson, B., Sendén, M. G., Gallegos, D., & Doupe, M. (2016). Retirement savings and satisfaction with retirement plans: A comparison of defined contribution and defined benefit pension members. Journal of Behavioral Decision Making, 29(4), 409-417.

Ongori, H., & Agolla, J. E. (2008). Occupational Stress in Organizations and its Effects on Organizational Performance. Journal of Management Research, 8(3), 123-135.

Smith, P. C., & Kendall, L. M. (1963). Retrospective Studies of the Job Satisfaction-Job Performance Relationship: A Methodological and Substantive Review. Journal of Applied Psychology, 47(5), 277–284.

WorldatWork. (2018). 2018 Inventory of Total Rewards Programs & Practices. WorldatWork. https://www.worldatwork.org/workspan/articles/2018-inventory-of-total-rewardsprograms-practices

THE IMPACT OF FINANCIAL LITERACY ON THE PROFITABILITY OF SMALL AND MEDIUM SCALE ENTERPRISE IN YENAGOA LGA OF BAYELSA STATE

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Abstract
This study investigates the impact of financial literacy on the profitability of small and medium-scale enterprises (SMEs) in Yenagoa LGA of Bayelsa State. SMEs play a vital role in economic growth and development, yet their profitability is often influenced by factors such as financial knowledge, behaviour, and attitude. Using a quantitative research design, data were collected from 154 SMEs across different sectors using proportionate stratified sampling technique. The study employs regression analysis to examine the relationships between financial literacy variables and SME profitability. The results indicate that financial knowledge, behaviour, and attitude significantly influence SME profitability, with financial knowledge emerging as the strongest predictor. These findings underscore the importance of enhancing financial literacy among SME owners and managers to improve business performance and sustainability. Recommendations include implementing training programs, integrating financial literacy education into school curricula, providing support through industry associations, and developing tailored financial products and services for SMEs. Overall, improving financial literacy within the SME sector holds promise for fostering economic growth and development in Yenagoa LGA and beyond.

1.1 Background of the study

Small and Medium Scale Enterprises (SMEs) play a crucial role in driving economic growth and fostering development in both developed and developing economies. These enterprises serve as facilitators for broad-based growth by promoting competition, fostering entrepreneurship, and delivering economy-wide benefits such as innovation and aggregate productivity growth (Tarfasa, Ferede, Kebede, & Behailu, 2016). In both developed and developing countries, SMEs contribute significantly to to the econmy of Nigeria in terms of productive output and increase in gross domestic product (Godwin, 2019).

SMEs are often considered engines of economic growth due to their agility, adaptability, and ability to innovate. They create employment opportunities, especially for marginalized groups such as women and youth, thereby contributing to poverty reduction and social inclusion (Tarfasa et al., 2016). Moreover, SMEs play a vital role in fostering entrepreneurship by providing a platform for individuals to start and grow their businesses, driving economic diversification and resilience (Godwinl and Ezekiel 2019).

The profitability of SMEs is a crucial indicator of their financial health and sustainability. It reflects their ability to generate sufficient returns on investment, cover operational costs, and reinvest in business expansion and development. Understanding the factors influencing SME profitability is essential for identifying challenges, exploring opportunities, and formulating
effective strategies to support SME growth and development in Yenagoa State. (John, 2011) identified lack of training and experience among other factors hindering small business in Nigeria.

Yenagoa the capital of Bayelsa State, located in the southern region of Nigeria, is home to a diverse array of SMEs operating across various sectors such as agriculture, retail, manufacturing, and services. These SMEs contribute significantly to the state's economy, generating employment, income, and revenue. However, they face numerous challenges that impact their profitability and hinder their ability to thrive and grow (Ntiamoah et al., 2014).

One of the primary challenges facing SMEs in Bayelsa State is the inadequate infrastructure. Poor road networks, unreliable electricity supply, and limited access to telecommunications services increase production costs, disrupt supply chains, and impede market access for SMEs. These infrastructure deficiencies not only reduce profitability but also hamper business operations and competitiveness.

Access to finance is another critical issue confronting SMEs in Bayelsa State. Many SMEs struggle to obtain financing from formal financial institutions due to stringent collateral requirements, high interest rates, and limited financial literacy. As a result, they often rely on informal sources of finance, such as personal savings and contributions from family and friends, which may not provide adequate capital for business expansion and investment.

Furthermore, the regulatory environment in Nigeria poses challenges for SMEs in Yenagoa. Cumbersome registration procedures, multiple taxation, and inconsistent government policies increase compliance costs and create uncertainty for SMEs. These regulatory constraints not only hinder profitability but also discourage entrepreneurship and investment in the SME sector.

Financial literacy is a critical skill imperative for entrepreneurs to effectively manage their finances, make

well-informed decisions, and enhance profitability. Yenagoa LGA in Bayelsa State, Nigeria, stands as a hub for small-scale enterprises. Nonetheless, the profitability of these ventures remains subdued, largely attributed to deficient financial literacy among proprietors. Consequently, this study endeavors to scrutinize the influence of financial literacy on the profitability of small-scale enterprises within Yenagoa LGA, Bayelsa State.

Undoubtedly, the significance of financial literacy in small-scale enterprises cannot be overstated. It serves as the bedrock for adept financial management, informed decision-making, and overall profitability enhancement. Research conducted by Adegbie and Alawode (2020) underscores this significance, revealing a noteworthy positive correlation between financial management practices and the performance of small and medium-scale poultry businesses in Ogun State, Nigeria. Noteworthy financial management practices such as annual budgeting, capital structure management, and working capital management significantly bolstered profitability, cash solvency, and economic value added within these enterprises, accentuating the indispensable role of financial literacy.

Similarly, Aya-Peres ()' study delved into the impact of public financial management on local government administration in Bayelsa State, Nigeria. The findings underscored the pivotal role of sound public financial management in rural poverty alleviation. Emphasizing the imperative of robust financial management practices to meticulously plan and regulate available funds, the study resonates with the necessity for effective financial literacy in driving small-scale enterprise profitability.

Nevertheless, the dearth of financial literacy among small business proprietors in Nigeria remains a formidable obstacle to enterprise profitability. (Samson,2021) study elucidates this predicament, revealing a pervasive lack of requisite financial management skills among Nigerian small business proprietors. This deficiency hinders effective financial management, informed decision-making, and ultimately, profitability augmentation. Hence, the imperative for comprehensive financial literacy initiatives to uplift the financial management acumen of small business proprietors across Nigeria.

Recognizing the paramount importance of financial literacy in fostering small-scale enterprise viability, the Nigerian government has embarked on initiatives to enhance financial literacy among entrepreneurs. The Central Bank of Nigeria (CBN) has spearheaded various programs tailored to augment the financial management competencies of small business proprietors. Notably, the Financial Literacy for Entrepreneurs (FLIFE) program stands as a testament to this commitment, providing training on financial management, record-keeping, and facilitating access to finance for small business owners.

The issue of small-scale enterprise profitability within Yenagoa LGA of Bayelsa State, Nigeria, is of paramount importance, necessitating urgent attention. Despite their substantial role in fostering employment opportunities and generating income, these enterprises encounter various hurdles that impede their financial viability. Chief among these challenges is the insufficient level of financial literacy among small business proprietors, which obstructs their capacity to proficiently manage financial resources, make well-informed fiscal decisions, and consequently, enhance profitability.

The nexus between financial literacy and the profitability of small-scale enterprises constitutes a pressing concern that warrants immediate intervention. Absent a firm grasp of financial management principles, small business owners may encounter difficulties in maintaining liquidity and securing the enduring sustainability of their ventures. Deficient financial literacy often precipitates suboptimal financial management practices, thereby exerting detrimental repercussions on the profitability and overall performance of these enterprises. This study aims to examine correlation between financial literacy and the profitability of small-scale enterprises operating within Yenagoa LGA of Bayelsa State.

2.0 LITERATURE REVIEW

2.1 Definition and Concepts Financial Literacy

Financial literacy refers to the knowledge, skills, and understanding necessary to make informed and effective financial decisions. It encompasses various aspects of personal finance, including budgeting, saving, investing, borrowing, and managing debt. Individuals who are financially literate are equipped with the tools and resources to navigate complex financial systems, evaluate financial products and services, and plan for their future financial goals (Lusardi & Mitchell, 2014).

At its core, financial literacy empowers individuals to take control of their financial well-being, enabling them to make sound financial decisions that align with their values and objectives. It involves understanding key financial concepts such as interest rates, inflation, risk diversification, and compounding returns. Moreover, financial literacy extends beyond mere knowledge to encompass practical application and behaviour change. It involves developing financial habits and behaviours that promote financial security and resilience over the long term (Lusardi & Tufano, 2009).

Financial literacy is essential for individuals of all ages and backgrounds, as it provides the foundation for building financial independence and security. From managing everyday expenses to planning for retirement, financial literacy skills are critical for navigating life's financial challenges and opportunities. Moreover, in an increasingly complex and interconnected world, financial literacy is vital

for promoting economic stability and prosperity at both the individual and societal levels (OECD, 2005).

2.2 Dimensions of Financial Literacy

Financial literacy encompasses various dimensions that collectively contribute to an individual's ability to make informed financial decisions. These dimensions include financial knowledge, financial behaviour, and financial attitude. Each dimension plays a crucial role in shaping an individual's overall financial well-being and can have a significant impact on their financial outcomes. In this write-up, we will explore each dimension in detail, examining their importance and implications for personal finance.

Financial Knowledge

Financial knowledge refers to an individual's understanding of fundamental financial concepts, principles, and products. It encompasses knowledge about topics such as budgeting, saving, investing, borrowing, insurance, taxes, and retirement planning. A strong foundation of financial knowledge is essential for making informed decisions and navigating the complexities of the financial landscape (Hastings & Mitchell, 2011).

Individuals with higher levels of financial knowledge are better equipped to evaluate financial opportunities and risks, identify suitable financial products and services, and plan for their long-term financial goals. They are more likely to make prudent decisions regarding budgeting, debt management, and investment strategies. Moreover, financial knowledge empowers individuals to protect themselves from financial fraud and exploitation, enhancing their financial security and resilience (Lusardi & Mitchell, 2011).

Research has consistently shown that individuals with greater financial knowledge tend to exhibit healthier financial behaviours and achieve better financial outcomes over time. Therefore, efforts to improve financial literacy should focus on enhancing financial knowledge through education, training, and access to reliable financial information and resources (Lusardi & Mitchell, 2014).

Financial Behavior

Financial behaviour refers to the actions and decisions individuals take regarding their financial matters. It encompasses behaviours such as budgeting, saving, investing, borrowing, and spending. Financial behaviour is influenced by various factors, including financial knowledge, attitudes, beliefs, and external circumstances (Fernandes et al., 2014).

Individuals with positive financial behaviours tend to engage in prudent financial practices, such as living within their means, saving regularly, avoiding excessive debt, and investing for the future. They demonstrate self-discipline and restraint in their spending habits, prioritize long-term financial goals over short-term gratification, and are proactive in managing their finances (Fernandes et al., 2014).

On the other hand, individuals with negative financial behaviours may struggle with impulse spending, excessive debt, and a lack of financial planning. They may engage in risky financial behaviours, such as gambling or speculative investing, which can jeopardize their financial security and well-being (Hastings & Mitchell, 2011).

Financial attitudes and beliefs play a significant role in shaping financial behaviour. Individuals with positive attitudes towards money, such as valuing thriftiness, frugality, and long-term financial planning, are more likely to exhibit responsible financial behaviours. Conversely, individuals with negative attitudes, such as a lack of confidence in their ability to manage money or a belief in quick fixes or get-rich-quick schemes, may engage in behaviours that undermine their financial well-being (Fernandes et al., 2014).

Financial Attitude

Financial attitude refers to an individual's beliefs, perceptions, and emotions regarding money and financial matters. It encompasses attitudes towards saving, spending, investing, risk-taking, and financial planning. Financial attitude plays a crucial role in shaping financial behaviour and outcomes, as it influences decision-making processes and priorities (Fernandes et al., 2014).

Positive financial attitudes include beliefs in the importance of financial planning, saving for the future, and living within one's means. Individuals with positive attitudes towards money are more likely to engage in responsible financial behaviours, such as budgeting, saving regularly, and investing for the long term. They view money as a tool for achieving their goals and aspirations and prioritize financial security and independence (Fernandes et al., 2014).

Conversely, negative financial attitudes can hinder financial well-being and success. Negative attitudes towards money, such as fear of financial loss, mistrust of financial institutions, or a belief in financial instability, may lead to behaviors such as hoarding cash, avoiding investment opportunities, or engaging in impulsive spending. These attitudes can limit individuals' financial growth and prevent them from realizing their full financial potential (Fernandes et al., 2014).

Efforts to improve financial attitudes should focus on promoting positive beliefs and perceptions about money, challenging negative attitudes through education and awareness-building, and providing support and resources to help individuals overcome financial fears and insecurities. Financial education programs, workshops, and counseling services can help individuals develop a healthy mindset towards money and empower them to make confident and informed financial decisions (Carpena et al., 2011).

2.3 Profitability of SME's in Nigeria

The profitability of small and medium-scale enterprises (SMEs) in Nigeria is a topic of considerable importance given their significant contribution to the country's economy.

One crucial aspect influencing SME profitability is the business environment in Nigeria. The World Bank's Ease of Doing Business Index provides insights into the regulatory environment, access to credit, and other factors affecting SME operations. Unfortunately, Nigeria's ranking in this index has been relatively low in recent years, indicating challenges such as bureaucratic procedures, corruption, and inadequate infrastructure, which can hinder SME profitability (World Bank, 2020).

Access to finance is another critical factor. According to the Central Bank of Nigeria (CBN), SMEs often face difficulties in accessing credit due to stringent collateral requirements, high-interest rates, and limited financial literacy (CBN, 2019). This lack of access to finance constrains SMEs' growth and investment opportunities, affecting their profitability adversely.

Furthermore, the informal nature of many SMEs in Nigeria poses challenges in accessing formal financial services. The International Finance Corporation (IFC) estimates that over 70% of SMEs in Nigeria operate informally, limiting their ability to access credit, insurance, and other financial products (IFC, 2018). This informal status often leads to lower productivity and profitability compared to formal SMEs.

Infrastructure deficiencies also impact SME profitability. Power shortages, inadequate transportation networks, and unreliable internet connectivity increase operating costs and disrupt business operations. The Nigerian Electricity Regulatory Commission (NERC) reports that SMEs spend a significant portion of their revenue on alternative power sources due to unreliable grid electricity (NERC, 2021). These additional costs reduce profitability and competitiveness, particularly for manufacturing and service-based SMEs.

Moreover, the lack of skilled labor exacerbates the profitability challenges faced by SMEs in Nigeria. The National Bureau of Statistics (NBS) indicates a significant skill gap in the labor force, particularly in technical and managerial roles (NBS, 2020). SMEs often struggle to attract and retain qualified employees, impacting productivity and innovation, thus affecting profitability.

However, despite these challenges, SMEs in Nigeria exhibit resilience and innovation. The Small and Medium Enterprises Development Agency of Nigeria (SMEDAN) reports that SMEs contribute over 48% of Nigeria's GDP and employ over 84% of the workforce (SMEDAN, 2020). This highlights the sector's importance in driving economic growth and employment generation, despite the profitability challenges.

Government initiatives play a crucial role in supporting SME profitability. The Nigerian government has implemented various programs aimed at enhancing SME access to finance, such as the Central Bank of Nigeria's Anchor Borrowers' Program and the Development Bank of Nigeria's MSME Fund (CBN, 2021; DBN, 2021). Additionally, reforms to improve the business environment, such as the Companies and Allied Matters Act (CAMA) and the National Enterprise Development Program (NEDP), aim to reduce regulatory burdens and promote SME growth (CAMA, 2020; NEDP, 2020).

Furthermore, technological advancements offer opportunities for SMEs to enhance profitability. The adoption of digital platforms for marketing, sales, and operations can lower costs, improve efficiency, and expand market reach. The Nigerian Communications Commission (NCC) reports a significant increase in internet penetration and mobile phone usage, providing SMEs with avenues for innovation and growth (NCC, 2021).

2.5 The relationship between Financial Literacy and Profitability of Nigerian SME's

The relationship between financial literacy and the profitability of Nigerian SMEs is a critical aspect deserving attention, given the challenges SMEs face in accessing finance and managing their finances effectively. Financial literacy refers to the knowledge and understanding of financial concepts and tools necessary to make informed decisions about managing personal and business finances.

One of the primary challenges facing SMEs in Nigeria is the lack of financial literacy among entrepreneurs and business owners. The National Financial Inclusion Strategy (NFIS) Survey conducted by Enhancing Financial Innovation & Access (EFInA) reveals that only 42.7% of Nigerian adults are financially literate, with even lower levels of literacy observed among SME owners (EFInA, 2018). This lack of financial literacy hampers SMEs' ability to understand financial statements, manage cash flow, and make sound investment decisions, all of which are crucial for profitability.

A study conducted by the African Development Bank (AfDB) highlights the correlation between financial literacy and SME profitability in Nigeria. The study found that SMEs with higher levels of financial literacy tend to have better financial management practices, resulting in higher profitability compared to their less financially literate counterparts (AfDB, 2019). Specifically, SMEs with adequate financial literacy are more likely to budget effectively, negotiate favorable terms with suppliers, and access appropriate financing options, all of which contribute to improved profitability.

Furthermore, research by the Central Bank of Nigeria (CBN) underscores the importance of financial literacy programs in enhancing SME profitability. The CBN's Financial Literacy

Framework for Nigeria emphasizes the need to provide targeted financial education and training programs to SME owners and entrepreneurs (CBN, 2020). These programs aim to improve their understanding of financial concepts such as budgeting, saving, investment, and risk management, thereby empowering them to make better financial decisions for their businesses.

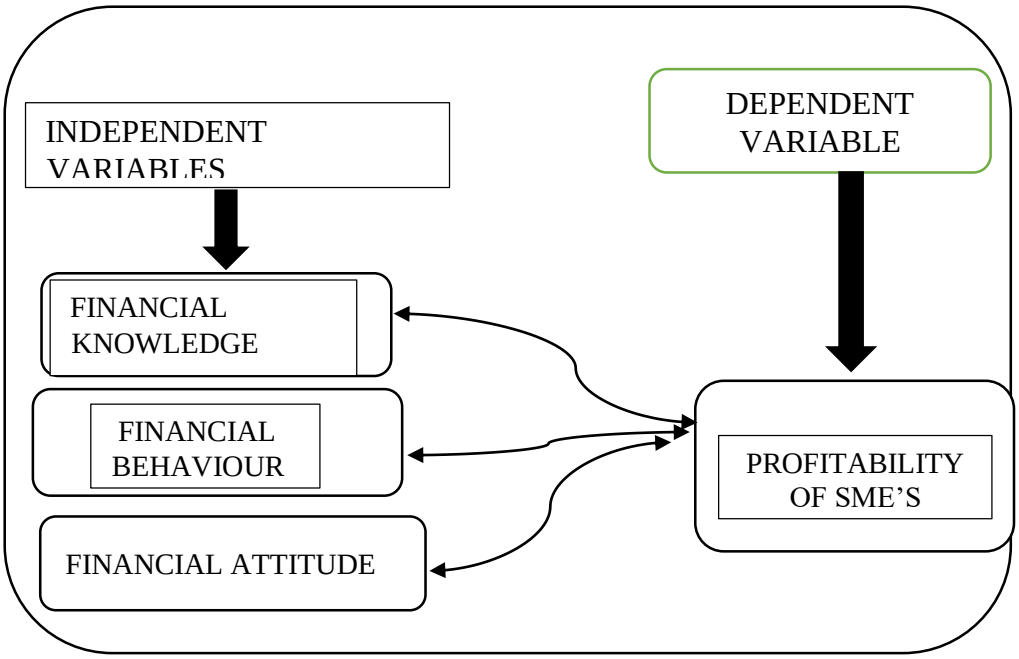
Moreover, empirical evidence from other developing countries corroborates the positive relationship between financial literacy and SME profitability. A study conducted in Ghana found that SMEs with higher levels of financial literacy were more likely to access formal financing, leading to increased investment in productive assets and higher profitability (Adomako et al., 2020). Similarly, research in Kenya revealed that SMEs participating in financial literacy programs experienced significant improvements in profitability, productivity, and business growth (Ouma & Odongo, 2018).

However, despite the clear benefits of financial literacy, challenges remain in promoting financial education among SMEs in Nigeria. The EFInA survey cited earlier also highlights disparities in financial literacy levels across different demographic groups, with women, rural dwellers, and individuals with lower levels of education being particularly vulnerable (EFInA, 2018). Addressing these disparities requires targeted interventions and innovative approaches to deliver financial education effectively to underserved populations.

In conclusion, the relationship between financial literacy and the profitability of Nigerian SMEs is undeniable. Empirical evidence suggests that SMEs with higher levels of financial literacy are better positioned to manage their finances, access credit, and make strategic investment decisions, leading to improved profitability. However, addressing the financial literacy gap among SMEs remains a formidable challenge that requires concerted efforts from policymakers, financial institutions, and other stakeholders to ensure the sustainable growth and development of the SME sector in Nigeria.

2.6 Conceptual Framework

The conceptual framework for the relationship between financial literacy on the profitability of small and medium scale enterprise in Yenagoa LGA of Bayelsa State based on the conceptual review above is presented in fig. 1 Design by the Author.



2.6 Empirical Review

Several empirical studies shed light on the relationship between financial literacy and various factors such as individual decision-making, gender differences, educational interventions, and the effectiveness of financial education programs.

Mier and Sprenger (2008) conducted a field study assessing individual decisions to acquire financial information and their time preferences. They provided a short, free credit counselling and information program to over 870 individuals, with approximately 55% choosing to participate. Through incentivized choice experiments, they elicited time preferences from both participants and non-

participants. Their findings suggested that individuals opting to acquire personal financial information through counselling programs tended to discount the future less than those who did not participate. This implies that time preference could influence individuals' decisions regarding financial literacy.

Huddleston and Danes (1999) examined the impact of a high school financial literacy program on a national sample of students in the USA post-graduation. Their study revealed that teaching personal financial literacy in high schools led to increased financial knowledge among students. Moreover, they observed positive effects on teenage financial behaviours' and subsequent behaviour as adults. They advocated for personal financial literacy to be a mandatory component of consumer education in schools.

Chatzy (2002) addressed the state of personal financial literacy education among American adults. She noted that despite exposure to financial matters, many adults did not retain much of the content. Supporting this claim, she cited evidence indicating that the average adult could correctly answer only 50% of 31 financial literacy multiple-choice questions. Chatzy recommended integrating financial literacy education into the curriculum of US schools, particularly at the high school level. She argued that financial education is more effective when provided before individuals start practicing financial decision-making in their daily lives.

These empirical studies highlight the importance of financial literacy in shaping individuals' decisions, the influence of gender on financial knowledge, the effectiveness of financial education interventions, and the necessity of integrating financial literacy education into formal education systems. Overall, they underscore the significance of promoting financial literacy to enhance individuals' financial well-being and decision-making capabilities.

Okoli (2011), conducted a comprehensive investigation into the practice of record-keeping and its consequential effects on the profitability of small-scale enterprises specifically within Enugu state. Employing a sample size comprising 168 small-scale enterprises, Okoli's study delved into the intricate dynamics of record-keeping practices and their implications for the financial health of these businesses.

One striking observation from Okoli's findings was the prevalence of single-entry record-keeping systems among small-scale enterprises. He noted that the simplicity and accessibility of the single-entry method made it a favored choice among these businesses. However, this preference for simplicity often came at the expense of comprehensive financial tracking, potentially hindering these enterprises from fully understanding their financial standing and making informed decisions.

Furthermore, Okoli's research shed light on the detrimental consequences of inadequate record-keeping practices within the small-scale enterprise sector. He found that many of these businesses struggled or failed outright due to their inability to maintain accurate and up-to-date financial records. Without a clear understanding of their cash flows, expenses, and revenue streams, these enterprises were left vulnerable to financial instability and mismanagement.

Importantly, Okoli's study also revealed a notable correlation between financial literacy and the profitability of small-scale enterprises. He observed that businesses with higher levels of financial literacy tended to prioritize proper record-keeping practices, recognizing the pivotal role such practices play in driving profitability and sustainability. Conversely, enterprises lacking in financial literacy often faltered in their record-keeping efforts, thereby jeopardizing their overall profitability and long-term viability.

2.7 Theoretical Review

2.7.1 Human Capital Theory

The theory introduced by Gary S. Becker (1964), Human capital theory posits that investments in education, training, and knowledge acquisition lead to enhanced productivity and economic success. In the context of SMEs, financial literacy can be viewed as a form of human capital that enables entrepreneurs and business owners to make informed decisions about managing finances, allocating resources, and pursuing profitable opportunities. According to this theory, individuals with greater financial literacy are more adept at understanding financial statements, evaluating investment options, and effectively managing cash flow, all of which contribute to higher profitability in their enterprises.

While human capital theory provides a theoretical foundation for understanding the importance of financial literacy in SME profitability, empirical studies have raised several critiques. One critique is the challenge of measuring and quantifying the impact of financial literacy on business outcomes. While some studies have found positive correlations between financial literacy and profitability, others have failed to establish a clear causal relationship. Additionally, contextual factors such as industry dynamics, market conditions, and regulatory environments may influence the effectiveness of financial literacy in different settings. Moreover, the theory tends to overlook socio-economic barriers that may limit access to education and training, particularly in underprivileged areas like Yenagoa LGA of Bayelsa State. Therefore, while human capital theory offers valuable insights, its application in real-world contexts requires careful consideration of contextual nuances and socio-economic disparities.

2.7.2 Resource-Based View (RBV)

The resource-based view (RBV) of the firm emphasizes the role of internal resources and capabilities in generating sustainable competitive advantage. From this perspective, financial literacy can be considered as a valuable intangible resource that enables SMEs to leverage financial opportunities, identify competitive advantages, and adapt to changing market conditions. Firms with higher levels of financial literacy are better equipped to allocate financial resources efficiently, manage risks effectively, and capitalize on profitable opportunities, thereby enhancing their profitability over time.

Despite its theoretical appeal, the resource-based view has faced empirical critiques regarding its applicability in diverse contexts. Some studies argue that the RBV may not fully account for the dynamic and heterogeneous nature of SMEs operating in environments like Yenagoa LGA of Bayelsa State. Factors such as resource constraints, market volatility, and institutional barriers may influence the effectiveness of financial literacy in driving profitability. Additionally, the RBV tends to focus on internal resources and capabilities while overlooking the role of external factors such as market competition, customer preferences, and regulatory changes. Therefore, while the RBV provides valuable insights into the strategic importance of financial literacy, its application in specific contexts requires careful consideration of external influences and organizational capabilities.

3.0 Research Methodology

3.1 Research Design

For this study on the impact of financial literacy on the profitability of small and medium-scale enterprises (SMEs) in Yenagoa LGA of Bayelsa State, a quantitative research design will be adopted. Quantitative research involves the collection and analysis of numerical data to understand relationships, patterns, and trends (Creswell & Creswell, 2017). This approach is suitable for examining the influence of financial literacy on SME profitability as it allows for the measurement of variables and statistical analysis to test hypotheses.

3.2 Target Population

The target population for this study comprises 250 registered SMEs operating in four sub-sectors within Yenagoa town, as identified by the Yenagoa Chamber of Commerce, Industry, Mines, and Agriculture (BECIMA, 2020). These sub-sectors include Service, Retail/Wholesale, Manufacturing, and Agribusiness.

3.3 Sample Size and Sampling Techniques

SMEs were first stratified into the four sub-sectors mentioned above: Service, Retail/Wholesale, Manufacturing, and Agribusiness. Proportionate sampling was then employed to determine the number of respondents from each stratum to ensure equal representation and reduce sampling errors. The sample size was calculated using Yamane's formula (1967), resulting in a sample of 154 SMEs being selected for the study.

Table 1: Individual Sample Size Distribution

S/N	Strata	Population	proportion	Sample size
1	Retail/Wholesale	100	100 x 154 250	62
2	Service	20	20 x 154 250	12
3	Production	80	80 x 154 250	49
4	Agribusiness	50	50 x 154 250	31
5	**Total**	**250**		**154**

3.4 Variable Measurement and Model Specification

Independent Variables

Financial Knowledge

This variable refers to the level of understanding and awareness of financial concepts and principles among SME owners or managers. It will be measured using a validated questionnaire assessing respondents' knowledge of financial terms, financial statements, and basic financial management practices (Lusardi & Mitchell, 2014).

Financial Behavior

This variable encompasses the financial decisions and actions taken by SME owners or managers in managing their businesses' finances. It will be measured using Likert scale items assessing respondents' financial habits, budgeting practices, and investment decisions (Huston, 2010).

Financial Attitude

This variable represents SME owners' or managers' beliefs, perceptions, and attitudes towards financial matters and risk-taking. It will be measured using a series of statements assessing respondents' attitudes towards saving, investing, and financial planning (Shim et al., 2009).

Dependent Variable

Profitability of SMEs

This variable indicates the financial performance and profitability of small and medium-scale enterprises in Yenagoa LGA. It will be measured using financial ratios such as return on investment (ROI), net profit margin, and gross profit margin calculated based on respondents' financial data (Brigham & Houston, 2012).

Model Specification

The relationship between financial literacy variables (Financial Knowledge, Financial behaviour, Financial

Attitude) and SME profitability will be examined using multiple regression analysis. The model will be specified as follows:

Profitability of SMEs = $\beta 0 + \beta 1FK + \beta 2FB + \beta 3FA + \varepsilon$

Where:

$\beta 0$ is the intercept term,

$\beta 1$, $\beta 2$, and $\beta 3$ are the coefficients of the independent variables,

Financial Knowledge, Financial Behavior, and Financial Attitude are the independent variables,

ε represents the error term capturing unexplained variability.

3.5 Method of Data Analysis

The collected data will be analyzed using appropriate statistical techniques. Descriptive statistics will be employed to summarize the characteristics of the sample and the variables under investigation. Inferential statistical methods such as regression analysis will be used to examine the relationships between financial literacy variables (i.e., financial knowledge, behaviour, and attitude) and SME profitability, while controlling for relevant covariates.

4.0 RESULTS AND DISCUSSION

4.1 Test of Hypotheses

Table4.1: Model Summary

Model	R	R Square	Adjusted R Square	Std. The error in the Estimate
1	0.589[a]	0.3374	0.6941	0.443

a. Predictors: (Constant), Financial Attitude, financial behaviour, financial attitude

The model summary in Table 4.1 indicates that the predictors (Financial Attitude and Financial behaviour) collectively explain approximately 33.74% of the variance in the dependent variable (Profitability of SMEs). The adjusted R Square value, which considers the number of predictors and sample size, is 0.6941. This suggests that the model accounts for a substantial portion of the variability in SME profitability. The standard error of the estimate is 0.443, indicating the average deviation of the observed values from the predicted values by the model.

Table 4.2: Analysis of variance (ANOVA).

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	30.587	3	11.596	22.252	0.000[b]
Residual	55.913	116	0.582		
Total	86.500	119			

a. Dependent Variable: Profitability of SME's;

b. Predictors: (Constant), Financial knowledge, financial behaviour, financial attitude

The ANOVA results indicate a significant regression model ($F=22.252$, $p<0.001$), suggesting that the predictors (Financial Knowledge, Financial behaviour, and Financial Attitude) collectively contribute to explaining variance in SME profitability. The regression model's sum of squares (30.587) and mean square (11.596) show substantial variability explained. The residual sum of squares (55.913) represents unexplained variability. Overall, the model demonstrates a strong fit in predicting SME profitability based on financial knowledge, behaviour, and attitude, with a significant impact on the dependent variable.

Table 4.3: Regression coefficients.

Model	Unstandardised Coefficients		Standardised Coefficients		
	B	Std. Error	Beta	t	Sig
(Constant)	1.022	0.156		6.536	0.000
Financial Knowledge	0.289	0.040	0.427	7.288	0.000
Financial Behavior,	0.144	0.046	0.196	3.147	0.002
Financial Attitude	0.357	0.045	0.089	3.4567	0.000

a. Dependent Variable: profitability of SME's

Hypothesis 1: There is no significance relationship between financial knowledge and profitability of SME's

The coefficient for Financial Knowledge is 0.289, indicating that a one-unit increase in Financial Knowledge is associated with a 0.289 increase in SME profitability, holding other variables constant. This coefficient is statistically significant ($p < 0.001$), suggesting that higher financial knowledge positively influences SME profitability. The standardized coefficient (Beta) of 0.427 indicates the relative importance of Financial Knowledge compared to other predictors.

Hypothesis 2: There is no significance relationship between financial behaviour and profitability of SME's

The coefficient for Financial Behaviour is 0.144, suggesting that a one-unit increase in Financial Behaviour leads to a 0.144 increase in SME profitability, controlling for other factors. This coefficient is also statistically significant ($p = 0.002$), indicating that better financial behaviour contributes positively to SME profitability. However, compared to Financial Knowledge, Financial Behaviour has a lower standardized coefficient (Beta) of 0.196, suggesting it may have a relatively weaker impact.

Hypothesis 3: There is no significance relationship between financial attitude and profitability of SME's

The coefficient for Financial Attitude is 0.357, implying that a one-unit increase in Financial Attitude results in a 0.357 increase in SME profitability, when other variables are held constant. This coefficient is statistically significant ($p < 0.001$), indicating that positive financial attitudes contribute significantly to SME profitability. However, the standardized coefficient (Beta) of 0.089 suggests that Financial Attitude has a relatively weaker impact compared to Financial Knowledge and Financial Behaviour.

Overall, the results suggest that Financial Knowledge has the strongest influence on SME profitability, followed by Financial Attitude and Financial behaviour. These findings highlight the importance of financial literacy, positive attitudes, and responsible financial behaviour in driving SME success and profitability. However, it's crucial to note that while statistically significant, the effect sizes of Financial behaviour and Financial Attitude are comparatively smaller than that of Financial Knowledge. Thus, interventions aimed at improving SME profitability should prioritize enhancing financial knowledge among entrepreneurs while also addressing attitudes and behaviors towards financial management.

4.2 Discussion and Implication of Findings

The findings from the regression analysis indicate that Financial Knowledge has the strongest positive impact on SME profitability, followed by Financial Attitude and Financial Behavior. These results are consistent with previous research in the field. For instance, a study by Lusardi and Mitchell (2014) found a significant association between financial literacy and business performance, highlighting the importance of understanding financial concepts for entrepreneurial success. Similarly, research by Cole and Shastry (2009) supported the idea that financial knowledge enhances SME profitability by enabling better decision-making and resource allocation.

However, there are studies that present contrasting perspectives. For instance, a study by Robb and Robinson (2012) suggested that while financial literacy may be important, it does not necessarily translate directly into improved business outcomes for SMEs. They argued that factors such as access to finance, market conditions, and managerial skills may play a more significant role in determining profitability. Additionally, research by Klapper et al. (2015) found that while financial literacy interventions can improve financial knowledge, they do not always lead to tangible improvements in business performance.

These divergent findings highlight the complexity of the relationship between financial literacy and SME profitability. While financial knowledge is undoubtedly important, its impact may be mediated by various contextual factors and individual characteristics. Therefore, interventions aimed at enhancing SME profitability should take a holistic approach, addressing not only financial literacy but also other relevant factors such as access to finance, market dynamics, and managerial capabilities. Further research is needed to better understand the mechanisms through which financial literacy influences SME performance and to identify effective strategies for supporting entrepreneurial success in diverse contexts.

5.0 Conclusion and Recommendations

5.1 Conclusion

In conclusion, the findings of this study underscore the significant role of financial literacy in enhancing the profitability of small and medium-scale enterprises (SMEs) in Yenagoa LGA of Bayelsa State. Specifically, the results highlight the importance of financial knowledge, financial behavior, and financial attitude in driving SME success. While financial knowledge emerged as the strongest predictor of profitability, positive attitudes and responsible behaviors also exerted notable influences. These findings emphasize the need for targeted interventions aimed at improving financial literacy among SME owners and managers. By equipping entrepreneurs with the necessary knowledge, skills, and attitudes, policymakers, educators, and practitioners can empower SMEs to make informed decisions, allocate resources effectively, and navigate financial challenges more adeptly. Ultimately, enhancing financial literacy within the SME sector holds promise for fostering economic growth, creating employment opportunities, and contributing to the overall development of Yenagoa LGA and beyond.

5.2 Recommendations

Based on the findings of this study, several recommendations can be made to support small and medium-scale enterprises (SMEs) in Yenagoa LGA of Bayelsa State. Firstly, policymakers should prioritize initiatives aimed at enhancing financial literacy among SME owners and managers. This could involve the development and implementation of training programs, workshops, and educational campaigns focused on improving financial knowledge, behavior, and attitudes.

Secondly, educational institutions should integrate financial literacy education into their curricula, starting from the secondary school level and continuing into higher education. By equipping students with foundational financial skills and knowledge early on, future entrepreneurs will be better prepared to manage their businesses effectively.

Additionally, industry associations, chambers of commerce, and non-profit organizations can play a crucial role in providing ongoing support and resources to SMEs. This could include offering mentoring programs, access to

financial advisory services, and networking opportunities to facilitate knowledge sharing and collaboration among SMEs.

Lastly, financial institutions should develop tailored products and services designed to meet the unique needs of SMEs, including flexible financing options, business advisory services, and digital financial solutions. By addressing the specific challenges faced by SMEs and empowering them with the necessary financial tools and knowledge, stakeholders can contribute to the long-term growth and sustainability of the SME sector in Yenagoa LGA.

REFERENCE

Adegbie Festus Folajinmi and Alawode Olufemi Peter (2020). Financial Management Practices and Performance of Small and Medium Scale Poultry Industry in Ogun State, Nigeria. *Journal of Finance and Accounting. Archive* 8(2):90-106

Adomako, S., Danso, A., & Uddin, M. (2020). Financial Literacy, Access to Finance, and Firm Performance: Evidence from SMEs in Ghana. Journal of African Business, 21(4), 509-530.

African Development Bank (AfDB). (2019). Financial Literacy and SME Profitability in Nigeria: Evidence from Empirical Data. AfDB.

BECIMA. (2020). Yenagoa Chamber of Commerce, Industry, Mines, and Agriculture Report. Yenagoa, Nigeria.

Brigham, E. F., & Houston, J. F. (2012). Fundamentals of Financial Management. Cengage Learning.

Carpena, F., Cole, S., Shapiro, J., & Zia, B. (2011). Unpacking the causal chain of financial literacy. Journal of Development Economics, 97(2), 123-135.

Central Bank of Nigeria (CBN). (2020). Financial Literacy Framework for Nigeria. CBN.

Central Bank of Nigeria. (2019). Annual Report 2019. Central Bank of Nigeria.

Central Bank of Nigeria. (2021). Anchor Borrowers' Program Annual Report 2021. Central Bank of Nigeria.

Companies and Allied Matters Act. (2020). Official Gazette of the Federal Republic of Nigeria, 107(9), A215-A316.

Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative, and mixed methods approaches. Sage Publications.

Development Bank of Nigeria. (2021). Annual Report 2021. Development Bank of Nigeria.

EFInA. (2018). National Financial Literacy Survey Report 2018. EFInA.

Enhancing Financial Innovation & Access (EFInA). (2018). National Financial Literacy Survey Report 2018. EFInA.

Fernandes, D., Lynch Jr, J. G., & Netemeyer, R. G. (2014). Financial literacy, financial education, and downstream financial behaviors. Management Science, 60(8), 1861-1883.

Godwin Emmanuel Oyedoku and Ezekiel Elton Michael Micah (2019). Small and Medium Scale Enterprises Contribution and Economic Growth in Nigeria. [ResearchGate].

Hastings, J. S., & Mitchell, O. S. (2011). How financial literacy and impatience shape retirement wealth and investment behaviors. NBER Working Paper No. 16740. Retrieved from National Bureau of Economic Research website.

Huston, S. J. (2010). Measuring financial literacy. The Journal of Consumer Affairs, 44(2), 296-316.

International Finance Corporation. (2018). MSME Finance Gap: Assessment of the Shortfalls and Opportunities in Financing Micro, Small, and Medium Enterprises in Emerging Markets. International Finance Corporation.

John O. Okpara (2011) Factors constraining the growth and survival of SMEs in Nigeria. *Management Research Review*. 34(2):156-171

Lusardi, A., & Mitchell, O. S. (2011). Financial literacy and planning: Implications for retirement wellbeing. NBER Working Paper No. 1. Retrieved from National Bureau of Economic Research website.

Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. Journal of Economic Literature, 52(1), 5-44.

Lusardi, A., & Tufano, P. (2009). Debt literacy, financial experiences, and over indebtedness. NBER Working Paper No. 14808. Retrieved from National Bureau of Economic Research website: https://www.nber.org/papers/w14808

National Bureau of Statistics. (2020). Nigerian Living Standard Survey Report 2020. National Bureau of Statistics.

Nigerian Communications Commission. (2021). Communications Sector: Quarterly Report Q4 2021. Nigerian Communications Commission.

Nigerian Electricity Regulatory Commission. (2021). 2020 Annual Report and Statement of Accounts. Nigerian Electricity Regulatory Commission.

Ntiamoah, E.B., Opoku, B., Abrokwah, E., Baah-Frimpong, G. and AGYEI-Sakkyi, M. (2014). Assessing the contributions of small and Medium sized enterprises to Ghana economic growth. *International Journal of Economics and Commerce and Management*, 2(11)

OECD. (2005). Improving Financial Literacy: Analysis of Issues and Policies. OECD Publishing.

OECD. (2015). OECD/INFE International Survey of Adult Financial Literacy Competencies. OECD Publishing. https://doi.org/10.1787/978926423299 5-en

Organisation for Economic Co-operation and Development (OECD). (2005). Improving Financial Literacy: Analysis of Issues and Policies. OECD Publishing.

Organisation for Economic Co-operation and Development (OECD). (2015). OECD/INFE International Survey of Adult Financial Literacy Competencies. OECD Publishing. https://doi.org /10.1787/9789264232995-en

Organisation for Economic Co-operation and Development (OECD). (2005). Improving Financial Literacy: Analysis of Issues and Policies. OECD Publishing.

Organisation for Economic Co-operation and Development (OECD). (2015). OECD/INFE International Survey of Adult Financial Literacy Competencies. OECD Publishing. https://doi.org/ 10.1787/9789264232995-en

Ouma, D. O., & Odongo, T. M. (2018). The Impact of Financial Literacy on Profitability of Small and Medium Enterprises in Kenya. *Journal of Accounting and Finance*, 18(5), 114-124.

Robb, C. A., & Robinson, D. T. (2012). The capital structure decisions of new firms. Review of Financial Studies, 25(2), 341-374.

Samson Adewumi (20212). Financial Literature and business risk-taking among business startup students in Nigeria. *Journal of problems and perspectives in Manageemnt*.20 (2): 575-587

Securities and Exchange Commission Nigeria. (2011). Code of Corporate Governance for Public Companies in Nigeria. Securities and Exchange Commission Nigeria.

Shim, J. K., Siegel, J. G., & Dauber, N. A. (2009). Financial management. Barron's Educational Series.

Small and Medium Enterprises Development Agency of Nigeria. (2020). SMEDAN Annual Report 2020. SMEDAN.

World Bank. (2020). Doing Business 2020: Comparing Business Regulation in 190 Economies. World Bank Group.

TAX INCENTIVES AND FINANCIAL PERFORMANCE OF LISTED AGRIBUSINESS IN NIGERIA

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ABSTRACT
This study investigated the relationship between tax incentives and financial performance of selected Agro-allied manufacturing businesses in Nigeria. The study adopted the ex-post facto research design and used secondary data and analyzed the data with the aid of regression analysis through, the statistical package for social science (SPSS). The study found that capital allowance has a negative but insignificant relationship with net profit margin; capital allowance has a positive but insignificant relationship with return on equity. This study recommended among others, that investment allowance should be increased for the agro-allied sector for it to have more impact on the sector and all agro-allied companies in Nigeria should be conducted in compliance with applicable laws, regulations, supervisory requirements, and procedures governing capital allowance administration as this may lead to better utilization of the capital allowance provided for it to have a desired impact on the net profit margin. In conclusion, it is without any form of doubt that granting tax incentives to companies in the agro-allied sector is expensive on the part of government.

Key Word: Financial Performance, Tax Incentive, Capital Allowance, Investment Credit

1.0 INTRODUCTION

Taxes collected by government are used to run the affairs of the country which in turn contributes to the economic growth of the country. The Nigerian economic system comprises both the public and private sectors, and since most of the tax revenues collected by the Federal Government of Nigeria are from the private sector, the private sector needs to grow more to ensure continuity of operations which facilitates economic growth. The Government therefore has introduced some incentives to manufacturing businesses to encourage them to ensure their continuous participation in the growth of the economy. Among the incentives provided by the Government is tax incentives granted to manufacturing companies in Nigeria. In view of promoting indigenous investment in Nigeria, tax incentives were put in place to encourage the growth of local manufacturing industries, which will in turn reduce the amount of imported goods. Since 1949, there have been fiscal tax incentives in Nigeria, and they are still widely used in government today (Fowowe, 2013).

According to Ndajiwo (2016), in recent times, there seems to be a move towards finding a middle ground between the proponents of tax incentives, usually the organized business sector and the opponents, the civil society organizations and campaigners. A contentious debate regarding the importance of tax incentives in driving Nigeria's growth took place in March 2018 at a summit of civil society organizations organized by Action Aid Nigeria. Representatives from the organized private sector and the Federal Inland Revenue Service (FIRS) were present despite the meeting's emphasis on the third sector. The meeting's objectives included determining how stakeholders felt about tax incentive concerns, discussing and reaching consensus on a number of topics, and setting a course for future action. Because tax incentives are intended to encourage investment in certain sectors or geographical areas, they are provided with conditions attached. As the United Nations Conference on Trade and Development, (UNCTAD, 2000) noted, very often countries design special incentives regimes which concern tax benefits as well as key restrictions. For instance, these regimes may require that a facility be established in a certain region(s), have a certain turnover, require the transfer of technology from abroad or employ a certain number of individuals.

Statement of the Problem

Good financial performance is the key to the sustenance of a business entity, and a desirable attribute of any organization. It brings about increase in shareholders' wealth, as well as stability and survival of any business. In the same manner, good financial performance indicates the tax liability of companies because the higher the financial performance of a business, the higher its tax liability. In view of this, the incentives that the government gives to companies in relation to tax can affect the financial performance of companies, including the agro-allied sector; this is given the position the agro-allied industry now has in the Nigerian economy. Notwithstanding the relative importance of tax incentives on the financial performance of companies, there are still some contending issues facing tax incentives. One of such challenges is that several companies tend to take advantage of loopholes in tax administration to either avoid or evade payment of tax out rightly.

With respect to tax incentives and financial performance, there have been several studies conducted by researchers and authors alike with the likes of Agundu and Ohaka (2013), Nwanyanwu (2018), Olowo, et al. (2020), Omesi and Maccarthy (2022). However, to the best of the knowledge of this researcher, no attention has been given to the agro-allied manufacturing companies in recent times to cover between 2014 to 2021. Therefore, this study is conducted to cover the knowledge gap created due to the time gap in the agro-allied manufacturing sector. It is on this basis that hypotheses are formulated and expressed.

Objectives of the Study

The aim of this study is to evaluate the relationship between tax incentives and financial performance of listed agro-allied manufacturing companies in Nigeria. Specific objectives are to:

i. determine the relationship between Nigerian agro-allied industrial businesses' capital allowance and net profit margin.
ii. determine the relationship between Nigerian agro-allied industrial enterprises' capital allowance and return on equity.
iii. investigate the relationship between Nigerian agro-allied industrial businesses' investment tax credits and net profit margin.
iv. investigate the relationship between investment tax credits and agro-allied manufacturing enterprises in Nigeria's return on equity.

Research Questions

This work will provide answers to the following questions:

i. What is the relationship between capital allowance and the net profit margin of listed agro-allied manufacturing companies in Nigeria?
ii. What is the relationship between capital allowance and the return on equity of listed agro-allied manufacturing companies in Nigeria?
iii. What is the relationship between investment tax credit and net profit margin of listed agro-allied manufacturing companies in Nigeria?
iv. What is the relationship between investment tax credit and return on equity of listed agro-allied manufacturing companies in Nigeria?

2.0 REVIEW OF RELATED LITERATURE

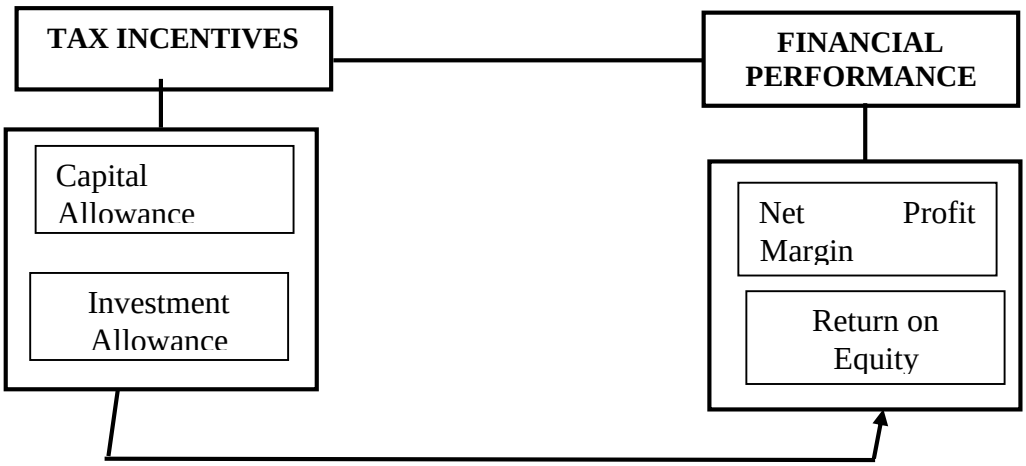
2.1 Conceptual Review

Concept of Tax Incentives

Tax incentives has been defined by various authors and scholars. According to Philip (2015), it can be described as deliberate reduction in tax liability granted by government in order to encourage particular economic units. (e.g., corporate entities to behave in certain desired ways, such as investing more, producing more, employing more, exporting more, saving more, conserving less, polluting less, and so forth). Tax incentives were defined by Okauru (2019) and Aguolu (2019) as an exemption or relief given to a person or a business to lessen the impact of taxation and so promote savings and investment. Well and Allen (2021) conclude that experience strongly suggests that fiscal investment incentives are popular in developing countries yet they have not been effective in making up for fundamental weaknesses in the investment climate. The conceptual framework of the relationship between tax incentives and financial performance is presented in Fig. 2.1

Conceptual Framework

Fig. 2.1: Conceptual framework of the relationship between financial performance and tax incentive
(Sources: Philip (2018, in Omesi and Maccarthy, 2022).



Forms of Tax Incentives

Capital Allowance

Simply put, capital allowance is a way of reducing tax bill of a person that spent money on certain item used to benefit his business in the long term. The money incurred in procuring the item is termed "qualifying expenditure" (Philip, 2015). Capital allowance is also described as a scheme of allowing a company to tax relief in respect of certain capital expenditures by allowing them to be expensed against the business annual assessable profits (Okauru, 2019). Technically, capital allowance is a form of tax relief granted by the relevant tax authority in accordance to the extant tax laws to a person for incurring a qualifying expenditure on a certain asset used for the purpose of trade

or business carried on by it in producing income in the basis period for which that asset was used (Olowo, et al., 2020).

Investment Allowance

Olowo, et al. (2020) reckon that investment allowance is granted on qualifying capital expenditure that is incurred on plant and equipment for the purpose of the business. This incentive comes once a year for the first utilization of such a qualifying capital asset. The rate is 10% of the cost claimable on plant and equipment utilized for agricultural and manufacturing businesses. Kiabel and Nwikpasi (2019) opine that investment allowance is granted on qualifying capital expenditure incurred on new assets on or after 1st of April 1969, an investment allowance of 10% is granted to companies into agricultural and manufacturing businesses only and it is given once in the life of an asset and not also deductible in determining the tax written down value of an asset. Ariwodola (2015) optically states that an investment allowance is granted in the first year of purchase of that asset (plant and/or machinery) engaged in agricultural and manufacturing activities, which is in integration with the customary initial and annual allowances.

Financial Performance

There are several ways to gauge a company's effectiveness, but they should all be combined. Along with total unit sales, line items like operating income, operational revenue, or cash flow from operations might be included (Njeru, 2012). The profitability of an organization may be measured quantitatively using terms like gross margin, net margin, return on sales, return on equity economic value added, return on equity less cost of equity, and return on capital utilized. Other performance indicators include cash flow metrics like free cash flow over sales and growth indicators like historically growing revenue (Agundu & Ohaka, 2013).

Traditionally, financial performance can be measured in many different ratios such as profitability ratios which are financial measures of a company's capacity to create revenue in relation to sales, costs, assets, and equity over a certain time span; liquidity ratios which tell a company about its ability to meet its short-term financial obligations; efficiency ratios which tell management how well they are, using its business assets; financial leverage or gearing ratios which tell a firm how sustainable its exposure to long-term debt is; and other investors ratios (Nwanyanwu, 2018).

Net Profit Margin

Nwanyanwu (2018) points out that net profit is that profit which is generated from all phases of the business, including interest and taxes. This is the bottom line that attracts most of the attentions in discussions of a company's' profitability. The net profit margin or net margin, compares net income to sales, a consistently high net margin is often a strong indication that a company has been enjoying one or more competitive advantages.

Additionally, a high net margin provides a company with a cushion during unanticipated downturns in its business. Anwaar (2016) describes net profit margin or net profits ratios as the percentage of post-tax and interest profits to sales. It shows how much of the earnings by the company are translated into profits. According to Wilkinson (2013), net profit margin, also known as net margin, is the ratio of net income to total sales that a firm generates. A corporation is more effective at converting sales into actual profit if its net profit margin is larger.

Return on Equity

Tyson and Schell (2018) state that return on equity (ROE) is a percentage determined by dividing profit to equity. i.e., pretax profits from the profits and loss statement and equity or net worth from statement of financial position. Tracy (2018) opines that ROE ratio tells us how much profit a business earned in comparison to the book value of its shareholders' equity. It is useful especially for privately owned business, which is hard to determine the market value of owners' equity.

Theoretical Framework

Agency Theory

The agency theory was first developed by Berle and Means (1932), and then expounded by Jensen and Meckling (1976) and is characterized through the conflict of interest between the principal (owners) and agents (managers), known as an 'agency problem'. The relationship arises whenever the principal gives control and/or decision-making authority to the agent. Simply, put the agency theory deals with the operational relationship existing between one party, the principal, who delegates work to another party referred to as an agent. The work of Berle and Means (1932), Prias (1976) and Ross (1973) discussed the extent to which there was a dispersion of shareholding, which consequently led to the separation of ownership and control. In discussing the theory further, Jensen and Meckling (1976) stated that the managers of the company are the agents and the shareholders as the principal.

In other words, the directors, who serve as the shareholders' agents, receive daily decision-making authority from the shareholder who serves as the company's owner or principle. The agent is expected to make decisions that will maximize the wealth of the principal, and the act in the best interests of the principal (Solomon, 2004).

Stakeholder Theory

This theory was first described by Dr. Edward Freeman (1984). It contends that investors are only one among a number of stakeholders in a corporation, according to a professor at the University of Virginia. The stakeholder ecosystem, involves any one invested and involved in, or

affected by, the company; employees, vendors, governmental agencies, and more.

The stakeholder theory is the anchor theory of this research. It applies to this research because it focuses on what the government, as stakeholder, does to affect the financial outcomes of companies in the agro-allied sector in Nigeria.

2.2 Empirical Review

Amendola et al (2018) investigated the impact of tax incentives on firm performance in Dominican Republic. The analysis of the data was based on panel data for the period often years from 2006 to 2015 of manufacturing firms in Dominican Republic. The study used both random and fixed effects estimation methods to find out the relationship between tax incentives and firm performance. The findings of the study showed that tax exemptions have a direct effect in firm performance. The study also revealed that firms located in special economic zones were receiving special treatment on tax and they ended up performing better in comparison to other firms in other areas. The study revealed a clear statistical correlation between tax incentives and firm performance. The study recommended that in order to encourage a level playing ground tax incentives should be reduced or totally eliminated.

Philip (2018) examined the impact tax incentives have on the Nigerian manufacturing sector growth as a veritable tool in the hands of the government. Investment allowance and pioneer status were used to gauge tax advantages, while Return on Capital Employed (ROCE) measured manufacturing firms' performance. The study employed secondary data and cross-sectional data analysis. The method of analysis adopted was Ordinary Least Square regression technique. The empirical results based on 2016 tax data obtained for 15 quoted manufacturing firms in Nigeria lend support to the objective of the study. The study revealed that investment allowance has a positive significant effect on the ROCE of manufacturing companies. The study recommended that Nigerian businesses receive higher tax breaks in order to draw capital into the industry.

A research on the impact of tax incentives on the financial performance of construction enterprises in Malaysia was undertaken by Iliyas et al. in (2019). The study was carried out in a sample of 138 firms where secondary data was collected for the year 2015 to 2017.The study adopted Ex Post Facto Research Design and ordinary least square estimation and regression analysis was used for the data analysis. The findings of the study indicated that there was no significant difference in the financial performance between the firms which engage in construction of green buildings and the ones which do not.

Omesi and Maccarthy (2022) investigated on tax incentives and financial results of Nigerian firms that manufacture consumer items listed on. The research adopted ex-post facto design. The population for this study was twenty-one (21) listed consumer goods companies in Nigerian Stock Exchange and a sample size of twenty listed consumer goods companies. The instrument of the study was secondary data obtained from the company's published financial report or statements within the period of eleven (11) years, ranging from 2009-2019.The study's findings showed that listed Nigerian consumer goods manufacturing businesses' return on assets and investment allowance had a positive and substantial link. The study recommended that to continually maintain high return on assets of consumer goods manufacturing industry and foster economic development, the tax authority should consider proportionately increase of annual allowances if the period for a year of assessment happens to be a period of more than one year. This will attract more investors thereby improving the economic growth of the country.

3.0 METHODOLOGY

This research adopted ex-post facto research design. The population for this study was five (5) listed agro-allied manufacturing firms on the floors of Nigeria Exchange Group (NGX) which include: Indorama Fertilizers, Dangote Group, Seedco Nigeria Ltd, Bua Group and Agromallas at 2022 and have consistently submitted their annual reports to the NGX from 2017-2021. This population size equally represented the sample size. The study used secondary data instrument, and data were analyzed using the various data analysis model such as descriptive analysis and regression analysis, which enabled the researcher present the data in a more meaningful way. The analysis for the distribution for the variables examined the manifestations and distribution of each variable.

3.1 Data analysis

Data were analyzed by means of descriptive statistics; where by minimum, maximum, mean and standard deviation were analyzed. The results are presented in Table 3.1

Table 3.1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
NPM	8	11.51	61.82	25.7259	16.03460
ROE	8	9.61	35.66	19.0020	9.95425
CAL	8	918608711.00	3583304430.00	1773374771.2500	959631077.91769
TXH	8	204094500.00	2190414900.00	801478100.0000	660590316.38557
1NA	8	117910230.00	565784910.00	271449335.5000	159428467.19341
ValidN(listwise)					

Source: Researcher's analysis, 2022

The Table3.1 above reveals that the values for the dependent variables are much smaller than those of the independent variables. Hence there is a need to convert the independent variables to log 10 in order to unify the values before proceeding with the analyses as shown in Table 3.2 below.

Table 3.2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
NPM		11.51	61.82	25.7259	16.03460
ROE	8	9.61	35.66	19.0020	9.95425
Log10CAL	8	8.96	9.55	9.1986	.21773
Log10TXH	8	8.31	9.34	8.7805	.35187
Log10INA	8	8.07	8.75	8.3718	.24471
Valid N (listwise)	8				

Source: Researcher's analysis, 2022

From the above results, the variance inflation factor results are low for all the predictor variables. The tolerance level is high, close to 1.0. High tolerance level and low variable inflation factor make it clear that there is No high collinearity among the predictor variables.

Having passed the diagnostic tests, below are the discussions of the research findings.

Regression Analysis

HO_1: There is no significant relationship between capital allowance and net profit margin of listed agribusinesses in Nigeria.

Table 3.3a: Model Summary on the relationship between capital allowance and net profit margin of listed agribusinesses in Nigeria.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.251[a]	.063	.093	16.76324

a. Predictors: (Constant), Capital allowance

Source: Field Data, 2022

Table 3.3b: ANOVA[a] on the relationship between capital allowance and net profit margin of listed agribusinesses in Nigeria.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	445.611	1	455.611	10.781	.017[b]
	Residual	41.222	27	.871		
	Total	486.833	28			

a. Dependent Variable: Net profit margin

b. Predictors: (Constant), Capital allowance

Source: Field Data, 2022

Table 3.3c: Coefficients on the relationship between capital allowance and net profit margin of listed agribusinesses in Nigeria.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-190.657	63.894		-2.984	.025
Capital allowance	23.814	7.253	.802	3.283	.017

a. Dependent Variable: Net profit margin

Source: Field Data, 2022

Table 4.3b (ANOVA) and Table 4.3c (Coefficient) reveal that the p-value level as 0.017 which is <0.05 significant level. This shows that capital allowance has a significant positive relationship of 0.802 with net profit margin of listed agribusiness in Nigeria. Therefore, we reject the null hypothesis.

HO_2: There is no significant relationship between capital allowance and return on equity of listed agribusinesses in Nigeria.

Table 3.4a: Model Summary on the relationship between capital allowance and return on equity of listed agribusinesses in Nigeria.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.251[a]	.063	.093	16.76324

a. Predictors: (Constant), Capital allowance

Source: Field Data, 2022

The R-value in Table 3.5a (Model summary) is the correlation between the observed and predicted value of the dependent variable and indicates the proportion of variance in the dependent variable (return on equity) which can be predicted by capital allowance. R-Square was found to be 0.063, this value indicates that 6.3% of the variance in the return on equity can be predicted by capital allowance. Therefore, we accept the null hypothesis as there is no significant relationship between capital allowance and return on equity of listed agribusinesses in Nigeria.

HO_3: There is no significant relationship between investment allowance and net profit margin of listed agribusinesses in Nigeria.

Table 3.5a: Model Summary on the relationship between investment allowance and net profit margin of listed agribusinesses in Nigeria.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.251[a]	0.063	0.093	16.76324

a. Predictors: (Constant), Investment allowance

Source: Field Data, 2022

Table 3.5a (Model summary) shows the R square value which is 0.251. This value indicates that the 6.3% of the variable in return on equity can be predicted by investment allowance. This is way too insignificant.

Table 3.5b: ANOVA[a] on the relationship between investment allowance and net profit margin of listed agribusinesses in Nigeria.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	113.722	1	113.722	.405	.548[b]
	Residual	1686.037	6	281.006		
	Total	1799.758	7			

a. Dependent Variable: Net Profit margin

b. Predictors: (Constant), Investment allowance

Source: Field Data, 2022

Table 3.5c: Coefficients[a] on the relationship between investment allowance and net profit margin of listed agribusinesses in Nigeria.

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	163.620	216.843		.755	.479
	Investment allowance	-16.471	25.892	-.251	-.636	.548

a. Dependent Variable: Net profit margin

Source: Field Data, 2022

Table 3.5b (ANOVA) and Table 3.5c (Coefficient) reveal that the p-value level as 0.548 which is >0.05 significant level. Since this research used a 1-tailed test, we divide the 2-tailed result 0.548 by 2 which is 0 .274. This is still higher than the acceptable significant level of 0.05. This show that investment allowance has no significant impact on Net profit margin. Therefore, we accept the null hypothesis.

HO_4: There is no significant relationship between investment allowance and return on equity of listed agribusinesses in Nigeria.

Table 3.6a: Model Summary on the relationship between investment allowance and return on equity of listed agribusinesses in Nigeria.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.055[a]	0.003	-0.163	10.73574

a. Predictors: (Constant), Investment allowance

Source: Field Data, 2022

Table 3.6a (Model summary) shows the R square value which is 0.003. This value indicates that the 0.03% of the variable in return on equity can be predicted by investment allowance.

Table 3.6b: ANOVA[a] on the relationship between investment allowance and return on equity of listed agribusinesses in Nigeria.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.073	1	2.073	.018	.898[b]
	Residual	691.537	6	.256		
	Total	693.610	7			

a. Dependent Variable: Return on equity

b. Predictors: (Constant), Investment allowance

Source: Field Data, 2022

Table 3.6c: Coefficients[a] on the relationship between investment allowance and return on equity of listed agribusinesses in Nigeria.

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.383	138.874		.003	.998
	Investment allowance	2.224	16.582	.055	.134	.898

a. Dependent Variable: Return on equity

Source: Field Data, 2022

Table 3.6b (ANOVA) and Table 4.6c (Coefficient) reveal that the p-value level as 0.898 which is >0.05 significant level. Since this research used a 2-tailed test, we divide the 2-tailed result 0.898 by 2 which is 0.449. This is still higher than the acceptable significant level of 0.05. This show that investment allowance has no significant impact on return on equity. Therefore, we accept the null hypothesis.

3.2 Discussion of Findings

With respect to hypothesis one, the R value of-0.027 indicates a negative relationship. This indicates that there is a negative but insignificant relationship between capital allowance and net profit margin of listed agro-allied companies in Nigeria. Therefore, we accept the null hypothesis. This finding corroborates the findings of Abdulrahman and Kabir (2017) that the tax incentives granted do not significantly affect profitability as they were not sufficient enough to sustain the desired development for which they were granted.

The result of analysis relating to hypothesis two shows R value to be 0.246. This indicates a positive relationship; hence there is relationship between capital allowance and return on equity of listed agro-allied companies in Nigeria.

In respect of hypothesis three, the result of the R value of -0.251 indicates a negative relationship. This indicates that there is no significant relationship between investment allowance and net profit margin of listed agro-allied companies in Nigeria.

With respect to hypothesis four, the result of the R value of 0.555 indicates a positive relationship. Therefore, it is concluded that there is a positive but insignificant relationship between investment allowance and return on equity of listed agro-allied business in Nigeria.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

This research work centered on the measure of tax incentives which are capital allowance and investment allowance. Net profit margin and return on equity serve as stand-ins for financial profitability. Tax incentives have a considerable positive link with the financial success of specific economic sectors, according to some of the empirical research addressed here. Agro-allied sector plays a major role in the development of most African countries. Thus, inadequate attention paid to the agro-allied sector can hurt the economy of any given country. The government reduces tax rates and offers different tax incentives to encourage investments and economic activity that boosts capacity for production and propels economic growth.

4.2 Recommendations

On the basis of the findings of this study, the following recommendations are hereby made.

Companies in the agro-allied businesses need to carefully manage the savings from capital allowance in productive activities as these have not yet proved impactful on their return on investment.

The government should increase investment allowance for agro-allied companies as this has shown no significant relationship with net profit margin and overall financial performance of the agro-allied companies in Nigeria, or remove other factors that hinder the intended goals of the generous incentives in order to achieve the desired goals.

Investment allowance can be carefully monitored to find out other factors that have been militating against its success since it has shown no statistical relationship with return on equity of the agro-allied companies in Nigeria. Otherwise, it will be another method of starving the government of much-needed funds.

REFERENCES

Abdulrahman, S. & Kabir, M. K. (2017). Tax incentive as a real modifier for industrial growth and development in Nigeria. *International Journal of Development Strategies in Humanities, Management and Social Sciences*, 7(1), 72-88.

Adamu, S. (2014). The impact of tax incentives on economic growth and industrial development in Nigeria. *International Journal of Advanced studies in Economics and Public Sector Management*, *2*(1), 13-24.

Amendola, I. A., Boccia, M., Mele, G., & Sensini, L. (2018). Fiscal tax incentives and firm performance: Evidence from the Dominican Republic. *IMF Policy research working paper* No 8382.

Adefeso, H. A. (2018). Government Tax Policy and Performance of Listed Manufacturing Firms in Nigeria: Evidence from dynamic panel data model. *Zagreb International Review of Economics and Business*, *27*(1), 1-15.

Adegbie, F. F., & Fakile, A. S. (2011). Company income tax and Nigeria economic development. *European Journal of Social Sciences*, *22*(2);309-319.

Adelegan, H. & Jansen, S. (2010). Financial inclusion and financial stability: Current policy issues. *International Finance Review*, *5*(4), 35-52.

Agundu, P. & Ohaka, J. (2013). Capital allowance: captivating nuance of investment incentives in the Nigerian manufacturing sector. *Journal of Financial Management and Analysis*, *26*(2), 26-32.

Iliyas, A. S., Hamid, N. A. & Sanusi, S. (2019). Tax incentives for Green Industries: Determinants of performance between Green Building Index (GBI) and Non-Green Building Index Firms in Malaysia.

Ohak, J. & Agundu, P. (2013). Tax incentives: Using tax incentives to attract foreign direct investment. *The World Bank Group. Journal of Business Management, 2*(5), 65-88.

Oluwole, O. S., Adekunle, A. R. & Olusola, A. A. (2020). Effect of tax incentives on the growth and development of manufacturing firms in Nigeria. *African Journal of Accounting and Financial Research, 3(*1) 77-84.

Omesi, I. & Maccarthy, M. I. (2022). Tax incentives and financial performance of listed consumer goods manufacturing companies in Nigeria. *International Journal of Management, Accounting and Human Development, 11*(1). https://bwjournal.org/index.php/bsjournal/article/view/149/125

Philip, G. T. (2018). Tax incentives and the growth of Nigerian manufacturing sector. *SAU Journal for Management and Social Sciences, 3*(1&2), 71-97.

Timah, B. P. & Chukwu, G. J. (2021). Tax incentives influence on corporate earnings: Evidence from Quoted Manufacturing Companies in Nigeria. *Archives of Business Research, 9*(1). 182-194. http://dx.doi.org/10.14738/abr.91.9665.

Tunji, S., Adedeji, B., Adegbie, F. F. & Rahman, N. (2017) Tax incentives and industrial/economic growth of sub-Saharan African States. *Journal of Advanced Research in Business and Management S*

THE RE-PRESENTATION OF MODERN AFRICAN POETRY AND ITS IMPACT ON POST-COLONIAL NIGERIAN SOCIETY

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Abstract
This paper examines re-presentation of modern African poetry and its impact on post-colonial Nigerian society. The aim of this research is to study the re-presentation of modern African poetry and its impact on post-colonial Nigerian society. The study uses post-colonial literary theory as its theoretical framework to examine the effects of colonialism in contemporary Nigerian society, the limitations of critical literature on the subject of modern African poetry in post-colonial Nigerian society. The study asserts that modern African poetry reflects African experiences and concerns. It is poetry of and from the Africa continent. The study identifies two features that describe modern African poetry in post-colonial Nigerian society. They are master-slave dialectic and ethnicity. This idea of master-slave dialectic in modern African poetry reveals the relationship between African leaders and the masses in post-colonial Nigerian society. Also, the paper affirms that the concept of ethnicity classifies the historical, social-cultural and political systems which help to represent a cultural uniqueness of the modern African poetry.

Keywords: master-slave dialectic, ethnicity, colonialism, Nigeria

1.0 INTRODUCTION

1.1 Background of the Study

African poetry started as oral recitations and performances in pre-colonial African societies. Examples were children's songs, love songs, narrative epic, occupational verse, ritual verse, praise poems to rulers and other prominent people in the society. The poetry was chanted during traditional ceremonies and was not acknowledged in written form because it was intended for the whole community rather than for a few individuals. Also, there was "a thin line between poets and musicians, who composed and rendered poetry in musical form. Poets then published their works in form of renditions at funerals and marriage ceremonies, with themes focused on praising virtues and condemning vices in society" (Anthony, 2011, p. 12).

The colonial era saw the birth of modern African poetry. The period witnessed the presentation of African poems by Africans in European languages. Modern African poetry is the sum total of poetic configuration of African source written in European languages with the essential purpose of apprehending the social experiences of post-independence African societies. Thus, modern African poetry refers to poetry of and from Africa. It is the poetry written by Africans reflecting African themes and concerns. It was conceived to appease the human mind, emotion, opinion, intention, view, experience and prediction among other things present in Africa. In this respect, modern African poets explore subject matters that are unique to the understanding of the African experience. Thus, the poetry deals with mystical, social and political concerns found in the African consciousness.

Modern African poetry developed from the colonial period to the post-independence period of Africa. Also, most critics see modern African poetry as a protest poetry. However, this paper examines modern African poetry in post-colonial Nigerian society from a new perspective in such a way that it answers the various questions of post-colonial literary theory regarding master-slave dialectic and ethnicity. The research studies selected poetry volumes of four modern African poets from Nigeria. They are Niyi Osundare, Ezenwa Ohaeto, G 'Ebinyo Ogbowei and Barine Ngaage.

1.2 Statement of the Problem

Studies on modern African poetry in post-colonial Nigerian societies always focused on other issues. Also, a substantial feature of those who study modern African poetry in post-colonial Nigerian society have not considered the master-slave dialectic and ethnicity as major themes in the rendition of this poetry. Therefore, this study examines these issues in line with the principles of post-colonial literary theory.

1.3 Aim and Objectives

The aim of this research is to study the re-presentation of modern African poetry and its impact on post-colonial Nigerian society. To fulfil the aim of this study the specific objectives are to:

a) examine the master-slave dialectic and ethnicity as features that describe the modern African poetry in contemporary Nigerian experience;
b) show the limitations of critical literature on the modern African poetry which has generally underestimated the literary re-presentational strategies of the poems under study in their different presentations of the contemporary cultural, socio-political and economic realities in Nigeria.

1.4 Research Questions

This research seeks to address the following questions:

a) What is the connection between modern African poetry and the post-colonial Nigerian society?

b) How does modern African poetry influence the cultural and socio-political development of Nigeria?.

1.5 Significance of the Study

The scope of modern African poetry in post-colonial Nigerian society connects the complex gap between the struggle for dignity during the early periods of political independence to the more complex political and socio-economic challenges of the present. This has led modern African poets to turn their gaze to the present and thus raise issues about the subject of master-slave dialectic and ethnicity. Hence, this research is significant, primarily because it addresses these issues. This study offers yet another understanding of modern African poetry in post-colonial Nigerian society and how it will contribute to the re-presentation of African literature. It will answer questions about the manner of re-presentation in poetry, and the changing aspects in the relationship between contemporary Nigerian societies and modern African poetry.

2.0 LITERATURE REVIEW

2.1 Conceptual review

2.1.1 Master-Slave Dialectic

This concept was inherited from colonialism. The German philosopher, Georg Wilhelm Friedrich Hegel described this notion of "Master-Slave dialectic" when he states that "self-consciousness exists in all for itself when, and by the fact that, it exists for another" (Hegel, 2018, p. III). For example, during colonial rule in Africa, most natives in African desired endurance to morality by decreasing their position to slavery because of their fear of the colonial masters. This connection has created the concept of "Slave and Master" in opposition. The slave was the African native, while the master was the European settler and "the look that the native turns on the settler is a look of lust" (Fanon, 2021, p.32). The native wanted to be like the European settlers. The result of this relationship was racial discrimination because the European settler sees the native as an inferior human being during colonialism. This idea of slave and master contention later influenced the political perception of most post-independence African leaders. After gaining political power, most political elites disassociate themselves from the masses. They see the masses as slaves and not fellow citizens of their commonwealth.

2.1.2 The Idea of Ethnicity

Modern African poetry reveals the awareness of ethnicity in literature. Ethnicity denotes "the combination of social prototypes of a particular ethnic group. Examples of such prototypes are norms, beliefs, values and behaviours" (Igbe, 2015, p. 303). The concept of ethnicity explains socio-cultural alterations and patterns rather than the overviews of race with its supposition of humankind divided into static, hereditarily determined genetic categories (Ashcroft et al 2013). The concept helps to create the socio-cultural uniqueness of modern African poetry in post-colonial Nigerian society.

2.2 Theoretical Framework

Post-Colonial Literary Theory

The theoretical framework adopted for this study is post-colonial literary theory. This literary theory deals with literature written in countries that were once colonies of France, Spain, Portugal, Belgium and Britain. Postcolonial literary theory covers a wide range of texts that criticize the idea of colonialism. Also, it pays attentions to the question of colonialism and reveals how "the optic of race enables the colonial powers to represent, reflect, refract and make visible native cultures in inferior ways … [It is an] intellectual discourse that analyses, explain and respond to the cultural legacies of colonialism and imperialism" (Amina, 2019, p. 698).

This is because colonialism reveals the relations of domination and submission which turn the indigenous people into instruments of production for the colonizing nations. The theory examines socio-cultural norms that address the disputes surrounding the colonial encounter between the West and other parts of the world. The awareness of post-colonial literary theory in the third world nations begin with the incapability of the European system to deal with the cultural challenges of post-colonial writing (Ashcroft et al., 2013). The theory examines the involvement of western cultures in their approaches and principles of expansion overseas. According to Mushtag et al. (2018) postcolonial literary theory:

> … is a significant field of literary studies that refers to the study of the literary, social and cultural heritage of colonial and imperial powers and focuses on the impact of hegemonic control and exploitation of the people who were colonized … The term refers to the representation of racial, cultural, ethnic, social and human identity in modern history, when a number of geographical entities got their independence from colonial rule (p. 207).

Post-colonial theory studies the use of power by colonizing nations over the colonized people's values and their definition of the Self during colonialism. Thus, post-colonial literary theory deals with literature written in colonized countries by their citizens who try to articulate their identity and reclaim their past. An example is the modern African poetry in post-colonial Nigerian society. The study examines the concepts of master-slave dialectic

and ethnicity in line with the premises of post-colonial literary theory.

2.3 Empirical Framework

Nearly all African cultures, at diverse times, came under the oppressive rule of European colonialism. This collective colonial experience has a great influence on the discussion of modern African poetry, especially in the post-colonial Nigerian environment. Thus, modern African poetry has received different degrees of critical attention from literary critics since its inception. A significant feature of most of the critical positions of these critics is that while they adopt different approaches to interpret modern African poetry in post-colonial Nigerian society, they did not show that African poetry employs master-slave dialectic, ethnicity, hybridity and feminism in its rendition. Therefore, the purpose of this section is to review some of the critical works on modern African poetry.

Chinweizu et al. (1980) divides modern African poetry in post-colonial societies into three groups. The first group is "the euromodernists who have assiduously aped the practices of 20th century European modernist poetry. These include Wole Soyinka. J. P. Clark, and the Christopher Okigbo" (p. 163). They came into prominence between 1957-1967 and have been faulted on their deliberate use of European imageries in African poetry. For example, "J. P. Clack speaks of Io (Greek mythology) in "Cry of Birth," and of Jean of Arc (medieval France) in "Olumo," instead of using "an outcast or a woman of stubborn heart in indigenous African mythology or history?" (p. 168). Another example of "the euromodernist" rendition of African poetry is Michael Echeruo's "Ure Igne". Below are some lines of the poem:

> Storms rage; fire consume
> and after (so they say),
> all shall be restored in the Lord,
> all shall be forgiven by the Lord.
> (Chinweizu et al., 1980, p. 168).

For Chinweizu et al., the poem above "tends to give legitimacy to … alien religious rites" (p. 169). This is because the European modernist "poets compound the problem of meaning by insisting on importing imagery from alien [European] environments and sometimes shamefacedly apologizing for doing so" (Chinweizu et al., 1980, p. 168). However, "the traditionalist" (the second group) "sought to model their English-language poetry on elements from traditional African poetry. These include Mazisi Kunene, Kofi Awoonor, Okot p'Bitek, and the later Okigbo," and the third group, "a miscellany of individual voices of the middle ground who, unlike the euromodernists or the traditionalists, share no strongly distinguishing characteristics" (Chinweizu et al., 1980, p. 163). Their examples of poets in this group are Lenrie Peters, Gabriel Okara and Dennis Brutus. Thus, the review of Chinweizu et al., is largely centred on the periods in the development of African poetry in post-colonial societies and the use of language in the different periods.

Ojaide (1995) sees modern African poetry in post-colonial African societies as a deliberate reaction against the earlier presentation of modern African poetry, especially the poetry of Christopher Okigbo, Wole Soyinka and J. P. Clark. This new trend in modern African poetry started in the 1970s. According to Ojaide, "while one can fairly point out the influences of Eliot and Pound on Okigbo and Hopkins on Clark as well as the Shakespeareanism on Soyinka, most poems written since about 1973 seem to have shed foreign influences" (Ojaide, 1995, p. 6). Ojaide sees himself as an example of poets in this new trend in African poetry. Others are Afam Akeh, Niyi Osundare, Tijah M. Sallah, Jack Mapanje, etcetera. Furthermore, he writes that African poetry in post-colonial societies:

> … emanates from the dare economic predicament of most African countries, which has exposed more than before the intolerable gap between the rich and the poor, the haves and the have-nots […] The poets are now using their art as a means of attempting to reverse the negative socio-economic order in their societies so that economic equality and justice will prevail … [it is] a strong commitment towards socio-economic change for the benefit of the generality of the people. It is a poetry whose function is geared towards socio-economic liberation (Ojaide, 1995, p. 7).

For Ojaide, the concept of modern African poetry in the post-colonial African societies seeks to put a check on the wasteful practice and mismanagement of the economy by the political leaders. The poetry is also presented against dictatorship in Africa and hope for the masses. This is because the poetry is a reflection of the contemporary Nigerian reality. Ojaide's illustration is from his poem, "The Fate of the Vultures". Thus, the poem reads:

> The Chief and his council, a flukes
> gamboling in the veins of fortune.
> Range chickens, they consume and scatter,
> they ran for a pocket-lift
> in the corridors of power
> and share contracts in cabals.
> (Ojaide, 1995, p. 11).

A study by Sallah (1995) divided modern African poetry into three periods. They are pre-independence (colonial), independence and the era of nationalism/post-nationalism. He observes that the independent era of modern African poetry possessed "freshness of imagery; innovative use of language which remained sometimes sincere to local, flora and fauna or even to local deities and traditions; and utilization of African experience to articulate a uniquely personal voice" (Sallah, 1995, p. 19).

This is because the poets in this period had "mastered the techniques of Eliot, Pound, Hopkins, Milton, and Shakespeare and advanced them into the realm of personal experimentation" (Sallah, 1995, p. 19). Poets in this group include Christopher Okigbo, Gabriel Okara, John Pepper Clark, Dennis Brutus, Kofi Awooner, Okot p'Bitek, Lenrie Peters, Kwei Brew, etcetera. However, his review is focused on the nationalism/post-nationalism era. Thus, an understanding of modern African poetry in post-colonial Nigerian society is typical here, and deserves to be quoted at length:

> The poems represented here reflect the idiomatic worldview of poets who all write in some European language (i.e., English, French, Portuguese, etc.) but who have skillfully mastered the inferiority of such a language, imbibed its instrumentality, and domesticated it to serve their own individual and culture specific sensibilities … The distinguishing feature of these poets … is that they have been largely nurtured under the hash economic and political environment of the 1970s and 1980s, a period of galloping inflation, lilliputian growth, structural adjustment, skill flight, mounting external debts, crumbling infrastructure, stubborn droughts, border conflicts, religious/sectarian clashes, impatient armies … [Thus] these poets have assumed the task of art for social advocacy in the hope of quickening the possibility for the attainment of a better world (Sallah, 1995, p. 15-16).

The nationalism/post-nationalism period of modern African poetry according to Sallah deals "with their local realities with no colonial *hang-ups*, but with only commitment to their art and a sincere urge to see a positive social transformation" (p. 19). Poets in this generation include Molara Ogundipe-Leslie, Syl Cheney-Coker Niyi Osundare, Tanure Ojaide, Kofi Anyidoho Ezenwa Ohaeto, and Emmanuel Ngwaimbi Komben. These third generations of poets are influenced by the independent generation of poets but are not ready to present poetry like their forerunners. For example, in Ezenwa Ohaeto's "I Wan bi President", Sallah observes that the poet employs "linguistic humour and commonplace images to achieve the energizing effects of high art" (p. 20). Below are some lines of the poem:

> If I sleep small
> Na di dream go come
> If I siddon for chair
> say make I rest small
> Na di dream go come
> I think say na malaria dey come. (Sallah, 1995, p. 20).

Similarly, Okon (2013) separates modern Africa poetry in post-colonial Nigerian society into two groups: the older generation (1960-70) and the younger generation (1970– to date). Poetry in the first generation "was private and individualistic, or […] only showed social concern, but never preached revolution" (p. 101). An example is Kwesi Brew's "A Plea for Mercy", where the persona is addressing political leaders in Africa who failed to fulfill their political promises to their people:

> The peasants home, from their labours
> Sit by their log-fires
> Telling tales of long-ago
> Why should we the sons of the land
> Plead unheeded before your shrine?
> We have come to your shrine to worship
> We the sons of the land. (Okon, 2013, p. 44).

However, the poetry of the younger generation is "for the masses … [and the] diction is much simpler, so that even the least educated man in the society can read and understand …" (Okon, 2013, p. 102). His examples of poets in this group are Kofi Anyidoho (Ghana) and Niyi Osundare (Nigeria). For Okon, these poets are concerned about the well-being of the masses. Thus, their poetry is presented to protect the plight of the masses. An example is Osundare's *Songs of the Marketplace*:

> I made an unbreakable pledge to myself,
> That the people would find their voices in
> my song
> I sing. (p. 90).

3.1 METHOD OF DATA COLLECTION

The research work adopts the primary and secondary sources of data collection. The primary source of data collection is gathering of information from selected poetry volumes of Niyi Osundare, Ezenwa Ohaeto, G 'Ebinyo Ogbowei and Barine Saana Ngaage. The secondary sources of data collection are obtained from the library (relying on books, journal articles, newspaper articles, official monographs and reviews) and electronic sources on the primary data and contemporary issues affecting modern African poetry in Nigeria.

4.0 DISCUSSION

4.1 Features of Modern African Poetry in Post-Colonial Nigerian Society

This section examines the features of modern African poetry in post-colonial Nigerian society. The major concern is to show how master-slave dialectic and ethnicity are used in the presentation of modern African poetry in post-colonial Nigerian society.

4.1.1 Master-Slave Dialectic

Modern African poetry examines the concept of master-slave dialectic in the political history of Nigeria. The concept reveals a heavy presence of a binary opposition between the master and the slave from the period of European colonialism. This is because the European forced the African to accept colonialism and western values. The consequence was racial conflict and discrimination. According to Ogbowei (2023), the black Africans are "the bearer of the reproach of the race/spurned alone … trembling in the cold" (76). The European sees the African as an inferior human being and a slave because of his skin colour.

Also, "Africa was carved up in the European interest … African nations, individually and collectively, are under the thumb of Europe" (Saro-Wiwa, 1991, p. 109 -110). Thus, the idea of master-slave dialectic in modern African poetry revealed that "stigmatisation has helped in the process of dehumanisation" (February, 2014, p. vii) of the African by the European. Although the master and the slave are inhabitants of the earth, both are not equal in status because of the impact of European colonialism. For example, man's inhumanity to man makes the Earth cries out in lines below:

Tell my story;
Said the Earth to me
'Oh, tell my story the way it is.
Don't sugarcoat its bile
Don't varnish its rust
Don't cover its scars with pretty words
Tell my pain the way it is. (Osundare, 2021, p.7).

Here, the poet employs personification when "the Earth" tells the persona to unveil her pains to the reader. This poem reveals how the Europe forced Africa to accept European political systems and values. Western democracy was "alien to African political constructions and was unsuitable to our peculiar situation. For instance, Nigeria inherited a parliamentary system of government at independence that was not politically possible for a nation that is highly divided by ethnicity and religion" (McCormick, 1998, p. 352). Also, the political system benefitted only the political leaders because fairness is restricted in the system. Thus, modern African poetry cautions the politicians in Nigeria when he writes:

The Democracy of fenced walls
does not mend broken hearts
The Democracy of self
deflates the wheel of trust.
The Democracy of race or
class is blind to others.
The Democracy of class is blind to the poor. (Ngaage, 2011, p. 37).

This inherited political systems from Europe created a "Democracy of fenced walls" because the political leaders dissociate themselves from the people they were elected to lead after promising to change the master-slave dialectic initiated by colonialism. After independence, Nigerian political system became the new masters because of "its enchanting aroma … holds up a red flag" (Ogbowei, 2022, p. 15) against the masses. The Nigerian successors to British colonial management "have proved to be negations of leadership. Bereft of ideology, policy and positive moral values, and with no concern for the welfare of their people, the principal objective in life seems to be how to get the advantage over one another, and the state" (Udoeyop, 1999, p. 37).

However, their "lying tongues sell cheap /to the ears demanding evidence" (Ogbowei, 2022, p. 25). This is because "there is high level of insincerity and instability in government policies and programmes since her independence in 1960" (Igbe et al., 2019, p. 235). Also, their political manifestos became failed promises after many years of propagating falsehood to the people. The poem below is an example:

I read your epistle
to the people
i read your gospel
to the rabble
my little boy
with yellow fever's gone. (Ogbowei, 2003, p.9).

Instead of providing infrastructural development in the country, most politicians build a "rabble" (mob or throng) around themselves to prevent the people from coming close to them. They failed to provide healthcare services to the people. Thus, the son of the poet persona dies of "yellow fever". Also, these politicians are seen as new preachers:

I saw the new preacher draft his sermon…
blessed are those who water the earth with human blood;
they are the peace makers.
Blessed are those who obtain power by force…
Blessed are the crafty who obtain by deceit.
(Ngaage, 2007, p. 34).

The poem above reveals a new generation of politicians that are bedeviled by corruption. They "soon acquired a reputation for corruption and for wrong-footing their adversaries… Remaining in power had become an obsession for them" (Saro-Wiwa, 1998, p. 77). Similarly, in Osundare (1995) seek to find out why most postcolonial Nigerian leaders are not part of the people ("this earth") they are leading. Thus, he writes:

Are they of
this earth
who live that earth may die
Are they?
(Osundare, 1995, p. 45)

These select few display their ill-gotten riches from their activities cited in the lines above for all to see. Thus, creating a desire in the hearts of the masses to be like them because the desire is born via mimicry of the conjured subject of desire (Fanon 2019). The conjured subject in this context is the political elite. The poem below illustrates this point when the persona cries out:

I wan bi President like Russia dem own
If him sneeze every country go begin cry
I wan bi President like America dem own
If him cough every country go begin weep
(Ohaeto, 1995, p. 65).

Here, "Russia" and "America" are imageries of imperialism. The persona is referring to the dreadful nature of these western powers on African political and economic affairs because Africa was imprinted up in the European interest. The poet's use of "every country" in the lines above refers to all African countries in the post-independent era. Also, the poem reveals that most post-independence Nigerian political leaders set themselves above the laws of the land. Therefore, the constitution of the nation cannot put a check on the excesses of political leaders. This extravagant life-style of the ruling class motivates the persona (a poor Nigerian) to desire to be like the African president in the lines below:

I wan bi President
Wey them go dey praise
Every street go carry my name
I go rename all university for di country
All di town go carry my name
((Ohaeto, 1995, p. 65).

4.1.2 The Idea of Ethnicity

This concept of Ethnicity helps to create socio-cultural uniqueness of modern African poetry. This is achieved by identifying the historical, social and political systems which help to represent African cultural uniqueness in poetry. Thus, the idea of ethnicity shows a subversion of the Western tradition in poetry. For instance, the poem below: Barine Ngaage's "Name the Yams" exemplifies issues of ethnicity as the verse below illustrates:

Name the yams
Name three vultures
Name six conspirators against the throne
It is the season of harvest
Slay the nine yams like goats
Or fry them in crude oil. (Ngaage, 2004, p. 22).

Here, "the yams" represent the natural resources present in Nigeria. The "three vultures" represent the three major tribes in Nigeria. The "six conspirators against the throne" are the six geopolitical zones in Nigeria. While "the nine yams" represent the nine Niger Delta states of Nigeria. However, the three major tribes in Nigeria want to: "Slay the nine yams like goats" because of "A lee ge ali de" (22). Furthermore, the persona writes:

Name the yams on the barn for sacrifice
It is the feast of the powerful.
Kpel Kpel Kpel Kpel
A tani o si kol
Kpel Kpel Kpel Kpel
A tani o si kol (Ngaage, 2004, p.22).

The lines above show an alteration from the western tradition of poetic rendition because of the use of Ogoni words ("Kpel Kpel Kpel Kpel"). These words are sounds made while roasting a yam for eating. "A lee ge ali de" means 'it is time to eat' in Ogoni language (Ngaage, 2004). Also, "A tani o si kol" means a hungry man should go to the barn and take some yams to feed himself (Ngaage, 2004). Again, there is a variation from the European practise of poetic delivery in the poem, "The Song of Kawabali" by Ngaage. He uses the Gokana dialect of Ogoni language to expose the negative impact of European colonisation on post-independence Nigeria. Thus, he writes:

*O dé giá kawabali
taá dò taá dò
O bá gia kawabali
taá do taá dò. (Ngaage, 2007, p.12).

[English Translation]:
If you ate the food of Kawabali
Stumble and fall, stumble and fall
If you ate the food of Kawabali
Stumble and fall, stumble and fall
(Ngaage, 2007, p.81).

From the citations above, "Kawabali" is a metaphor "for those who have committed crimes" (Ngaage, 2007, p.81) in Nigeria. The preceding lines in the poem reveals the criminals when the poet cries, I have "no mercurial father-in-law/I have no nairan god-father" (lines 1 & 2). Here, the poet identifies the "mercurial father-in-law" as a metaphor for the unpredictable Nigerian politician who sees himself as the "nairan god-father" of the poor masses that "unites with the Union Jack" (line 11), to "officiate and play the game"

(line 15) of corruption in Nigerian. Thus, the poet prays that these corrupt Nigerian politicians who collaborate with their former colonial masters (Great Britain) to loot the resources in Nigeria should "Taá do taá dò" (Stumble and fall, stumble and fall).

4.2 Research Findings

This paper examines modern African poetry in post-colonial Nigerian society. Although the critical positions of the literature on modern African poetry in post-colonial African society are suggestive, illuminating and interesting, none has been able to explicitly study the above subject. This is because the critics approached the study through different theoretical perspectives. The research has shown the limitations of critical literature on modern African poetry in post-colonial Nigerian society to examine the varying position of post-colonial African poetry in the historical periods and the socio-cultural circumstances in which the presentation of this poetry occurs. Also, the critical positions of the literature do not study the features of modern African poetry in post-colonial Nigerian society which are influenced by the post-colonial literary theory.

On the other hand, the study presents master-slave dialectic, and ethnicity, as features of modern African poetry in post-colonial Nigerian society. The paper reveals that the concept of master-slave dialectic is presented from a conflictual position in post-colonial modern African poetry. This is because of the heavy presence of a binary opposition between the master (political leaders) and the slave (the masses) in the rendition of post-colonial African poetry. However, this binary opposition in poetry creates a desire in the hearts of the masses to be like their leaders because of the gains of corruption.

A reading of African poetry in post-colonial African society also shows that the concept of ethnicity identifies the historical, social-cultural and political systems present in Africa. Thus, the conception of ethnicity helps to create a cultural distinctiveness in the rendition of African poetry in post-colonial society. Similarly, there is an alteration from the western tradition of poetic rendition because of the use of African indigenous words.

5.0 CONCLUSION

This paper has been concerned with the re-presentation of modern African poetry and its impact on post-colonial Nigerian society. African poetry refers to poetry of and from Africa. It deals with social-cultural and political issues found in the African awareness. The study has shown that modern African poetry has developed from the colonial period to the post-independence era. Also, the paper revealed that the study of modern African poetry in post-colonial society is beyond protest poetry. Thus, the paper examined some features that constitute modern African poetry in post-colonial Nigerian society. They are master-slave dialectic and ethnicity. The study is relevant in that it will, among other things, offer to scholarship a new conception of modern African poetry in post-colonial Nigerian society. Thus, this study occupies a central position in African literature and post-colonial writings.

REFERENCES

Anthony, O. C. (2011). Poetry Evolution in Nigeria. *African Resource Journal.* 3(2), 10 – 23.

Ashcroft, B. et al. (2013). *Post-Colonial Studies: The Key Concepts.* 3rd Edition. Routledge.

Amina, S. (2019). "Hybridity, Ambivalence and Mimicry in Postcolonial Algerian Novel". *Global Scientific Journals.* 7, (4), 697 – 708.

Chinweizu, I., Jemie, I. & Madubuike, I. (1980). *Toward the Decolonization of African Literature.* Fourth Dimension Publishers.

Fanon, F. (2019). *Black Skin, White Masks*. Trans. Reprint Edition. Grove/Atlantic.

Fanon, F. (2021). *The Wretched of the Earth*. Trans. Reprint Edition. Grove/Atlantic.

February, V. A. (2014). *Mind Your Colour*. Kegan Paul International.

Hegel, G. W. F. (2018). *Phenomenology of Spirit.* Trans. Terry Pinkard. Cambridge University Press.

Igbe, D. E. (2015) The Effects of Post-Colonial Literary Theory in Buchi Emecheta's *Second-Class Citizen*. *African Social and Educational Journal*. *Nigerian Edition.* 4(1), 75-83.

Igbe, I., Zuokemfa A. P. and Abarowei, F. E. (2019). The Dearth of Political Leadership in Sefi Atta's Everything Good Will Come. *IAUE Social and Educational Journal*. 6(1), 232 – 241.

Mc Cormick, John. *Comparative Politics in Transition*. Texas: Harcourt Brace College Publishers, 1998.

Mushtag, H. (2018). Analysis of Postcolonial Literature: A Bibliometric Study 1900 to 2007. *Qualitave and Quantitaive Methods in Libraries*. (7), 205 – 229.

Ngaage, B. (2004). "Name the Yam". *Rhythms of Crisis Poems*. Kraft Books Limited.

Ngaage, B. (2007a). The Song of Kawabali. *The Earth Listens*. University of Port Harcourt Press, 12 – 13.

Ngaage, B. (2007b). Salute to the New Preacher. *The Earth Listens*. University of Port Harcourt Press, 34 – 35.

Ngaage, B. (2011). Democracy of Fenced Walls. *Democracy of Fenced Walls*. University of Lagos Press, 36 – 37.

Ogbowei, G. E. (2003). letter to the minister. *the town crier's song*. Minson Publishers, 9 – 16.

Ogbowei, G. E. (2022a). beautiful brandy bowl. *the pregnant shop grows*. Rose Light Nigeria, 15.

Ogbowei, G. E. (2022b). the door bolted. *the pregnant shop grows*. Rose Light Nigeria, 25.

Ogbowei, G. E. (2023). how can I breathe. *moods of the wounded river*. Rose Light Nigeria, 76 77.

Ohaeto, E. (1995) "I Wan bi President". Ed. Sallah, Tijan. *New Poets of West Africa.* Malthouse Press, 62 – 66.

Ojaide, T. (1995a). Love Song. Ed. Sallah, Tijan. *New Poets of West Africa*. Malthouse Press, 33-34.

Ojaide, T. (1995b). New Trends in Modern African Poetry. *Research in African Literature*. 26(1), 4 – 19.

Okon, F. (2013). "Politics and the Development of Modern African Poetry". *Canadian Center of Science and Education Journal*. 3(1), 94 – 110.

Osundare, N. (1995a). They Too Are the Earth. Ed. Sallah, Tijan. *New Poets of West Africa.* Malthouse Press, 26.

Osundare, N. (1995b). The Fate of Vultures. Ed. Sallah, Tijan. *New Poets of West Africa*. Malthouse Press, 34 – 35.

Osundare, N. (2021). Hole in the Sky. *green: sighs of our ailing planet poems*. Black Widow Press, 7 – 12.

Sallah, T. (1995). *New Poets of West Africa.* Malthouse Press.

Saro-Wiwa, Ken. (1991). *Pita Dumbrok's Prison.* Port Harcourt: Saros International

Saro-Wiwa, Ken. (1998). *Prisoners of Jebs*. Port Harcourt: Saros International Publishers. Publishers.

Udoeyop, N.J. (1999). The Political Fiction of Ken Saro-Wiwa. Ed. Eshiet. I. Imo et al. *Ken Saro-Wiwa and the Discourse of Ethnic Minority in Nigeria.* Calabar: University of Calabar Press, 33 - 46.

ENHANCED JOB PERFORMANCE EVALUATION MODEL FOR BAYELSA STATE POLYTECHNIC NON-ACADEMIC STAFF USING FUZZY LOGIC AND NEURAL NETWORK

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ABSTRACT
Staff performance evaluation is one of the most tedious tasks handled by the human resources (HR) department in every organization. This is as a result of the adoption of conventional techniques employed in carrying out this task. Also, these conventional methods are prone to several computational errors, manipulation and bias, due to human involvement. Several researchers over the years have developed staff appraisal systems for institutions, organizations and other work settings. However, these systems have limitations such as use of poor evaluation parameters, lack of a machine training model to predict future performance, and lack of a performance model for evaluating non-academic staff in the institution. In this work, we proposed an enhanced performance evaluation model for non-academic staff of Bayelsa state Polytechnic using fuzzy logic and neural network. Neural network (specifically artificial neural network) was used to train the system using staff performance dataset containing 100 records and 20 attributes which was designed in the course of the work. Fuzzy Logic was used to develop an inference engine made up of fuzzy rules which maps attributes to targets outputs using IF-THEN statements. Agile methodology was adopted in this approach. The system will be implemented using Python for Neural Network design and Hypertext Preprocessing (PHP) for the frontend. MySQL database was used as the backend. The proposed system had an accuracy of 95%, Precision of 100% and Mean Square Error of 0.1, which outperforms the existing system. This system could be beneficial to the administrators of the institution, the appraisal department of the institution, the non-academic staff of the institution, and the research community.

Keywords: Fuzzy logic, Staff, Performance evaluation, Neural Network, Performance parameters

1.0 INTRODUCTION

Appraisal or performance evaluation of the staff of an organization plays a very vital role in the growth of that organization, and organizations have grown increasing aware of this fact in recent years. The success of an organization in achieving the laid down goals within a period of time is driven by this process. Also human talent which are integral for the growth of an organization are properly managed, when the strength of each staff is evaluated and directed to the appropriate department where they will be fully utilized and function maximally.

This evaluation looks into what the employee does and how he does it towards achieving the set goals, thereby evaluating the quality of the employee's performance both in the past and presently in that organization in relation to the set standards for performance for employees working within that environment. Performance evaluation also plays a role in informed organizational decision making process in issues like promotions, retrenchments, salary increase, and job change for an employee, etc. based on the results gotten from the evaluation process. This serves as a source of encouragement for employees to improve their performance in their various sectors.

Performance evaluation within the academic setting is one of the most challenging tasks faced by the administrators in this sector. This is as a result of several factors ranging from, the number of staff (both academic and non-academic staff), and the large environmental setting of the institutions which limits direct access to most of the staff for evaluation when using the conventional evaluation methods. Bayelsa state polytechnic, Nigeria, is one of such institutions that are faced with this challenge. Little attention is paid to the appraisal of non-academic staff within higher institutions in Nigeria, which has led to delayed promotions, continuous strikes and demonstration by these non-academic staff, most of whom have been in the system for so many years without any promotion, increase in salary or better working

condition, despite all the important contributions they make towards the growth of the institutions.

Fuzzy logic and Neural network (NN) are two powerful problem-solving supervised learning algorithms which perform excellently when used for data evaluation and analysis. The combination of these two algorithms will therefore yield a higher efficiency in the performance evaluation process. These algorithms capture the way humans' reason and interact with the real-world knowledge in the face of vague, incomplete and ambiguous information and provided a way to draw definite conclusions. With the use of these machine learning models, the prevalent issue of performance evaluation are identified and addressed, thereby removing bias, false evaluation, and judgmental/ sentimental evaluation.

2.0 LITERATURE REVIEW

This section discusses some key components of the study.

2.1 Conceptual review

2.1.1 Performance Appraisal (PA): A survey

According to DeNisi & Pritchard (2011), performance appraisal can be defined as methods and processes an organization uses to evaluate their employee's level of performance. The processes usually include, measuring the performance of employees and giving them a feedback about their performance quality and level.

Singh et al (2013) defined Performance rating/appraisal as identification of certain critical elements or attributes which can reflect employee's performance in the best possible way. He stated that this process is usually carried out by a superior who wants to interpret the performance of his/her subordinate. This exercise does not only reveal the present performance of the employee, but also outlines their expected performance in the future.

Heyel et al (2014) defined performance appraisal as "the process of evaluating the performance and qualifications of the employees in terms of the requirement of the job, for which he is employed, for purposes of administration including placement, selection for promotions, providing financial rewards and other action which require differential treatment among the members of a group as distinguished from actions affecting all members equally others regard. It is a process of estimating or judging the value excellence, qualities or status of some object, person or thing".

Performance management is a major task of Human Resources department of every company or organization. This task is usually very cumbersome when the workforce of the organization is large, e.g. the higher institutions of learning. Performance evaluation became a widely used business tool since the 1980, and has continued even till date in almost every organization using several conventional and automated methods

Purpose of Performance Evaluation

Performance evaluation is critically essential for the effective management of the human resource of an organization and evaluation of staff that help develop individuals, improve organizational performance, and feed into institutional planning Ahmed, A., Pawlicki, M., Tomaszewska, R., Choraś, M. & Gerlach R. R. (2020).

Benefits of performance evaluation

The overall purpose of performance evaluation is to improve the individual's performance and the organization productivity and culture.

i. It helps the management decide on what increase of pay shall be given on grounds of merit.
ii. It helps the management to determine the future use of employee e.g. whether he/she shall remain in his or her present job or be transferred, promoted, demoted or dismissed.
iii. It indicates training needs in the organization that is area of performance where improvements would occur if appropriate training could be given.
iv. It motivates the employee to do better in his/her present job by giving him knowledge of result recognition of his/her merits and more, the opportunities to discuss his/her work with the manager, Agalamanyi, P., Senbagavalli, M., & Sakthivel, B. (2015).

2.1.2 Fuzzy Logic

Fuzzy logic is a technique that represents and modifies uncertain information by measuring the degree to which the hypothesis is correct. In the real world, sometimes we face a condition where it is difficult to recognize whether the condition is true or not. Thus, fuzzy logic gives relevant flexibility for reasoning that leads to inaccuracies and uncertainties of any condition. Fuzzy logic is also used for reasoning about naturally uncertain concepts (2008).

According to Constance (2009), fuzzy logic can be defined as the way of human reasoning. According to him, Fuzzy Logic approach imitates the way of decision making by humans that involves all intermediate possibilities between YES and NO. He further posits that Fuzzy Logic comprises of two main concepts, via Fuzzification and Defuzzification. Fuzzification is transformation of system input into Fuzzy Sets (Having Crisp Members) such as Large Positive (LP), Medium Positive (MP), Small (S), Medium Negative (MN), and Large Negative (LN). Fuzzification is the process of transforming a raw data into a decision data, while Defuzzification is the transformation of a decision data back to raw data.

Applications of Fuzzy Logic in Performance Appraisal

Neogi, A., Mondal, C.A. & Mondal, S.K. (2011), Presented A Cascaded Fuzzy Inference System for University Non-Teaching Staff Performance. They further asserted that, evaluating staff performance, performance

appraisal usually involves awarding numerical values or linguistic labels to employees' performance. According to them, these values and labels were used to represent each staff achievement by reasoning incorporated in the arithmetical or statistical methods. However, the staff performance appraisal may involve judgments which were based on imprecise data especially when a person (the superior) tries to interpret another person's (his/her subordinate) performance.

Thus, the scores awarded by the appraiser are only approximations. From fuzzy logic perspective, the performance of the appraisee involves the measurement of his/her ability, competence and skills, which are actually fuzzy concepts that can be captured in fuzzy terms. The study utilized a Cascaded fuzzy inference system to generate the performance qualities of some University non-teaching staff that are based on specific performance appraisal criteria.

The University of Zimbabwe (UZ) introduced a performance appraisal system (PAS) designed to improve performance indicators across the board in Public Service including academic/faculty staff at the University of Zimbabwe as part of a nation-wide strategy. The objective of the study was to evaluate the impact of five years of PAS on productivity and job satisfaction of Non-Academic. A random sample of Non-Academic was studied using questionnaires and interviews. Job satisfaction and some indices of productivity decreased by half following introduction of PAS. A possible contributory factor for the decline in job satisfaction was that PAS was introduced without adequate preparation and when the socio-cultural environment was not conducive to its implementation. This study underpinned the importance of community ownership of interventions targeted at performance management improvement prior to their implementation (2017).

Ahmed et al., (2016) proposed Employee Performance Evaluation: A Fuzzy Approach. They suggested that managers encounter many decisions that require the simultaneous use of different types of data in their decision-making process. A critical decision area for managers was the performance evaluation of personnel, whether individually or as a member of a team. According to them, performance evaluation is critically essential for the effective management of the human resource of an organization and evaluation of staff that help develop individuals, improve organizational performance, and feed into business planning.

Kamath (2014) presented design and development of soft computing model for teaching staff performance evaluation. Fuzzy Set Theory-an area under the umbrella of soft Computing, approach is followed in the presented work. This approach of performance evaluation allows the organization to exercise professional judgment in evaluating employees.

Arbaiy & Suradi (2014) proposed Staff Performance Appraisal Using Fuzzy Evaluation. They stated that most organizations use performance appraisal system to evaluate the effectiveness and efficiency of their employees. In evaluating staff performance, it usually involves awarding numerical values or linguistic labels to their performance. These values and labels were used to represent each staff's achievement by reasoning incorporated in the arithmetical or statistical methods.

However, the staff performance appraisal may involve judgments which were based on imprecise data especially when human (the superior) tries to interpret another human (his/her subordinate) performance. Thus, the scores awarded by the appraiser are only approximations. From fuzzy logic perspective, the performance of the appraisee involves the measurement of his/her ability, competence and skills, which are actually fuzzy concepts that can be captured in fuzzy terms.

Accordingly, fuzzy approach can be used to handle these imprecision and uncertainty information. The study utilized hierarchical fuzzy inference approach since performance evaluation comprises of four criteria; namely work achievement, skill knowledge, personal quality, and community services. The output of the study provides the ranking for staff performance.

2.1.3 Artificial Neural Network (ANN)

An artificial neural network consists of processing units called neurons. An artificial neuron tries to replicate the structure and behavior of the natural neuron. A neuron consists of inputs (dendrites), and one output (synapse via axon). The neuron has a function that determines the activation of the neuron. x1...xn are the inputs to the neuron. A bias is also added to the neuron along with inputs. Usually bias value is initialized to 1. W0...Wn are the weights. A weight is the connection to the signal. Product of weight and input gives the strength of the signal. A neuron receives multiple inputs from different sources, and has a single output.

There are various functions used for activation. One of the most commonly used activation function is the sigmoid function, given by the equation

$$\mathbf{F(x)} = \frac{\mathbf{1}}{\mathbf{1}+e^{-xw12}} \qquad \textbf{Eqn 2.1}$$

Where

$$\text{sum} = \sum_{r=u}^{n} x2w2$$

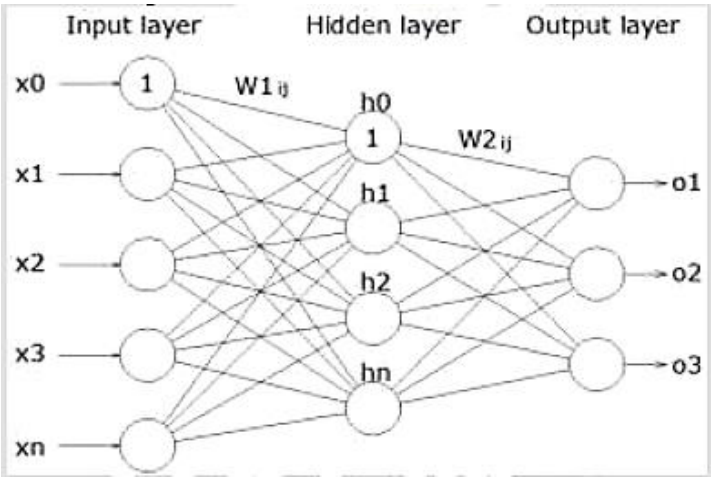


Fig.2.1: Model of an artificial neuron

The other functions that are used are Step function, linear function, Ramp function, hyperbolic tangent function. Hyperbolic tangent (tanh) function is similar in shape to sigmoid, but its limits are from -1 to +1, unlike sigmoid which is from 0 to 1.

The sum is the weighted sum of the inputs multiplied by the weights between one layer and the next. The activation function used is a sigmoid function, which is a continuous and differentiable approximation of a step function. An interconnection of such individual neurons forms the neural network.

The ANN architecture comprises of:

a. input layer: Receives the input values
b. hidden layer(s): A set of neurons between input and output layers. There can be single or multiple layers
c. output layer: Usually it has one neuron, and its output ranges between 0 and 1, that is, greater than 0 and less than 1. But multiple outputs can also be present.

The processing ability is stored in inter-unit connection strengths, called weights. Input strength depends on the weight value. Weight value can be positive, negative or zero. Negative weight means that the signal is reduced or inhibited.

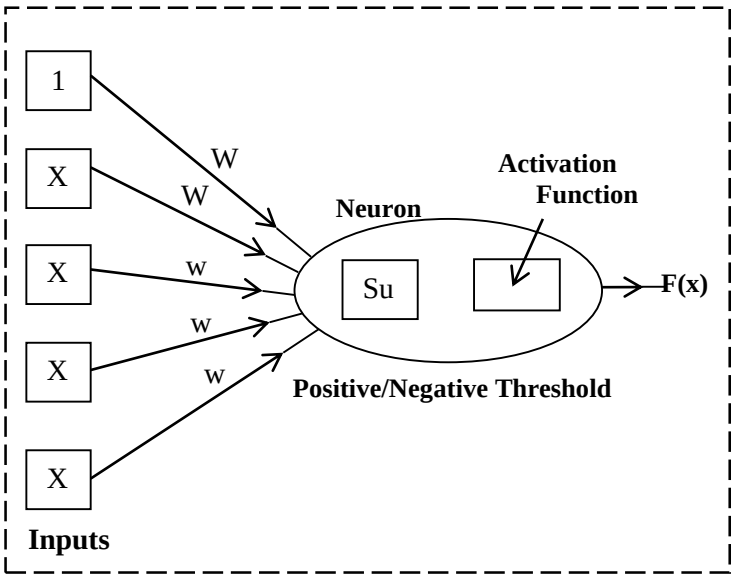


Fig 2.2. Neural network architecture

Zero weight means that there is no connection between the two neurons. The weights are adjusted to obtain the required output. There are algorithms to adjust the weights of ANN to get the required output. This process of adjusting weights is called learning or training.

Ann Training Process

Categories of ANN are based on supervised and unsupervised learning methods. The simplest form of ANN architecture is the Perception, which consists of one neuron with two inputs and one output. The activation function used

is step function or ramp function. Perceptions are used for classification of data into two separate classes. For more complex applications, multilayer perceptions (MLP) are used, which contain one input layer, one output layer, and one or more hidden layers.

Back propagation algorithm is the most commonly used method in training the neural network. Here the difference in targeted output, and the output obtained, is propagated back to the layers and the weights adjusted. A back propagation neural network (BPNN) uses a supervised learning method and feed-forward architecture. It is one of the most frequently utilized neural network techniques for classification and prediction.

In BP algorithm, the outputs of hidden layers are propagated to the output layer where the output is calculated. This output is compared with the desired output for the given input. Based on this difference, the error is propagated back from the output layer to hidden layer, and from hidden layer to input layer. As the flow moves back, it changes the weights between the neurons. This cycle of going forward from input and output, and from output to input is called an epoch. A neural network is first given a set of known input data and asked to obtain a known output. This is called training the network. The network undergoes many such epochs till the error (difference between actual output and desired output) is within a certain tolerance). Now the network is said to be trained. This process of training sets the weights between all the neurons in all the layers. The weights so obtained from a trained network are used in calculating the response of the network to an unknown data.

Strengths of ANN

ANN is different from a normal computer program in many ways. Some of its features are: Heyel, W.H., Wang, C.S., Lee, C.S., S.W., Lin, P.H. & Hung, (2014).

a. Adaptive learning: ANN replicates human brain in the way it learns how to do tasks while learning. A normal program cannot adapt to other types of inputs.
b. Self-organization: ANN can create its own organization while learning. A normal program is fixed for its task and will not do anything other than what it is intended to do.
c. Parallel operation: ANN works in parallel like a human brain. This is dissimilar to a computer program which works serially.
d. Fault tolerance: One of the most interesting properties of neural networks is their ability to work even on the basis of incomplete, noisy, and fuzzy data. A normal program cannot handle incomplete, unclear data and will stop working once it encounters the smallest wrong data.
e. In comparison with human brain, ANN is quite fast, as brain processing time is slower
f. In comparison with normal program, the method in which ANN calculates output is not clear. The time taken keeps changing with different sets of inputs, though they are similar.
g. ANN can be used for data classification, pattern recognition, and in applications where data is unclear

2.2 Empirical review

Singh & Kharola (2013) presented development of fuzzy logic model for performance rating (PR) of employee's. They adopted a scientific approach in the evaluation of PR and developed a model based on the fuzzy reasoning for PR. A comparison between the conventional and fuzzy logic approach in PR was carried out in the course of the study. The model was simulated and tested, and their results demonstrate that there is great shown shift in PR towards realistic and practical. However, this system cannot be adopted for performance appraisal of real official setting.

Turk (2013) proposed a study on performance management of academic staff (AS) and its effectiveness to teaching and research-based on the example of Estonian Universities. They investigated the relationship between staff performance appraisal and staff performance in terms of teaching efficiency and research. Data collection methods included questionnaire based surveys of AS Performed in 2013, and interviews with 9 academic leaders and 7 focus group. The result of the analysis showed that a good PR had a great impact on the performance of AS especially during periods of restructuring in the university. However, they could not develop an actual performance appraisal system to support their claim.

Vijayalakshmi et al, (2020) proposed predicting the performance of instructors using Machine Learning Algorithms. They focused on predicting teacher's performance and investigated the factors which affect student's accomplishment. Real datasets were collected from students via interviews. Machine learning (ML) algorithms such as Support Vector Machines (SVM), Naïve Bayes, Random Forest, K-Nearest Neighbor, and Decision Trees were used to implement the system in an R environment. Several parameters were used to evaluate the system and the results demonstrated that the instructor's performance was highly reliant on variable such as precision, recall, specificity, sensitivity, and accuracy using the various ML algorithms. SVM outperformed the other algorithms. However, the parameters used for the instructor's performance evaluation were not clearly defined.

Fateh & Ahmad (2016) proposed data mining in teacher evaluation system using WEKA. They investigated the response from learners concerning the instructors in order to shape Teacher Evaluation framework using WEKA tool. They gathered data from 830 understudies around 104 records with 5 attributes. The Decision tree (J48) algorithm was used to train the dataset and the results were utilized by the instructor to decide which teacher is to proceed to the following semester or not. However, this performance of

the system was not discussed in order to decide its industrial importance.

Ola & Pallaniappan (2013) proposed a data mining approach for evaluation of instructors' performance in higher institution of learning using machine learning algorithms. They adopted Formative and Summative assessment methods in appraising instructors to increase their quality of service. The formative evaluation involved the valuation of assessing the educator's study hall exercises, appraisal of understudy report, quality and shortcoming of teachers. Summative assessment strategy thought about the meeting, assessment, review and well spring of documentation. However, this system does not cover parameters for assessing non-academic staff of the institution, which makes it unrobust.

Yahya et al, (2016) proposed mining educational data to analyze teaching effectiveness. The practicality of applying data mining techniques to analyze the feasibility of instructors was investigated. They gathered data from nine data mining methods and applied KNN, NB, SVM, RA, J48, JPip, Ada Boost, BN, and Random Forest. The results demonstrated that Random Forest and SVM were the best performing algorithms. However, their system design was ambiguous and therefore not cost and time effective.

Pal & Pal (2013) proposed evaluation of teacher's performance: a data mining approach. They outlined a structure to forestall the performance of educator using their assessment, examining the classes and performance assessment of instructor. The data mining strategies utilized in this system were Naive Bayes, ID3, LAD tree and CART in WEKA tool. Three years of data gathered from post graduate students with 14 attributes. The precision created by ID3 was 65.14%, 72.32% by CART, 75.00% by LAD Tree and the most accuracy 80.35% produced by NB classifier. However, the dataset used was small and cannot be used to arrive at a conclusive result.

Hemaid, & El-Halees (2015) proposed improving teacher performance using data mining. They discovered a method of enhancing the performance of educators utilizing data mining procedures, such as Rule Induction, Decision Tree, Naive Bayes and K-Nearest Neighbor in the Rapid Miner tool. Data was gathered from 2010 to 2013 from instructors in the Ministry of Education Gaza. The datasets was made up of 813 records and 46 attributes in the form of survey. The accuracy delivered by the various methods is76.23% by rule induction, 77.05% by decision tree, 77.46% by Naive Bayes and finally acceptable accuracy 79.92% by K-NN. However, they could not implement the system using a programming language.

Asanbe et al, (2018) presented teachers' performance evaluation in higher educational institution using data mining. The technique assessed and anticipated the performance of educators in higher educational institutions utilizing Decision Tree (C4.5 andID3), MLP in WEKA data mining tool. The dataset was gathered from the Academic Department of a University, South West Nigeria with 350 records of 2010 to 2015. The accuracy delivered by C4.5 was 83.5%, 71% by ID3. However, their system was unrobust as it caters only for appraisal of academic staff of the institution.

Agaoglu, (2016) proposed predicting instructor performance using data mining techniques in higher education. They assessed the performances of teacher dependent on view of student using questionnaire of course evaluation using four distinctive data mining techniques, for example, Support Vector Machines, Decision Tree algorithms (C5.0, CART), Discriminant Analysis and Artificial Neural Networks (ANN-2QH, ANN-3QH, ANNMH). The performance measurements used were recall, precision, accuracy, and specificity. The information contains 2850 records, 25 attributes, and one class name. Among various strategies C5.0 delivered high accuracy as 92.3%. However, the system was ambiguous and cost effective.

Ahmed et al, (2016) presented a study using on data mining to predict instructor performance. They examined the aspects which were essentially inducing the achievement of learners for foreseeing the performance of educator to increase the quality of the educational system using various methods like Multilayer Perception, J48Decision Tree, Sequential Minimal Optimization and Naïve Bayes. Dataset was collected from University of California Irvine (UCI) Machine Learning Repository. There were 32 attributes gathered from Q1 to Q28 asked with reactions from 1 to 5. Attributes were assessed using One R, eight attributes are chosen as highly impact. However, the algorithms used had over fitting issues.

Kumar (2017) proposed a modern data mining method for assessment of teaching assistant in higher educational institutions. They utilized 3 data mining techniques such as Decision Trees, J48, and lazy IBK and Meta Bagging in WEKA to improve the efficiency and reliability of evaluation system of instructor's performance. The UCI Machine Learning Repository provided dataset of Teaching Assistant for 2 summer semesters and 3 regular semesters of insights concerning 151 instructors of Department of Statistics of the University of Wisconsin-Madison. The IBK algorithm outperformed other algorithms with an accuracy of 62.2% than the J48 and Bagging algorithms. However, the performance accuracy falls below the acceptable accuracy level of good evaluation model.

Adefowoke et al (2018) proposed a fuzzy driven decision support system (DSS) for enhanced performance appraisal. The DSS was based on a principle proposed by Henri Fayol's questions for appraisal of employees. A questionnaire consisting of 44 structured questions were used to extract data from employees of Babcock University, Nigeria. The fuzzy inference system integrated Mamdani computational technique and built the system using the data collected from the questionnaires. The system was

experimented in predicting the future performance of employees and an accuracy of 75% was recorded. However, no machine learning algorithm was adopted to train the system for better prediction.

Abaidullah, et al, (2015) presented identifying hidden patterns in student's feedback through cluster analysis. They used k-means clustering to investigate learner's feedback information for effective decision making by upper level board members in charge of appraising educational quality and for increasing teaching quality and improving nature of students' learning experience. However, their model does not address improvement of students' learning experience that would bring about progress in nature of instructive condition of establishment.

Kharola et al (2015) proposed Student's performance evaluation: a Fuzzy logic reasoning approach. The evaluation system was directed at students in schools or colleges. Academic and personality attributes were used as parameters for the evaluation. The estimation of issues of rule explosion was estimated using a stage-based fuzzy reasoning approach. Fuzzy logic toolbox in MATLAB was used for the modeling and simulation of the system. However, adoption of a hybrid model would have yielded a better performance.

Arora and Saini (2013) presented a fuzzy Probabilistic Neural network for students' academic performance evaluation. They developed a neural network model for modeling of academic profile of students. Qualitative observation was used by the model to predict students' performance. Probabilistic neural network (PNN) a feed-forward neural network was used to design this model. The PNN was chosen based on less complexity in determining network architecture and train the network. However, the performance of the model was not stated to have demonstrated the efficiency of the proposed model.

3.0 METHODOLOGY

The Agile methodology was adopted for the development of the proposed system. The Agile methodology is a project management process which is commonly used in software development where demands and solutions evolve through the collaborative effort of self-organizing and cross-functional teams and their customers. Agile is an iterative and incremental approach to project management that helps teams keep up with the demands of the modern workplace. It consists of different methodologies and all of them are based on the concepts of flexibility, transparency, quality, and continuous improvement. It involves a project management process where a project by breaking it up into several phases. It involves continual cooperation with stakeholders and steady improvement at every stage. Once the work begins, teams cycle through a process of planning, executing, and evaluating. Continuous collaboration is vital, both with team members and project stakeholders.

3.1 Architecture of the Existing System

The existing system was developed by Adefowoke et al., (2018). They proposed a fuzzy decision support system based on Henri Fayol's 14 principles of management for the appraisal of employees' performance. They constructed a questionnaire containing 44 structured questions based on these principles and administered to the employees of Babcock University, Ilisan-Remo, Ogun State, Nigeria. They built a Fuzzy inference system which integrated Mamdani computational technique based on the response/data extracted from the questionnaires, and applied this for evaluating the performance of employee in the institution. Experimental results show that the proposed system could predict the appraisal status of an employee with 75% accuracy in comparison to the conventional appraisal method.

The response to each questions on the questionnaire was quantified with a Likert scale that range from 1 (Strongly Agree) to 5 (Strongly Disagree).

The inference process primarily maps the input variables to the corresponding output using fuzzy rules and was made up of three major parts: the fuzzification of the input variables, fuzzy inferencing, and defuzzification of the output. The fuzzification module accepted the crisp input variables from the database and convert them into linguistic variables with associated linguistic terms using a membership function.

The fuzzy rule base built consisted of rules which were defined by a set of IF-THEN constructs in which the antecedents (IF parts) and the consequents (THEN parts) were linguistic variables which were carefully formulated based on the knowledge and experience of human resource experts of Babcock University, Ilisan-Remo, Ogun State, Nigeria. A rule in the rule base is triggered if any of its precedence parameter such as *low*, *moderate*, and *high* evaluates to true (1), otherwise it remains un-triggered. The Architecture of the existing System is presented in Figure 3.1

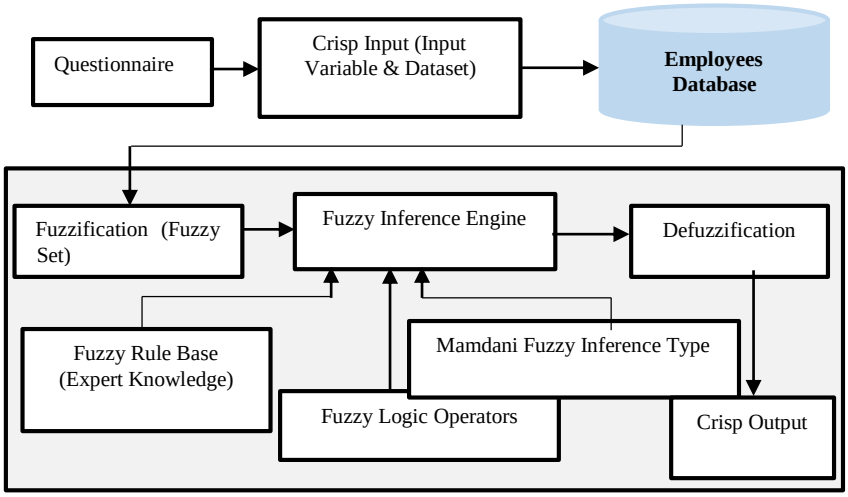


Figure 3.1: Architecture of the existing System

Disadvantages of the Existing System

i. The existing system lacked any learning capability due to the lack of a machine learning algorithm for training the dataset for better prediction results.
ii. The existing system lacked a user friendly interface for displaying staff performance evaluation results in an easily interpretable format.
iii. The existing system did not cover the appraisal of non-academic staff in their system design, which makes it unrobust.
iv. Only a few number of rules could be generated by the existing system, which implies that some performance criteria were omitted.

3.2 Algorithm of the Existing System

An algorithm is a series of steps or well defined rules followed in solving a computer-based problem. It contains finite, computer implementable instructions followed to perform a computation. The algorithm of the existing system is made up of the following steps:

Step 1: Define QQ
Where QQ = Questionnaire Questions
Step 2: Define Linguistic Categories
= Range: SA(1) – SD(5)
Where SA= Strongly Agree; SD= Strongly Disagree
Step 3: Define Fuzzy Equation (FE)
FE: A= {(,$A(x)$)} ,$x \in X$ [0,1]
A = fuzzy set (FS) of performance appraisal input variables
Map elements of FS/A to the universe of membership values, X in an
interval of [0,1].
Step 4: Define Membership Function (MF)
$(x;a,b,c)=1/1+|x-c/a|^{2b}$
Where c = center of the corresponding MF;
a ½ width;
b (together with a) controls the slopes at the crossover points.
Step 5: Define Rule Base
IF (DW is Agree) and (AR *is* Disagree/Agree)……
THEN
Performance Prediction is moderate
Step 6: Use Mamdani Fuzzy Inference to assign weights
= <3..50 : Low; 3.50-3.99: Moderate; >3.99: High
Step 7: Visualize Result using Mathplot in MATLAB
Step 8: End;

3.3 Architecture of the Proposed System

The proposed system is an enhancement of the existing system. The aim of the proposed system is to integrate learning ability into the performance evaluation process. To achieve this, we adopted a machine learning algorithm called artificial neural network (ANN) for training our data in order to correctly predict or appraise a staff's performance. The training process involved splitting our data set into training set (made up of 80% of the dataset) and test set (made up of 20% of the dataset). The dataset was generated from a record of non-academic staff of Bayelsa state Polytechnic. The data contained 100 records with 20 attributes.

In the proposed system, 10 parameters were defined which were used to map the performance evaluation rules. Table3.1 shows the parameters and their acronyms. These parameters are the yardstick for measuring the overall performance of each staff based on the data contained in the dataset used to train the system. Numerical values ranging from 10-100 were assigned to the parameters depending on the level of performance in that area. For example, Punctuality as a parameter, the values were derived from the attendance signed at the post on entrance into the institution. It is assumed that this attendance system is as transparent as

possible, which implies that data entered are not falsified. Hene, based on the punctuality rate, a value from 10 (not punctual) to 100(always punctual) is assigned to that parameter. Therefore, the parameters can also be viewed as variables for our proposed system.

The overall performance result is broken into five classes: Exceptional staff (those whose cumulative performance score is greater than 70%), etc. Table 3.2: shows the class labels and their weights.

How it Works

Python libraries such as Sklearn, Numpy and Pandas are used to preprocess the dataset by removing zero values and null values, split the data into an 80:20 ratio for train and test sets and inputted into the ANN. Initial weights are assigned for input, hidden and output layer nodes, depending on the number of nodes which we want at each level.

Finally, numbers of epochs are specified to handle the iterations. The model is trained and evaluated using Sklearn metrics such as Accuracy of training and prediction, precision, recall, etc. After the training and testing is completed, the predicted output is evaluated for error rate, i.e. rate of performance appraisals that were wrongly predicted, if the error is minimal (e.g. 2 wrong predictions out of 20 or 30 instances), the prediction result is accepted. Else, the weights of the three layers are adjusted and the model is retrained using back propagation. When the desired result is achieved, the fuzzy logic phase is initiated. The python file (.py file) containing the ANN model is imported into the performance app using the JavaScript function "onclick=exec('python MYSCRIPT.py')". Our fuzzy rule base contains linguistic variables which are our performance appraisal parameters e.g. Punctuality, etc. The fuzzy logic model takes the ANN training result as input and defines a set of rules using IF…THEN statements and maps these rules to the Linguistic variable or parameters. Recommendations are also specified in the Rule based on the performance result. For example,

"IF (Punc >= 10) && (INT >= 30) && (UoC >= 75) … (EDC >= 50)" THEN

ECHO ("Apprasial Result: Exceptional; Shotlisted for Salary Increase and possible Promotion")

The output from this stage if the final appraisal result and recommendations.

Table 3.1: Performance Parameter Definition

Performance Parameter	**Acronym**
Punctuality	Punc
Initiative	INT
Order	Or
Unity of Control	UOC
Unity of Direction	UOD
Discipline	DP
Authority & Responsibility	AR
Stability of Staff	SS
Subordination of Individual Interest to General Interest	SIIGI
Esprit de corps	EDC

Table 3.2: Class label Definition for Proposed System

Class Label	Exceptional Staff	Good	Satisfactory	Average	Poor	Unsatisfactory
Weight	>71%	61-70%	51-60%	40-50%	21-39	= <20%
IF AVERAGE (Parameters) x 100 = Weight; THEN Output = Class Label						

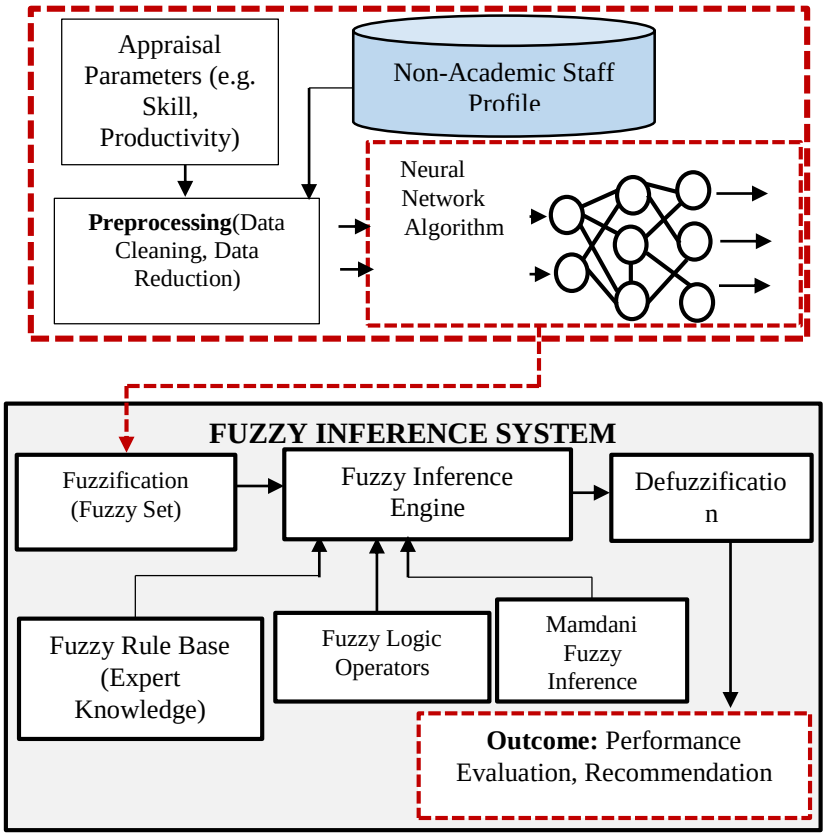


Figure 4: Architecture of the proposed system

Advantages of the Proposed System

i. The proposed system incorporated ANN algorithm to train the input data and the evaluation of the data training showed high accuracy results.
ii. The proposed system was developed with a user-friendly interface that can be easily navigated without any technical knowledge.
iii. The appraisal of non-academic staff was the focus of this study, which is an area that has been grossly neglected by other researchers.
iv. All performance criteria were covered in the fuzzy rule base development.
v. The proposed system is fast, gives accurate performance prediction in small time, and cost effective to develop.

3.4 Algorithm of the Proposed System

The proposed system algorithm is an improvement of the steps followed to implement the Existing system, with enhancements such as the introduction of parameters for appraisal and one of the input variables and the training of data using the Artificial Neural Network algorithm.

Step 1: Define PP
Where PP = Performance Parameters
PP= AR: Authority & Responsibility;
DP: Discipline; INT: Initiative, etc.

Step 2: Input Variables
Input = NAS + PP
Where NAS= Non-academic staff

Step 3: Data Preprocessing
Remove [0] Values; Delete EmpCls
Where EmpCls = Empty Cells

Step 4: Initiate ANN Training
Split data = Training Set: 80%; Test Set: 20%
Apply sigmoid fn. = 1 / (1 + np.exp(-x))

Step 5: Evaluate ANN Model
Accuracy; F1-score; Precision; Recall

Step 6: Define Performance Categories
= Range: ES (1) – VP (6)
Where ES= Exceptional Staff; VP= Very Poor

Step 7: Define Fuzzy Equation (FE)
FE: $A= \{(,A(x))\} ,x \in X$ [0,1]
A = fuzzy set (FS) of performance appraisal input variables
Map elements of FS/A to the universe of membership values, X in an
interval of [0,1].

Step 8: Define Membership Function (MF)
$(x;a,b,c)=1/1+|x-c/a|^{2b}$
Where c = center of the corresponding MF; a:½ width; b (together with a) controls the slopes at the crossover points.

Step 9: Define Rule Base
IF (AR is true) and (INT*is*true/false)……
THEN Performance Prediction is Exceptional

Step 10: Use Mamdani Fuzzy Inference to assign weights = <20%: Unsatisfactory; 21-39: Poor; 40-50%: Average; 51-60%: Satisfactory; 61-70%: Good; >70%: Exceptional

Step 11: Output Staff Appraisal & Recommendation on GUI
Step 12: End;

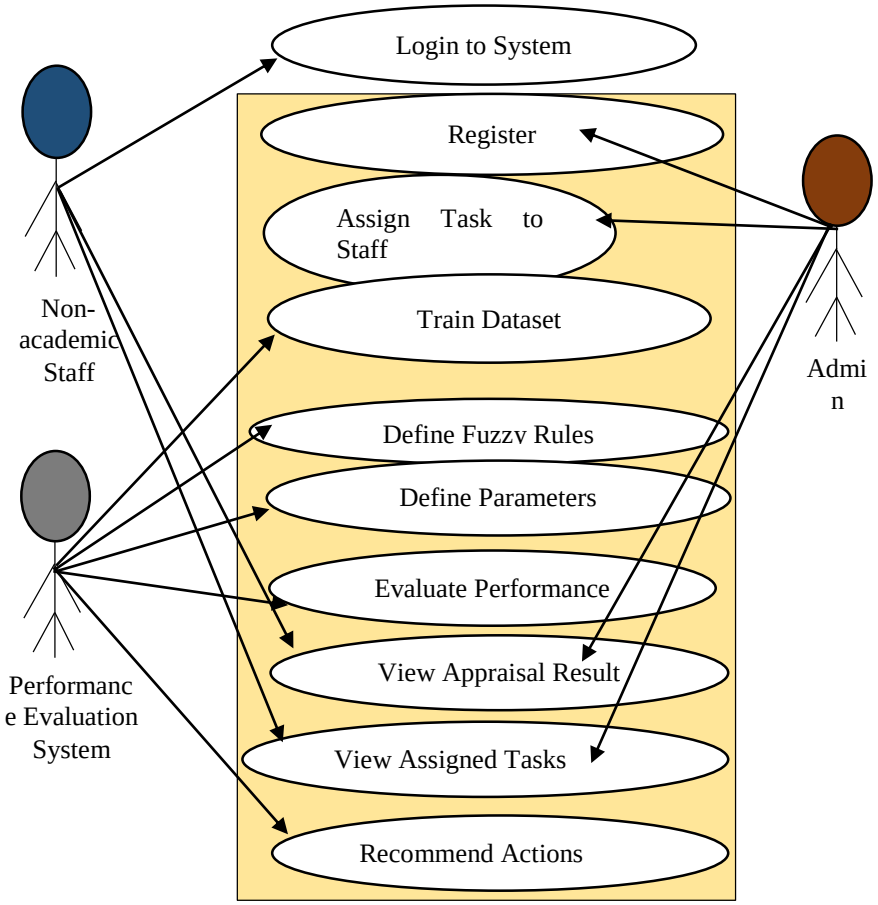


Figure3.3: Usecase diagram of the proposed system

3.5 Implementation

The system was implemented using Python programming language and Hypertext Markup Language (HTML). Python was used for data preparation, feature extraction and for building of the fuzzy model. HTML was used for designing the user interface using the web framework. Python libraries such as Sklearn_Metrics were used for the performance evaluation of the system to determine its efficiency and accuracy level.

3.0 DISCUSSION OF RESULTS

The first step of the implementation was to generate a dataset of performance evaluation of Non-academic staff (None was found in online repositories). Our dataset was made of 100 records randomly generated, and 14 attributes which represent the performance parameters.

The training of the ANN was performed in Python using the Jupyter Notebook IDE, started using the anaconda prompt or command line interface. Python libraries such as Numpy, Pandas, TensorFlow, Matplotlib and Sklearn were imported in the program to read, process, analyze and train the model, predict outcomes using test data, and evaluate the model's performance. Numpy was used to handle large data, arrays and matrices and provides mathematical functions to operate on these data. Pandas was used for data manipulation especially numerical data and time series using its inbuilt data structures. Matplotlib lib was used for data visualization in python. It provides functionalities for plotting charts, graphs and even GUIs for advanced applications. Python was also used for data preprocessing, by checking for zero values and auto-generating values to replace the zero values and empty spaces.

```
Epoch 1/100
3/3 [==============================] - 0s 3ms/step - loss: 0.6951 - accuracy: 0.5125
Epoch 2/100
3/3 [==============================] - 0s 7ms/step - loss: 0.6836 - accuracy: 0.5375
Epoch 3/100
3/3 [==============================] - 0s 7ms/step - loss: 0.6731 - accuracy: 0.5500
Epoch 4/100
3/3 [==============================] - 0s 7ms/step - loss: 0.6630 - accuracy: 0.5750
Epoch 5/100
3/3 [==============================] - 0s 3ms/step - loss: 0.6529 - accuracy: 0.6000
Epoch 6/100
3/3 [==============================] - 0s 8ms/step - loss: 0.6437 - accuracy: 0.6250
Epoch 7/100
3/3 [==============================] - 0s 3ms/step - loss: 0.6347 - accuracy: 0.6375
Epoch 8/100
3/3 [==============================] - 0s 3ms/step - loss: 0.6265 - accuracy: 0.6375
Epoch 9/100
3/3 [==============================] - 0s 6ms/step - loss: 0.6178 - accuracy: 0.6625
```

Figure 3.4: Neural Network Training in 100 Epochs

```
[[0 0]
 [1 1]
 [1 1]
 [1 1]
 [1 1]
 [1 1]
 [1 1]
 [1 1]
 [1 1]
 [0 1]
 [1 1]
 [0 0]
 [1 1]
 [1 1]
 [1 1]
 [1 1]
 [1 1]
 [1 1]
 [1 1]
 [0 0]]
```

Figure 3.5: Actual Performance VS Predicted Performance Output

The dataset was split into training and testing set, with 80% of the data used for training and 20% of the data for testing the model after development. The splitting was performed using the special python function "train_test_split". The training was set to 100 Epochs. One Epoch is completed when a complete dataset is cycled forward and backward through the neural network or you can say your neural network has watched the entire dataset for once. It is also referred to as the number of iterations. Figure3.5 shows the ANN watching the dataset for each epoch until it completes the set value.

The data was successfully trained, and when tested it accurately predicted the performance of 19 Non-academic staff out of the 20 records used for testing the network. This is shown in figure 3.6. We then imported the Sklearn library to perform the ANN training and testing.

The next phase is the application development phase, where the actual user interface containing the fuzzy rules was created. This application was created using PHP, JavaScript and HTML. The python script containing the training code was imported into this application to provide a machine learning capability to the system.

Figure 3.6 shows the registration page for the employees whose information have not been already stored in the database. This is important for every organization in order to keep track of certain information pertaining to their employees. Some of the fields required in this form include,

Full name, username, password, current salary, last date of promotion, current level, date of employment, etc. these details are then inserted into the database created specially to hold this data, as shown in figure 3.8. The username and password created by the staff will be used subsequently each time they want to access the system to perform certain tasks or view their information. The login page is shown in figure 3.7 this form will only accept usernames and passwords stored in the database as a form of verification. Each time an input is entered into the form, it searches the database for matching records and if found, validates the user and navigates them to the desired page, else, the system returns an error message for "invalid username or password".

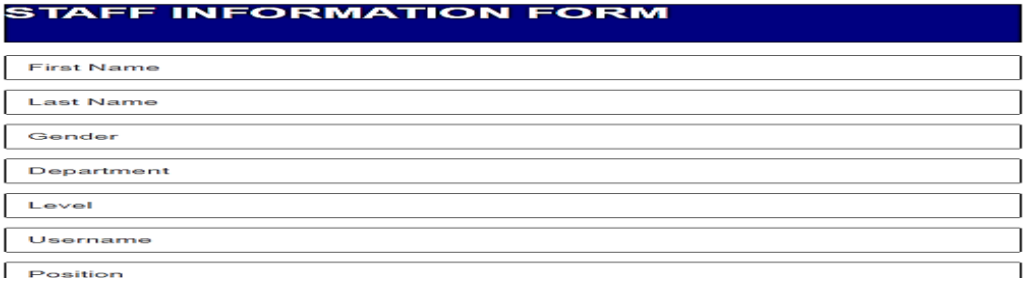


Figure 3.6: Non-Academic Staff Registration Page

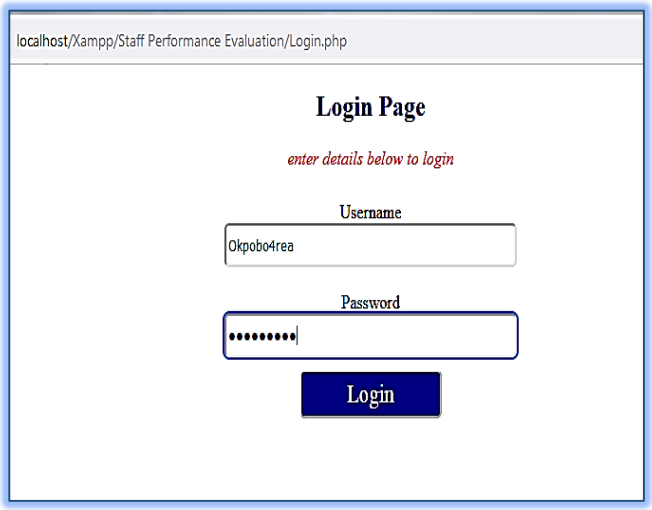


Figure 3.7: Login Page

The system allows the admin to assign tasks to the various Non-academic staff connected to this system. These tasks are monitored and a report is presented showing the outcome, performance and other details involved in the execution of the task.

Fuzzy inference rules were generated by mapping defined IF conditions to the six (6) different categories of performance defined in this work, which include: Exceptional, Good, Satisfactory, Average, Poor, and Unsatisfactory. The IF ELSE rules were defined to cover all the scenarios for the test data, which sums up to a total of 20 rules defined for all the staff in this organization. JavaScript and PHP were used to define these rules using their powerful conditional statement functions to determine the performance range for the system. The performance classification was carried out accurately for all the test cases carried out so far, which demonstrates the efficiency of our system in the accurate prediction of the performance of a non-academic teaching staff using the Neuro-fuzzy approach. The system predicted more accurately than any of the existing system currently designed for the same purpose.

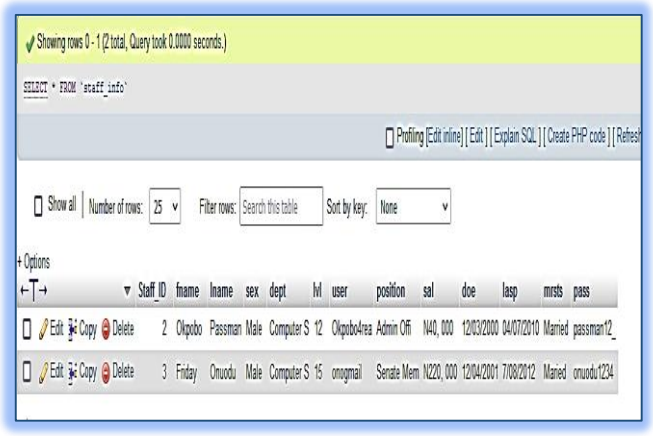


Figure 3.8: Database of Staff

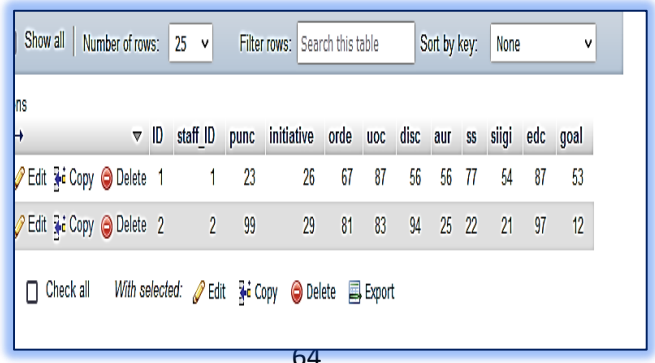


Figure 3.9: Database of Performance

Figure 3.9 contains the database for all the performance scores entered for each staff and duly identified using the unique staff number.

The query accepts a unique input called "Staff ID", with which it searches the performance records of the staff with the inputted ID, when it gets this record from the Staff Information database, it crosschecks the performance scores and the average performance of the staff with the ID on the Performance Evaluation database, once this data is gotten, it checks for the fuzzy rule that matches the stream of data gotten from the performance evaluation table and evaluates the staff based on that rule. The data used for this testing are in the test set recorded in Table 4.2.

For example, we want to evaluate the performance of a staff with Id = 10, this value if entered into the form shown figure 3.6 When this query is executed, the staff information database searches for a record which has its primary or unique key as 10 (note: in the staff information database, the primary key is the staff_ID.), when this record is found, it navigates to the database containing the performance records for each staff and "SELECTS" the row with Staff_ID as 10, copies the performance scores and then compares it to the fuzzy rules to determine which performance class it actually belongs to.

There are two possible outputs that can be generated from this query. The first is a successful evaluation, where the staff_ID entered is valid and such data actually exists in the database, this will generate outputs or alerts such as are shown in figure 3.10 and 3.11 The output generated is made up of: the performance class and recommendations, either positive recommendation (for good performance), or reprove remark (for poor performance).

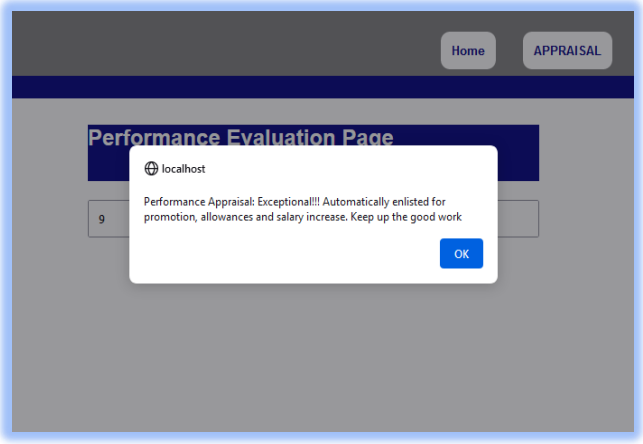


Figure 3.10: Evaluation output for Performance Grade > 70%

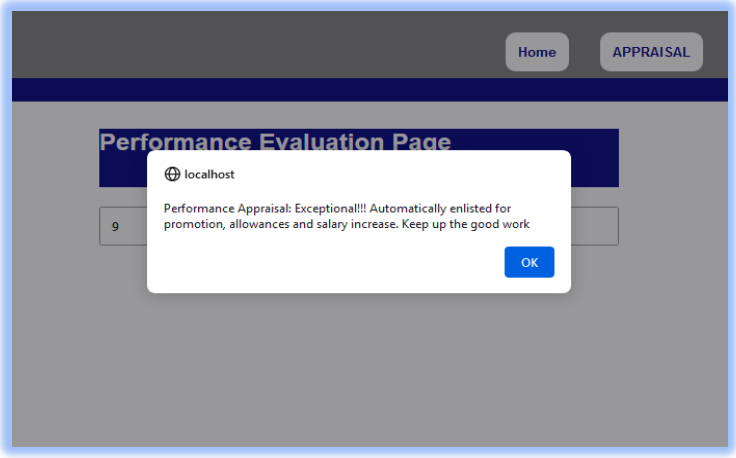


Figure 3.11: Query Result for non-existing record

The second output is generated when the query does not completely execute due to the fact that the requested record does not actually exist on the database.

4.2. Model Evaluation

After developing the Prediction model using ANN, certain parameters were used to evaluate the efficiency of the model. Some of them include: Precision, Recall (True

positives, True Negatives, False Positive and False Negative), F1-Score and Support. The overall accuracy was calculated using the sklearn.metrics function. The other parameters were derived in this way also. From the recall, the confusion matrix for the model was derived.

True positives (TP) is the number of times the model accurately predicted a true class as Positive. True negative (TN) is the number of times the model predicted a negative class as Negative. False positive (FP) is a number of times the model predicted a negative class as positive. False negative (FN) is the number of times a positive class was predicted as Negative.

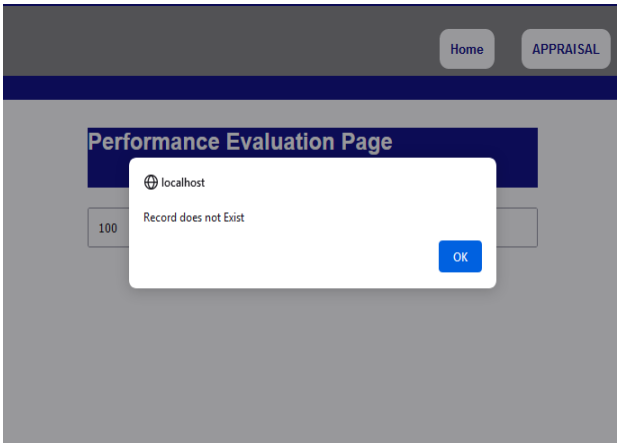


Figure 4.10: Figure 4.11: Evaluation output for Performance Grade between 61 & 69%

Figure 4.1 shows the performance evaluation chart of proposed system against existing system, using values in the evaluation table.

Table 4.1: Evaluation of the Proposed System against the Existing System

S/N	Parameters	Existing System	Proposed System	Parameters
1.	Accuracy	75%	95%	Accuracy
2.	Precision	75%	100%	Precision
3.	F1-Score	80%	94.1%	F1-Score
4.	Recall	75%	96.7%	Recall
5.	Time Complexity	5 Minutes	1 Minute	Time Complexity
6.	ROC AUC	72%	75.0%	ROC AUC
7.	Mean Square Error	0.08	0.1	Mean Square Error

Table 4.1. shows the proposed system and existing system performance using parameters mentioned above.

The various parameters are calculated as follows:

Precision = TP / (TP + FP)

Recall = TP / (TP + FN)

F1_Score = (2 * Precision * Recall) / (Precision + Recall)

Where TP= 18; FN = 0; FP = 0; TN= 2

The Area under Curve of the proposed system was plotted in python using the actual class against the predicted class values as input. Also the values recorded for the parameters were calculated using Python functions found in Sklearn.metrics.

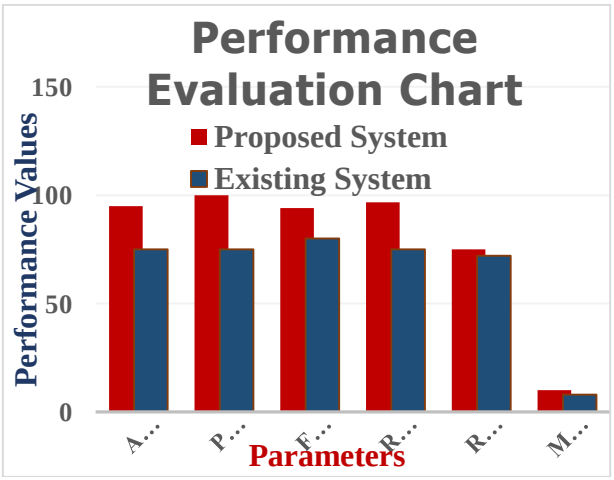


Figure 4.1: Performance Evaluation of Existing system against Proposed System

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The study concluded on the importance of performance appraisal for non-academic staff of Bayelsa Polytechnic. Performance appraisal or evaluation facilitates better performance and better work output in any organization, especially in the academic setting. It helps to identify staff who have contributed immensely towards the achievement of the organizational goals. ANN is very powerful machine learning algorithm that accurately trains and classifies data with minimal error. This algorithm was adopted to train our staff performance dataset. This algorithm was chosen because it efficiently handles complex patterns datasets which do not have defined outputs or targets. Fuzzy Logic was also adopted to design an inference engine for building a rule base which effectively assigns maps parameters or variables to their outputs. Our dataset was generated locally, containing 100 records and 20 attributes. This system will tackle the inefficiencies of the existing appraisal systems and bring ease in non-academic staff performance evaluation.

REFERENCES

Abaidullah, A. M., Ahmed, N. & Ali, E. (2015) "Identifying Hidden Patterns in Students Feedback through Cluster Analysis." *International Journal of Computer Theory and Engineering*, Vol. 7, issue 1, pp. 6.

Adefowoke, O.B., Arogunade, O.T., Asogbon, M.G., & Adeniyi, B.S. (2018) "Fuzzy driven decision support system for enhanced performance appraisal." *International Journal of Information & Computing Sciences*, Vol.13 Issue 2, PP. 131-140.

Agalamanyi, P., Senbagavalli, M., & Sakthivel, B. (2015). "Evaluation of Employee Mental Health using Artificial Neural Network." *International Journal of Emerging Technology in Computer Science & Electronics (IJETCSE)*. Vol. 18, pp112-120.

Agaoglu, M.. (2016). "Predicting Instructor Performance Using Data Mining Techniques in Higher Education." *IEEE Access*, Vol.4, pp. 2379-2387.

Ahmed, A., Pawlicki, M., Tomaszewska, R., Choraś, M. & Gerlach R. R. (2020) Innovative machine learning approach and evaluation campaign for predicting the subjective feeling of work-life balance among employees. PLoS ONE vol. 15, issue 5. 2020..https://doi.org/10.1371/journal.pone.0232771

Ahmed, A.M., Rizaner, A., & Ulusoy, A.H. (2016) "Using data mining to predict instructor performance". *Procedia Computer Science* Vol. 102. Pp. 137-142.

Arora, N., Saini, J.K.R. (2013) "A fuzzy Probabilistic Neural network for students' Academic Performance evaluation;" *International Journal of Innovative Research in Science* vol. 2, issue 9: pp. 4425-4432.

Asanbe, M.O., Osofisan, A. O. & William, W. F. (2018) "Teachers' Performance Evaluation in Higher Educational Institution using Data Mining Technique." *International Journal of Applied Information Systems (IJAIS).*

Constance, B. (2009) "A fuzzy logic model for performance evaluation."*Advanced Modelling and Optimization*, vol. 15, issue 3, pp. 1-19.

DeNisi and Pritchard (2006). Management and improving Individual Performance. *Journal of Human Resource and Sustainability Studies,* 4(4):

Dennis, H., Tseng, J., Yen, Y., & Huang, C. (2011). "University Staff Performance Evaluation Systems, Organizational Learning, and Organizational Identification in Taiwan." *Social Behaviour and Personality* vol. 39, issue 1, pp. 43-60.

Fateh A., & Ahmad, M.E.S. (2013) "Data Mining in Teacher Evaluation System using WEKA." *International Journal of Computer Applications*. vol. 63, issue 10.

Guruprasad, M., Sridhar, R. & Balasubramanian, S. (2016) "Fuzzy logic as a tool for evaluation of performance of faculty in higher education institutions." *Web of Conferences.* Vol. 26, pp. 1-7.

Hemaid, R., & El-Halees, A.M. (2015) "Improving Teacher Performance using Data Mining." *International Journal of Advanced Research in Computer and Communication Engineering* vol. 4, issue 2.

Heyel, W.H., Wang, C.S., Lee, C.S., S.W., Lin, P.H. & Hung, (2014) "Type-2 Fuzzy Set Construction and Application for Adaptive Student Assessment System." IEEE International Conference on Fuzzy Systems (FUZZ-IEEE), 6-11 July 2014, Beijing, China, 888-894, doi: 10.1109/FUZZ-IEEE.2014.6891894

Javadi, A., Kume, C. & Thakur, G.S.M.. (2014) "Design and implementation of fuzzy rule based expert system for employee's performance appraisal in I.T organizations." *International Journal Intelligent Systems and Applications*, vol. 8, pp. 77-86. 2014. DOI: 10.5815/ijisa.08.09.

Kamath R.S. (2014) "Design and Development of Soft Computing Model for Teaching Staff Performance Evaluation." *International Journal of Engineering Sciences & Research Technology,* vol. 3, issue 4, 3088-3094.

Kharola, A., Kunwar, S. & Choudhury, G.B. (2015) "Student's performance evaluation: a Fuzzy logic reasoning approach". *PM World Journal*. Vol. 4, issue 9, pp. 1-11.

Kumar, S. (2017). "Modern Data Mining Method for Assessment of Teaching Assistant in Higher Educational Institutions." *International Journal of Computer Science and Information Technologies*, vol. 8, 3, pp. 424-429.

Macwan, N. & Sajja, P.S. (2013). "Performance Appraisal using Fuzzy evaluation methodology." *International Journal of Engineering and Innovative Technology (IJEIT).* Vol. 3, issue 3, pp. 324-329.

Magesh, L.A., Nsude, I., Nwafor, K.A., Oginyi, R.C.N., & Ugwuanyi, C.U. (2018) "Evaluation of work attitude and job performance among non-teaching staff of a Nigerian University." *International Journal of Humanities and Social Sciences* (IOSR-JHSS), vol. 23, issue 8, pp. 71-80

Ndambakuwa, S., Mulla, A., & Mudholkar, R.R. (2017) "Best Student award- A fuzzy evaluation approach." *International Journal of Computer Science and Communication* vol. 3, issue 1, pp. 9-12.

Neogi, A., Mondal, C.A. & Mondal, S.K. (2011) "A cascaded fuzzy inference system for university non-teaching staff performance appraisal.". *Journal of Information Processing Systems* vol. 7, issue 4, pp. 11-21.

Ola, N., & Pal, R. (2013) "Data mining approach for evaluation of instructors' performance in higher institution of learning using machine learning algorithms.." *International Journal of Innovative Research in Science* vol. 2, issue 9: pp. 4425-4432.

Pal, A.K., & Pal, S. (2013) "Evaluation of teacher's performance: a data mining approach." *IJCSMC* vol. 2, issue 12, pp. 359-369.

Saleh, I., & Kim S. (2009) "A fuzzy system for evaluating students learning achievement." *Expert system with Application* vol. 36: pp.6236-6243, doi: 10.1016/j.eswa.07.088.

Singh, S. B. & Kharola, A. (2013) "Development of fuzzy logic model for performance rating (PR) of employee's." *Advanced Modelling and Optimization*, vol. 15, issue 3, pp. 839-853.

Taylor, S. (2005) "People resourcing." 3rd Edition, London: Chartered Institute of Personnel & Development; 3rd edition (August 1, 2005).

Turk, K. "Performance management of academic staff (AS) and its effectiveness to teaching and research-based on the example of Estonian Universities". *TRAMES*, vol. 20, issue 70, pp. 1-20.

Vijayalakshmi, V., Panimalar, K., & Janarthanan, S.S. (2020) "Predicting the performance of instructors using Machine learning Algorithms." *High Technology Letters.* 26(12), 694-705.

Yahya A.A., Osman A., & Khairi M. (2016) "Mining educational data to analyze teaching effectiveness." *Journal of Theoretical and Applied Information Technology,* vol. 89, issue 1, pp. 267-280.

AN INVESTIGATION INTO THE EFFECT OF SOCIAL MEDIA ADDICTION ON POLYTECHNIC LIBRARY USERS IN NIGERIA

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Abstract
The purpose of the study is to investigate the effect of social media addiction on polytechnic library users in Nigeria and to find out the most common social media activities the students engage in. Questionnaire was used to collect data from 299 Polytechnic library users in Nigeria. The results show that the most popular social media used by the students of Federal Polytechnics in Nigeria are WhatsApp, Facebook, YouTube, and Twitter. This reveals that the students in the Federal Polytechnics use the social media apps to engage in activities such as entertainment & fun, social communications such as birthdays, making friends, etc. online business, and searching for information. Only few use the social media apps for academic purposes. The results revealed that almost half of the Federal Polytechnic students engage in social media for more than 2 hours a day. The study also revealed that the extent of social media addiction among the library users of the selected federal polytechnics in Nigeria is high. The results revealed that the students of the selected Federal Polytechnics in Nigeria agree that to a great extent the excessive use of social media affect their studies. Therefore, it is concluded that there is a general tendency among students to exhibit behaviors associated with social media addiction. The results of the study will inform education authorities, Polytechnic management, healthcare practitioners, library directors, researchers, parents and students on the extent of social media usage and the academic implications.

Keywords: Social Media tools, Social Media Addiction, library users, polytechnics, Nigeria.

1.0 INTRODUCTION

Social media (e.g. Twitter, Facebook or WhatsApp, etc) has been deeply embedded in people's daily lives. Users are increasingly inclined to cultivate their virtual social life on social media platforms. Social Networking Sites (SNSs) are virtual communities where users can create individual public profiles, interact with real-life friends, and meet other people based on shared interests. They are seen as a 'global consumer phenomenon' with an exponential rise in usage within the last few years (Ostovar et al., 2016). Social media users spend many hours communicating with an acquaintance and reading new posts while ignoring the negative consequences of problematic usage (Dhir et al., 2018). Moreover, the excessive use of social media could bring psychological, social and work difficulties to users such as reduced productivity, increased work pressure (Yu et al., 2018). Anecdotal case study evidence suggests that 'addiction' to social networks on the Internet may be a potential mental health problem for some users (Ostovar et al., 2016).

Social media addiction can be defined as spending too much time on the social media sites (SNSs) on the Internet, accompanied by psychological dependence on overuse of the Internet (Hsieh, 2019). It has been discovered that instead of engaging in academic activities, students spend nearly all the time chatting and browsing the social networking sites (Kuss & Griffiths,2011). On the Internet, people engage in a variety of activities some of which may be potentially to be addictive. Rather than becoming addicted to the medium per se, some users may develop an addiction to specific activities they carry out online (Griffiths, 2000). Most scholars describe Internet Addiction (IA) as an impulse control disorder characterized by excessive or poorly controlled preoccupations, urges or behaviours regarding computer use and Internet access that lead to impairment or distress (Wang, Ren, & Long, 2019).The clinical application of IA may be supported by prior research that has demonstrated associations with a number of psychological impairments, such as low levels of well-being, self-esteem, and self-control (Mei et al., 2016); poor social support; sleep problems; and depression, anxiety, stress, and loneliness (Ostovar et al., 2016).SNSs are "web-based services that allow individuals to: (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system" (Boyd & Ellison, 2008).

Shapira et al. (2003) reported that excessive use of the Internet longer than expected is more likely to result in addictive behavior. Young and De Abreu, (2011) reported that the psychopathologic symptoms of Internet addiction includes salience and solitary life style. The use of social media in education provides students with the ability to get more useful information, to connect with learning groups and other educational systems that make education convenient. Social network tools afford students and institutions with multiple opportunities to improve learning methods (Ahmad, et al. 2020). However, some students have diverted social media usage towards non-educational, un-ethical and inappropriate actions and behaviours. The aim of this study is therefore to investigate the effects of social

media addiction on Polytechnic, Library users in Nigeria. To achieve this, five research questions are raised to guide the study. They are:

Research Questions

1. What is the most common social media app the Polytechnic library users usually connect to?
2. What are the most common social media activities the students engage in?
3. How long do the Polytechnic library users spend on social media apps in a day?
4. What is the extent of social media addiction among the Polytechnic library users?
5. To what extent does the excessive social media use affect the students' studies?

2.0 LITERATURE REVIEW

Social media apps used by students

Social media refers to the means of interaction among people in which they create, share, exchange and comment among themselves in different networks. Andreas and Michael (2010) opined that social media is a group of internet-based application that builds on the ideological foundation and allows the creation and exchange of users – generated content.

Social media has become one of the major channel of chatting through platforms such as 2go, WhatsApp, blogger, twitter, Instagram, etc. Ahmad, et al. (2020) studied usage and influence of social media on polytechnic students in Nigerian tertiary institutions and found that the social media platforms mostly used are WhatsApp, Facebook, Instagram, and YouTube; which are used mainly for socialization, information, and academic purposes and may also perhaps suggest the reason for addiction to social media. Nagel, et al (2018) in their study found that the vast majority of students had previously been active on social media. The most popular platform was Facebook, with 95.8% of students active on the platform. YouTube, Instagram, Twitter and LinkedIn were next in popularity, with usage rates of 77%, 71.3% and 69% respectively.

Online activities students engage in when using social media

Various types of online activities, such as online gaming, social networking, online gambling, online shopping, virtual sex, and information overload, are related to IA (Wu, et al. 2015). On the Internet, students engage in a variety of activities some of which may be potentially addictive (Kuss & Griffiths, 2011). A recent study by Balasubramanian and Parayitam (2023) revealed that IA is positively related to time spent on networking, video streaming, short video apps, educational apps, chat apps, online shopping apps, money involved apps, etc. Using YouTube Students can watch videos, answer questions, and discuss content. Additionally, students can create videos to share with others.

Zenebe, et al. (2021) reported that social media addiction lead to academic failure, reduced work performance, even marital discord and separation among addicts). Mariavinifa, Govindarajan, and Felix (2021) reported that degree of social media addiction is significantly associated with age and time spent daily on the internet.

Social media addiction among students

The study by Cao, et al (2020) demonstrate that social media addiction is determined by individuals' emotional and functional attachment to the platform. These attachments are in turn influenced by perceived enjoyment and social interaction. Westerman, Daniel and Bowman (2016) found that college users of social media were generally negatively influenced about the use and content of social media. Subhashini and Praveen (2018) studied social media addiction among professional college students of Hassan, Karnataka and found that out of the 300 professional college students, 173 (57.7%) were found to be social media addicted and 67 (38.7%) among them were found to be depressed. Balasubramanian and Parayitam (2023) recently studied antecedents and consequences of social media addiction among school and college students in India. The results revealed that time spent on the Internet every day is positively related to social media addiction

Bisen and Deshpande (2018) reported that there seem to be an alarming rate of social networking obsession among students today; a trend that could affect their academic, social and spiritual lives negatively if not properly controlled. . Bello (2012) observes that if the dangerous trend of social media network "obsession" if left unchecked could further affect an already collapsing education system in Nigeria. The study by Ahmad, et al. (2020) reported that Internet addiction level was (47%), distraction (35%), anti-social behaviour (7%), cyber bullying (2%), and writing and spelling skills deficiency (28%) as the influences of social media on polytechnic studies

As IA has the potential to result in psychological distress, anxiety, low esteem, aggression and even suicide, it is necessary to examine the extent to which students engage in the Internet using social media in terms of how much time they spend on unproductive and non-business use. Undergraduates spend more time on Facebook, Twitter and other social media through smartphones that are now in abundance among the youths (Balasubramanian &Parayitam 2023). Many students cannot go for two-three hours without checking and updating their profiles on these social networks even at the detriment of other activities such as educational and career pursuit. In a study of 884 students of different universities in Nigeria, Olowu and Seri (2012) revealed that students in Nigeria are spending too much time on social networking sites at the detriment of other necessary things such as their studies. They explained that youths' use of these social networking sites even to the point towards

obsession. The youths have made the social media their top priority and continued to need more usage in order to feel satisfied. Today, students are exposed to social media platforms on a daily basis; they use desktop computers, laptops, tablets and mobile phones to actively engage in social media platforms for chatting, blogging, content sharing and online learning purposes (Cassidy, Griffin, Manolovitz, Shen, &Turney, 2011). students spend much of their study time on social media rather than in their academic undertakings and this have an adverse effect on their academic performance. Felisoni and Godoi (2018; p.179) also reported that, the amount of time spent using a cellphone is negatively associated with academic performance

3.0 RESEARCH METHODOLOGY

The study covered library users in polytechnic libraries in the South-South and South-East of Nigeria. The population of the study consist of all the registered library users of the federal polytechnics in South-South, Nigeria. These include the registered library users of the Federal Polytechnic Ukana, Akwa-Ibom State, Federal Polytechnic Ekowe, Bayelsa State, Federal Polytechnic, Ugep, Cross River State, Auchi Polytechnic, Auchi, Edo State, and Federal Polytechnic of Oil and Gas, Bonny, Rivers State. Questionnaire was used to collect data from students of the various polytechnics. Convenient sampling technique was used to collect data from the respondents. The researcher administered the questionnaires to the students with the help of research assistants in the various polytechnics. The qualitative data collected was analyzed by means statistical package for social science (SPSS software).

4.0 RESULTS AND DISCUSSIONS

4.1 Results

A breakdown of the respondents in the various institutions are presented in Table 4.1.

Table 4.1: Population of respondents from the various institutions

Institution	State	Population (Registered library Users)
Federal Polytechnic Ukana	Akwa-Ibom State	612
Federal Polytechnic Ekowe	Bayelsa State	531
Federal Polytechnic Ugep	Cross River State	622
Auchi Polytechnic, Auchi	Edo State	1,008
Federal Polytechnic of Oil and Gas, Bonny	Rivers State	429
Total		3202

Source: Registered Library Users 2022/2023

Class and gender distribution of the respondents are presented in Table 4.2

Table 4.2: Class and gender distribution of the respondents

Class level	No. of respondents	Percentage
ND 1	67	22.4%
ND 2	53	17.7%
HND 1	78	26.1%
HND 2	101	33.8%
Total	299	100%
Gender		
Male	127	42.5%
Female	172	57.5%
Total	299	100%

Social media apps that the students usually connect to

Percentage distribution of population of respondents according to types of social media usually connected to are presented in Fig 4.1

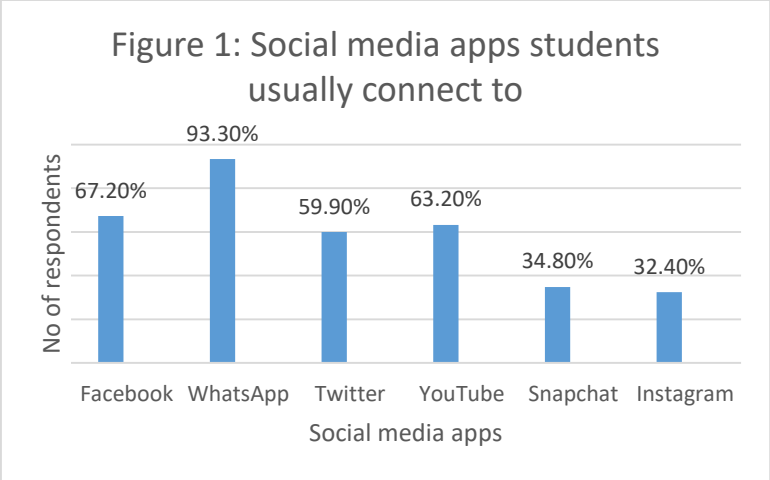


Fig 4.1: Social media apps students usually connect to.

Most common social media activities students engage on in social media are presented in Fig 4.2

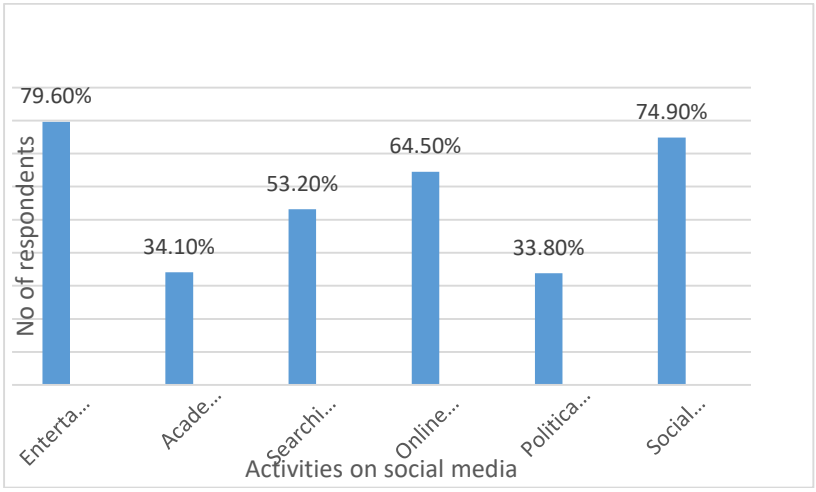


Fig 4.2: A graphical representation of distribution most common social media activities of respondents

A graphical presentation of the length of time in hours that users spend on social media per day is in Fig 4.3

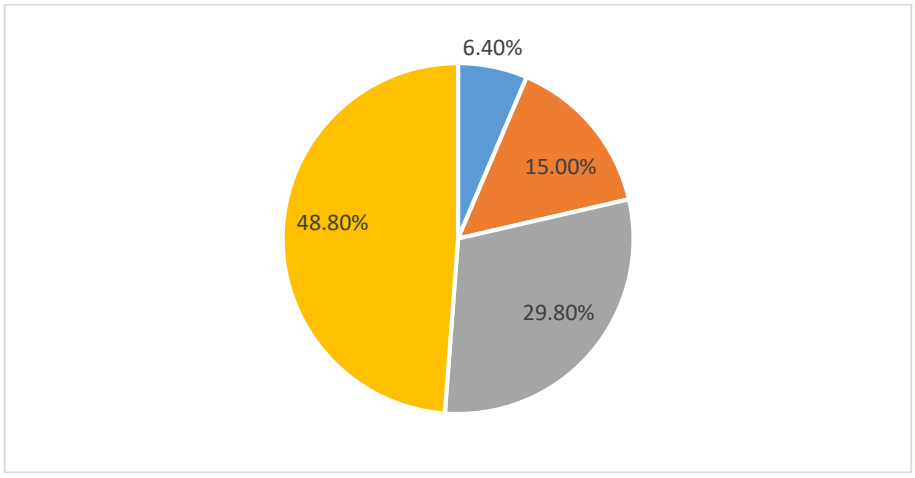


Fig 4.3: A graphical presentation of the length of time in hours that users spend on social media per day

The extent of excessive use of social media and effect on students' studies are presented in Fig 4.4

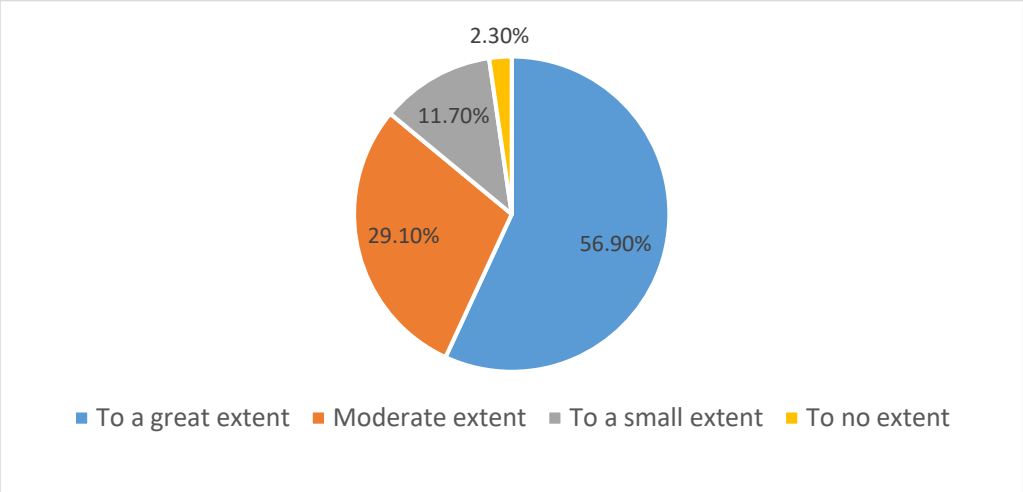


Fig 4.4: The extent of excessive use of social media and effect on students' studies.

4.2 Discussion of findings

The population of the study (registered library users) is 3202 students while 299 registered users were sampled. The population distribution of according to schools presented in Table 3.1. The data reveal that 612 registered library users in Federal Polytechnic Ukana, Akwa-Ibom State, 531 in Federal Polytechnic Ekowe, Bayelsa State, 622 in Federal Polytechnic Ugep, Cross River State, 1,008 in Auchi Polytechnic, Auchi, Edo State and 429 in Federal Polytechnic of Oil and Gas, Bonny, Rivers State. Academic levels and gender distribution of the respondents are shown in Table 4.2. It reveals that 67 ND1 students participated, 53 ND 2, 78 HND 1 and 101 HND 2.

Percentage distribution of population of respondents according to types of social media usually connected to are presented in Fig 4.1. The Results reveal that whatsApp is the most popular social media App used by students followed by Facebook, while Instagram is the least commonly used App. List of most common activities students engage in social media are presented in Fig 4.2. This reveals that the students in the Federal Polytechnics use the social media apps to engage in activities such as entertainment & fun, social communications such as birthdays, making friends, etc. online business, and searching for information. Only few use the social media apps for academic purposes. .It is demonstrated that the most common activities students engage in on social media is entertainment and fun (79.60%) followed by social communication (74.90%) and quiet unfortunate academic activities is least that students engage in on social media.

A graphical presentation of the length of time in hours that users spend on social media per day is in Fig 4.3. Analysis show that majority of the respondents (48.80%) indicated that they spend more than two hours in a day on social media. 29.80% of respondents spend 1-2 hours a day on social media, 15% of respondents spend 30minutes -1 hour a day on social media while 8.40% of respondents spend 10-15 minutes a day on social media. The results of the evaluation of the extent of excessive use of social media and effects on student studies are presented in Fig4.4. The result show that excessive use of social media affects student studies to great extent (56.90%), moderate extent is rated (29.10%), to a small extent 11.7% while to no extent is rated 2.30%.

Statistical evaluation of significance of the extent of social mediation addiction among the student show that the aggregate mean is 3.41 which is higher than the criterion mean (3.00). This signifies that the extent of social media addiction among the polytechnic library users is high. Therefore, it was concluded that there is a general tendency among students to exhibit behaviors associated with social media addiction. Wiley and Sisson (2006) argued that the previous studies have found that more than 90% of tertiary school students use social networks.

The findings of this study also reinforced the earlier findings of Owusu-Acheaw and Larson (2015) that students mainly used social media sites to chat rather than for academic purposes. Students tend to connect with friends for chatting purpose rather than to engage in conversation to seek academic knowledge. For example, Anyanwu, Ossai-Onah and Iroeze (2013) studied use of social media tools among Nigerian undergraduates in tertiary institutions in Imo State, Nigeria and found that Nigerian undergraduates have knowledge of social media tools and are using the tools majorly for communication with friends and information sharing among fellow students. Social networking sites although has been recognized as an important resource for education today, studies however show that students use social networking sites such as Facebook for fun, to kill

time, to meet existing friends or to make new ones (Ogedebe, Emmanuel & Musa, 2012).

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Academic distraction is a primary concern for educators as the learning environment continually evolves. With the advent of personal digital devices, students have more temptations than ever before to engage in media multitasking. Social media addiction has become chronic in the present-day digital world. Therefore, it is necessary to take rectification measures to avoid facing the perils of social media Addiction. The findings of this study will be useful to education authorities as considering the increasing trend of social media addiction in the recent years. The high prevalence of social media addiction among students is of great concern therefore it is pertinent for authorities to develop a national policy for the use of the Internet among students. If this is not addressed as a priority, the country must anticipate a large population dependent on the Internet, requiring medical attention.

5.2 Recommendations

Based on the findings, the following recommendations are made:

I. Cell phones use should be banned from classroom mostly during lectures.

II. One way parents can prevent their children from getting addicted to Internet is to provide them a digital gadget with educational App without entertainment app.

III. As the Internet has entered people's lives during the present digital era, it is more likely that the younger generation may misuse the available technology and get addicted to the net. To avoid this, the parents must educate their children about the dangers of social media addiction and communicate to them to use the internet for productive and business purposes.

IV. Students should better manage their study time in and prevent distractions that can be provided by the social media. There should be a decrease in the number of time spent by students when surfing the net.

V. The use of social media network by students should focus on the academic relevance of those sites instead of using them for negative purposes.

REFERENCES

Ahmad, A.,Yakubu, N. D., Sulaiman, A. H.,&Abdullahi, A. H. (2020). Usage and Influence of Social Media on Polytechnic Students in Nigerian Tertiary Institution. *Journal of African Sustainable Development,* 20 (2), 313-328.

Andreas, M & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media". *Business Horizons*, 53 (1). p. 61.

Anyanwu, E U., Ossai-Onah, V.O. & Iroeze, P. (2013). Use of Social Media Tools Among Nigerian Undergraduates in Three Selected Tertiary Institutions in Imo State, Nigeria. *Information Impact: Journal of Information and Knowledge Management,* 4 (2), 46-52

Balasubramanian, N. & Parayitam, S. (2023). Antecedents and consequences of Internet addiction among school and college students: evidence from India. *Global Knowledge, Memory and Communication*, 72 (8/9), 813-834.

Bisen, S.S., & Deshpande, Y.M. (2018). Understanding internet addiction: a comprehensive review, *Mental Health Review Journal*, 23(3), 165-187.Boyd, D.M. & Ellison, N.B. (2008). Social network sites: Definition, history, and scholarship. *Journal of Computer Mediated Communication*, 13, 210-230.

Cao, X., Gong, M., Yu L., &Dai, B. (2020). Exploring the mechanism of social media addiction: an empirical study from WeChat users. *Internet Research* 30 (4), 1305-1328.

Cassidy, E., Britsch, J., Griffin, G., Manolovitz, T., Shen, L., &Turney, L. (2011). Higher education and emerging technologies: Student usage, preferences, and lessons for library services. *Reference and User Services Quarterly,*50(4), 380-391.

Dhir, A., Yossatorn, Y., Kaur, P. & Chen, S. (2018). Online social media fatigue and psychological wellbeing—a study of compulsive use, fear of missing out, fatigue, anxiety and depression. *International Journal of Information Management*, 40 (2), 141-152.

Felisoni, D. D., & Godoi, A. S. (2018). Cell phone usage and academic performance: Anexperiment. *Computers & Education*, 177, 175–187.

Griffiths, M. (2000). Does Internet and computer ‘‘addiction’’ exist? Some case studyevidence. Cyber psychology and Behavior, 3, 211–218.

Kuss, D, Griffiths, M. (2011). Online Social Networking and Addiction: A Review of thePsychological Literature. *International Journal of Environmental Research in Public Health*, 8, (2), 3528-3552.

Mariavinifa, X, Govindarajan, P.K, &Felix, J.W.A. (2021). Prevalence and associated factors of Internet addiction among college students using smartphone in Tamil Nadu: a cross-sectional study. *International Journal of Community Medicine and Public Health*, 8 (3), 4525-4530.

Mei, S, Yau, Y.H.C., Chai, J., Guo, J., & Potenza M.N. (2016). Problematic Internet use, well-being, self-esteem and self-control: Data from a high-school survey in China. *Addictive Behavior*, 61:74-9.

Nagel, T. W. S., Remillard, C., Aucoin, R., &Takenishi, A. (2018). Findings on Student Use of Social Media at the Collegiate, Undergraduate, and Graduate Levels: Implications for Post-Secondary Educators. *Journal of University Teaching & Learning Practice*,15(1), http://ro.uow.edu.au/jutlp/vol15/iss1/8

Ogedebe, P. M., Emmanuel, J. A., & Musa, Y. (2012). A survey on Facebook and Academic Performance in Nigeria Universities. *International Journal of Engineering Research and Applications (IJERA)*, 2 (1), 788-797.

Olawade, D. B., Olorunfemi, O. J., Wada, O. Z., Afolalu, T. D. & Enahoro, M. A. (2020). Internet Addiction among University Students during Covid-19 Lockdown: Case Study of Institutions in Nigeria *Journal of Education and Human Development*,9 (4), 165-173.

Olowu, A. O., & Seri, F. O. (2012). A study of social network addiction among youths in Nigeria. *Journal of Social Science and Policy, Review*, 4 (2), 23-34.

Ostovar, S., Allahyar, N., Aminpoor, H., Moafian, F., Nor, M. B. M., & Griffiths, M. D. (2016). Internet addiction and its psychosocial risks (depression, anxiety stress and loneliness) among Iranian adolescents and young adults: A structural equation model in a cross sectional study. *International Journal of Mental Health and Addiction*, 14(3), 257-267.

Owusu-Acheaw, M., & Larson, A. (2015). Use of social media and its impact on academic performance of tertiary institution students: A study of students of Koforidua Polytechnic, Ghana. *Journal of Education and Practice*, 6(6), 94-101.

Shapira N.A., Lessig, M.C., Goldsmith, T.D., Szabo, S.T., Lazoritz, M., Gold, M.S., & Stein, D.J. (2003). Problematic internet use: proposed classification and diagnostic criteria, *Depression and Anxiety*, 17(4), 207-16.

Subhashini, K.J, &Praveen, G. (2018). An era of digital slavery: a study on internet addiction among professional college students of Hassan, Karnataka. *International Journal of Community Medicine and Public Health*, 5 (2), 2977-83.

Talaue, G. M., Alsaad, A., AlRushaidan, N. &AlHagail, A. (2018). The impact of social media on academic performance of selected college students. *International Journal of Advanced Information Technology*, 4, 27-35.

Wang Q, Ren H, &Long J, (2019). Research progress and debates on gaming disorder. *General Psychiatry*, 32 (3), 70-78.

Westerman, D, Daniel, E. S.& Bowman, N. D. (2016). Learned risks and experiences rewards: Exploring the potential sources of students' attitudes toward social media and face to-face communication. *Internet and Higher Education*, 31 (3), 52-57.

Wiley, C. & Sisson, M. (2006). Ethics, accuracy and assumption: The use of Facebook by students and employers. *Paper presented at the Southwestern Ohio Council for HigherEducation Special Topics Forum*, Dayton, OH.

Wu, C.Y., Lee, M.B., Liao, S.C., & Chang, L.R. (2015). Risk factors of Internet addiction among internet users: An online questionnaire survey. *PLoS ONE*, 10, e0137506.

Young K.S, & De Abreu C.N. (2011). Internet addiction. A handbook and guide to evaluation.

Yu, L., Cao, X., Liu, Z. & Wang, J. (2018). Excessive social media use at work: exploring the effects of social media overload on job performance. *Information Technology and People*, 31 (6), 1091-1112.

Zenebe, Y., Kunno, K., & Mekonnen, M., (2021). Prevalence and associated factors of internet addiction among undergraduate university students in Ethiopia: a community university-based cross-sectional study. *BMC Psychology*, 9 (4), 23-31.

MODELLING AND STRESS ANALYSIS OF CARDIOVASCULAR STENT USING FINITE ELEMENT METHOD2

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ABSTRACT
Stents are most frequently implanted in curved vessels such as the coronary arteries. The great success of cardiovascular stents in treating cardiovascular blockages is actually undermined by their long-term fatigue. The high variability of stent failure incidence suggests that it is due to several correlated aspects, such as loading conditions, material properties, component design, surgical procedure, and patient anatomy. This can be solved by using suitable biomaterial and models. By adopting computationl modeling method and Finite element analysis (FEA) this study aimed to investigate different stent models and materials such structural steel, titanium alloy as well as other metals or alloys to find suitable biomaterials . A total of five (5) cardiovascular stents model biomaterials of various densities, poisson ratios and Young's Moduli of elasticity were subjected to the testing and investigated using the finite element method. Stainless steel and A-36 Steel seem to be the most suitable among the materials tested followed by titanium and aluminum alloys. PMMA seem to be the least suitable biomaterial in this investigation. Therefore it is recommended that biomedical engineers should adopt stainless steel as suitable material for stents implantation.

Keywords: Stress analysis, cardiovascular stent, finite element

1.0 INTRODUCTION

Cardiovascular stents is a revolutionary technique in the treatment of vascular diseases. Success in surgical procedures requires examination of the performance of stent biomechanics, compatibility and safety of biomaterials in order to optimize endovascular devices. Stent design, fabrication, biomechanics and other properties are critical for vessel scaffolding. The use of metals as biomaterials has been reported since the 18th century (Bhat, 2002). However, with the development of biodegradable implants, the concept of biomaterials has shifted from purely mechanical replacement to devices towards true biological solutions (Webster, 2010) Biodegradable and bioabsorbable stents go one step further providing complete absorption over time governed by corrosion and erosion mechanisms. Moravej and Mantovani (2011) reported that degradable metallic materials could potentially replace corrosion resistant metals currently being used for stent application as it is has been shown that the role of stenting is temporary and limited to a period of 6-12 years after implantation during which arterial modeling and healing occurs.

Development of biodegradable stents is required to fulfill purpose (Sato,2005;Erne et al., 2006; Peuster et al., 2001 and Colombo and Karvouni, 2000) Biodegradable stents provide mechanical support to diseased artery during arterial healing and remodeling while degrading gradually and eventually eliminated from the body according to (Moravej and Mantovani (2011)). New fronts in computer modeling and computer aided designs as well as finite element analysis have ushered in the application of numerical simulations and the in silico evaluation of the performance of stent devices made up of various alloys and biomaterials of various geometry and designs (Bressloff *et al*., 2016).

Recently, revolutions in computing power, CAD models, finite element and computational fluid methods have made it possible to perform detailed simulations of the coronary artery stenting procedure as well as related virtual evaluation of stent performance, including fatigue resistance, corrosion and haemodynamic disturbance. There has been a growth in systematic computational optimisation research, largely exploiting the suitability of surrogate modeling methods to time consuming simulations. Currently, systematic optimization is geared towards stent design optimization and thus established the complexity of the multi-disciplinary, multi-objective problem at hand.

Computational modeling is often used to quantify hemodynamic alterations induced by stenting, but frequently use simplified device or vascular representations. The effectiveness of stent implantation in mitigation of blood flow through areas of vascular narrowing is limited by restenosis. Several recent studies have suggested that the local geometric environment created by a deployed stent may influence regional blood flow characteristics and alter distributions of wall shear stress (WSS) after implantation, thereby rendering specific areas of the vessel wall more susceptible to neointimal hyperplasia and restenosis. Stents are most frequently implanted in curved vessels such as the coronary arteries, but most computational studies examining blood flow patterns through stented vessels conducted to date use linear, cylindrical geometric models. It appears highly probable that restenosis occurring after stent implantation in curved arteries also occurs as a consequence of changes in fluid dynamics that are established immediately after stent implantation (LaDisa *et al.,*2006)

The great success of stents in treating cardiovascular disease is actually undermined by their long-term fatigue failure. The high variability of stent failure incidence suggests that it is due to several correlated aspects, such as loading conditions, material properties, component design, surgical procedure, and patient functional anatomy. Numerical and experimental non-clinical assessments are included in the recommendations and requirements of several regulatory bodies and they are thus exploited in the analysis of stent fatigue performance. Optimization-based simulation methodologies have been developed as well, to improve the fatigue endurance of novel designs.

A new area in stent technology is the development of biodegradable implants for cardiovascular applications to avoid long-term complications caused by permanent implants. Current research efforts to control the corrosion rate of some alloys are oriented mainly to the development of new alloys and nanocomposites with improved corrosion resistance and biocompatibility, and the development of protective biocompatible coatings. However, these materials still have limitation either in vitro or in vivo and hence a thorough understanding of the degradation kinetics of said alloy in both the testing should be evaluated for the betterment of utilization of this material as an effective biodegradable implant.

One of the successful candidates for manufacturing stent tubes are metals, as they possess better radial strength, tensile properties, high radiopacity for better visibility during stenting procedure, enhanced corrosion resistance, and better biocompatible properties. Traditional coronary stent materials include stainless steel (316L), cobalt-chromium alloys, nickel-titanium alloy (Nitinol), platinum, and tantalum alloys. However, several problems are associated with bare metal stents viz. thrombus formation, in-stent restenosis, chronic inflammatory reactions, mechanical mismatch between stented and nonstented vessel regions, interference with reinterventional procedures, prolonged antiplatelet therapy, and inability to adapt with vessel growth in the case of congenital heart diseases involving pediatric surgery The aim of this research is to investigate the stent biomechanics and stent fatigue of material using computational modeling approaches.

2.0 MATERIALS AND METHODS

2.1 Method

The study was carried out in the Information and Communication Technology Center (ICTC) in the University of Port Harcourt, Rivers State, Nigeria.

2.1 Materials

A Computer Aided Design (CAD) model of the stent was constructed using Design Modeler®, Simscale, finite element analysis engine, was then used to simulate the stent biomechanics and generation of the post process results.
The biomaterials tested and their properties are presented in Table.2.1

Table 2.1: **Biomaterials tested and their properties**

Number	Materials	Young's modulus	Poisson ration	Density
I	Structural Steel	2E +11	0.3	7850
Ii	A-36 Steel	2E +11	0.26	7800
Iii	Aluminum	7.05E +10	0.342	2300
Iv	Ti-6Al-4V	1.16E +11	0.342	4430
V	PMMA	2.60E +10	0.4	1100

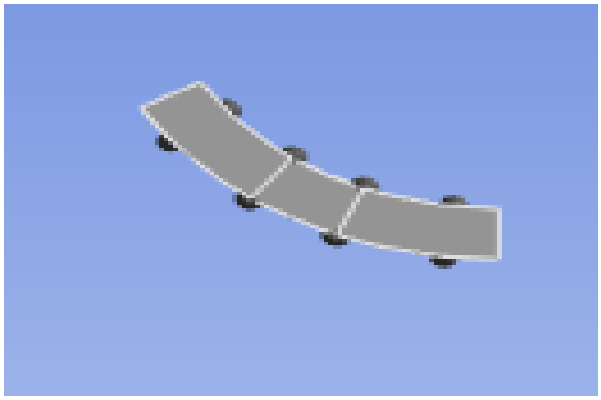


Fig. 2.1 Piece of model elements

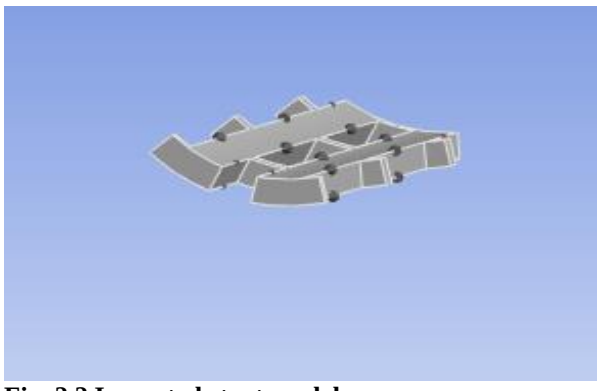


Fig. 2.2 Imported stent model

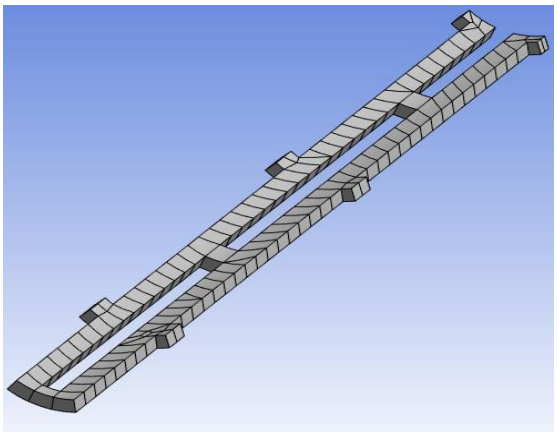


Fig. 2.3 Discretized slice of stent in modeler

3.2 Methods

The cardiovascular stent model was developed in Design Modeler which is then sliced into piece such that just a fraction of the model is used for easy numerical evaluation and to reduce simulation time. The model was then imported into the ANSYS workbench. Meshing was done with a simple hexahedral of 1249 nodes and 111 elements to discretize the model.

Specification of material properties are the material properties supplied to the software from Tab. 2.1. Stress-Strain value for each material was included in the simulation to generate yield point as well as strain hardening. A balloon-pressure of 0Pa to 100Pa was applied to the surface of the stent at an interval between 0s to 1s to cause plastic deformation and give pulse (1 sec being the time the total of 100Pa is applied on the stent).

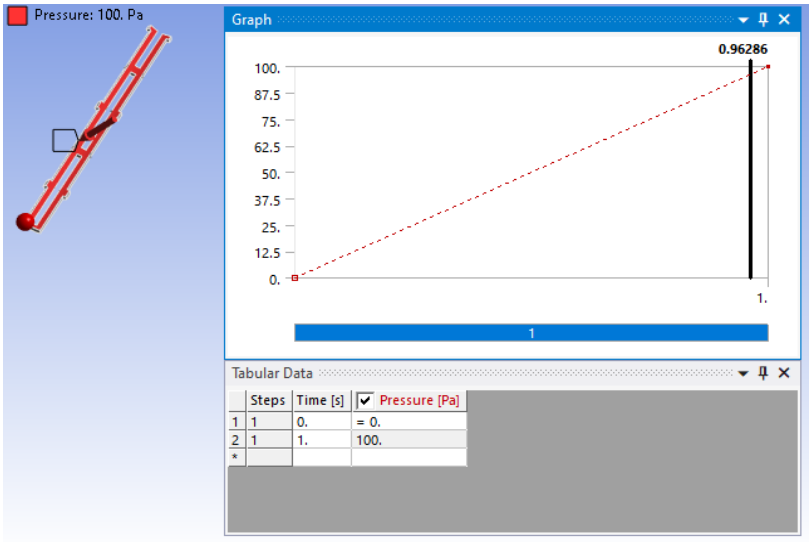
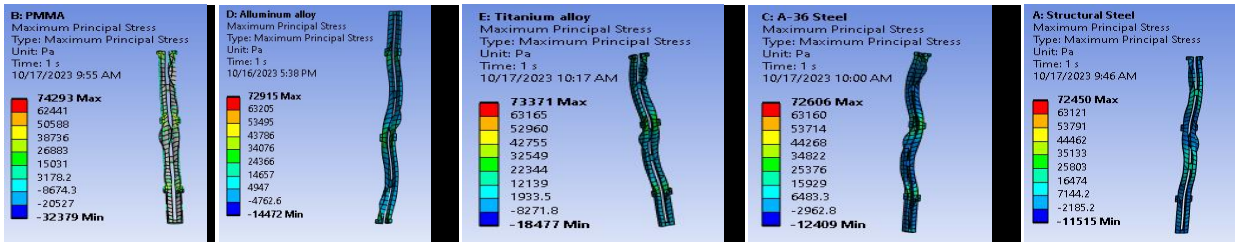


Fig. 2.4 Pressures exerted in stent from 0s to 1s

3.1 RESULTS AND DISCUSSION

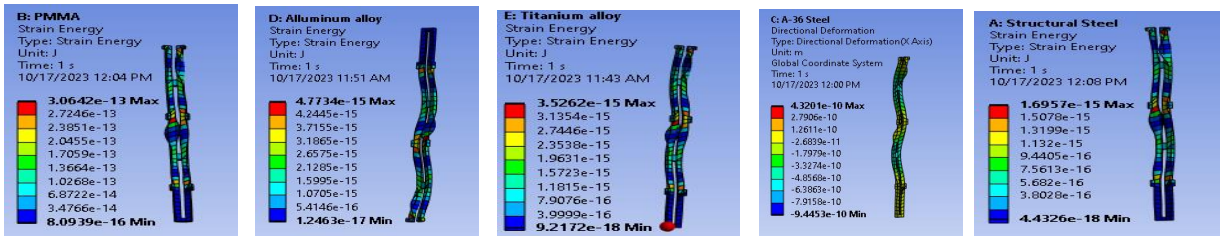
3.1 Results

The result of the simulation are presented in Figs 3.1 to 3.4



(a) (b) (c) (d) (e)

Fig. 3.1 Maximum Principal Stresses: (a) PMMA (b) Aluminum (c) Titanium (d) A36 Steel (e) Structural Steel



(a) (b) (c) (d) (e)

Fig. 3.2 Strain Energy (a) PMMA (b) Aluminum (c) Titanium (d) A36 Steel (e) Structural Steel



(a) (b) (c) (d) (e)

Fig. 3.3 Equivalent Stresses: (a) Structural Steel (b) PMMA (c) A-36 Steel (d) Aluminum Alloy (e) Titanium Alloy



(a) (b) (c) (d) (e)

Fig. 3.4 Total Deformation: (a) Structural Steel (b) PMMA (c) A-36 Steel (d) Aluminum Alloy (e) Titanium Alloy

Table 3.1: Biomaterials tested and their properties

Materials	Equivalent Stresses/Pa	Strain Energy/J	Total Deformations/m	Maximum Principal Stresses/Pa
PMMA	230 - 10903	8.09×10^{-16} - 3.06×10^{-13}	6.96×10^{-8}	-32379 - 74293
Aluminum Alloy	267 - 10978	1.25×10^{-17} - 4.77×10^{-15}	1.08×10^{-9}	-14472 - 72915
Titanium Alloy	253 - 10952	9.22×10^{-18} - 3.53×10^{-15}	8.00×10^{-10}	-18477 - 73371
A-36 Steel	277 - 10995	4.59×10^{-18}-1.76×10^{-15}	3.99×10^{-10}	-12409 - 72606
Structural Steel	282 - 11004	4.43×10^{-18} - 1.7×10^{-15}	3.85×10^{-10}	-11515 - 72450

3.2 Discussion

Stent biomaterials research is of vital importance in development of stent due to reaction between materials of stent and the internal environment of the body. Biodegradable, bioabsorbable as well as safe materials must be considered. Also requiring consideration is the plastic properties of materials. Material hardening is an important scaffolding property to ensure that the stent does not collapse after the balloon has been introduced in the affected area. Also important is the need for the material not to fracture due to overstretching. Thus, the need for material with suitable plastic properties. Although the four main materials used for stent currently are Tantalum, Stainless Steel, Nitinol and Cobalt Chromium this study investigated some more materials such as Aluminum alloy, A-36 Steel, Structural Steel, Titanium alloy and PMMA. Table 3.1 show us that all materials tested were within their yield point with same pressure applied (Equivalent stress). Structural Steel has the highest amount of average directional deformation and equivalent stress as well as lowest total deformation followed by A-36 Steel. These two materials seem to have the most suitable physical properties for stent design amongst the materials tested in this research. These are followed by Titanium and Aluminum alloys and lastly by PMMA. A study by Luciano et al (2011) in Brazil, reported that the use of two different alloys, stainless steel and Cobalt-Chrome stents in the same patient and in the same vessel produced similar 6- months restenosis and late loss

rates .Two novel concepts developed to rectify the problems associated with bare metal stents are drug eluting stents and biodegradable stents. The drug eluting stents work on the concept of using a metallic stent as a platform for controlled drug delivery with the aid of a drug loaded polymer matrix covering the metallic platform to assist in arterial remodeling. However, the long-term success of drug eluting stents is still hindered by the occurrence of late stent thrombosis.(Sankar et Al., 2016)

Biomaterial for stenting should have a finer grain size as finer grain size reduces the risk of a stent breaking and could potentially provide high mechanical properties for electroformed iron stents. (Meyer Kobbe and Hinrichs, 2010) reported that generally, the wall thickness of stent tubes should contain a minimum of 8 to 10 grains

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Advancement in technology and eventual emergence of biomedical engineering has made it possible for damaged, impaired or malfunctioning parts of the body to be corrected or replaced with human developed materials

4.2 Recommendations

The research in stent biomaterials is revolutionary and rapid development is made in multiple fronts requiring an interdisciplinary approach involving physicians, biomedical technologists and other scientists. More material properties, bio-properties, cheap properties as well as locally sourced materials should be investigated in future researches to enable patients get the best treatment as doctors make better decisions for their patients based on available research data.

REFERENCE

Bressloff NW, Ragkousis G, Curzen N. (2015). Design Optimisation of Coronary Artery Stent Systems. Ann Biomed Eng. 2016 Feb;44(2):357-67. doi:10.1007/s10439-015-1373-9. Epub 2015 Jul 17. PMID: 26183960.

Colombo A., Karvouni E (2000). Biodegradable stents: "fulfilling the mission and stepping away" Circulation. 102:371-373 [PubMed][Google Scholar]

Erne P., .Schier M., Reskin T.J (2006). The road to biodegradable stents: reaching clinical reality. Cardiovasc. Interv. Radiol. 29:11-16 [PubMed] [Google Scholar]

LaDisa JF Jr, Olson LE, Douglas HA, Warltier DC, Kersten JR, Pagel PS (2006). Alterations in regional vascular geometry produced by theoretical stent implantation influence distributions of wall shear stress: analysis of a curved coronary artery using 3D computational fluid dynamics modeling. Biomed Eng Online. 2006 Jun 16;5:40. doi:10.1186/1475-925X-5-40. PMID: 16780592; PMCID: PMC1550410.

Meyer Kobbe .K and Hinrichs B (2010). Why the annealing of 316LVM-Stents is so important. Available online: http://www.meko.de/downloads/316LVM.pdf

Moravej Maryam and Diego Mantovani (2011). Biodegradable Metals for Cardiovascular Staent Application: Interests and new opportunities. *Int J Mol Sci*, Vol. 12(7):4250-4270 PubMed.

Peuster M., Wohlsien P., Bruggmann M., Ehlerding M., Seidler K., Fink C., Brauer H., Fischer A., Haussdorf G (2001). A novel approach to temporary stenting: degradable cardiovascular stents produced from corrodible metal-results 6-18 months after I implantation into new Zealand White rabbits. Heart 86:563-569[PubMed][Google Scholar]

Sankar, Jithin Vishnu , Manoj Gupta , Geetha Manivasagam (2019). 4 - Magnesium-based alloys and nanocomposites for biomedical application. Biomaterials, Applications of Nanocomposite Materials in Orthopedics, Woodhead Publishing, 2019, Pages 83 109,ISBN 9780128137406, https://doi.org/10.1016/B978 -0-12-813740-6.00005-3.

Saito S (2005). New horizon of biodegradable stent. Cather. Cardiovasc interv. 66:595-596 [PubMed] [Google Scholar]

Webster, T.J (2010). Nanoterchnology Enabled in SITU Sensor for Monitoring Health. Springer Verlage; New York, NY, USA; [Google Scholar]

Luciano Mauricio de Abreu Filho., Antonio Artur da Cruz Forte., Marco Klyoshi Sumita., Desiderio Favarato and George Ceaser Ximenses Meireles(2011). Influence of metal alloy and the profile of coronary stents in patient with multvessel coronary disease. *Clinics Sao Paulo.* 66(6):985-989

ENVIRONMENTAL VIOLENCE IN THE NIGER DELTA: IMPLICATION FOR WOMEN DEVELOPMENT

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Abstract
Environmental violence is a common phenomenon in the Niger Delta. This is due to Oil exploitation and exploration activities in the region. The violence affects different segment of the populace in the region. The study examined environmental violence in the Niger Delta and the implication for women development. The aim of this study is to examine how the environmental violence in the Niger Delta affects female headed households (FHH) in Bayelsa State as well as their livelihoods and to determine the intervention measures that can be taken by humanitarian organizations after the affected period in order to improve women's livelihoods in Bayelsa State. The study employed the survey research design. The population of this study consists of all the eight Local Government Areas, which are Ekeremor, Kolokuma/Opokuma, Yenagoa, Nembe, Ogbia, Sagbama, Brass and Southern Ijaw local government Areas in Bayelsa State, Nigeria. Taro-Yamen's formula was used to determine the sample size of 200. Discriptive and inferential statistics were used to analyze the data obtained from the survey. statistical package for social science (SPSS) version 21.0 was employed for to carry out the analysis. The t-test analysis showed that the impact of environmental violence against women in Bayelsa State is statistically significant the following recommendation amongst others is made; that the federal of Nigeria and state governments should put an end to discriminatory customary practices against women by engaging the custodians of customary laws to reverse harmful practices against women.

Keywords: Environmental violence, Niger Delta, implication, women and development

1.0 INTRODUCTION

1.1 Background of the study.

The Niger Delta region is located in the southern part of Nigeria. It covers over 70,000 square kilometres and is made up of nine states (Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo and Rivers) out of the 36 states that make up Nigeria. The region is one of the largest wetlands in the world, with the ecosystem being acknowledged as one of the most diverse and richest in the world, (Aluko, 2004). The crude oil and natural gas deposits in Nigeria are concentrated in the Niger Delta, thus making the region a point of attraction for the multinational oil companies (MNCs). Presently, there are over 400 oil and gas production and storage facilities and several oil pipelines crisscrossing the entire region with its challenges on ecosystem sustainability and the health of the people.

The intensive exploitation of the Niger Delta area's rich oil reserves right from the discovery of oil at Oloibiri (now Bayelsa State) in 1956 has had some adverse effects on the region's environment. The socio-economic structure of Bayelsa State, intricately linked with the environment. Environmental degradation in the Niger Delta caused by the production and transportation of oil in the region intensifies the predicament faced by women. Environmental violence precipitated by oil exploration has engendered a cycle of poverty and underdevelopment, trapping women in a web of economic dependency and limited opportunities for empowerment (Nwankwo, 2012).

The environment includes fresh water swamp, rain water, farm land, forest, mangrove vegetation, wetlands/ creeks etc. the European communities interim report on the Economics of Ecosystem and Biodiversity EU, (2008) States that "Humanity receives countless benefits from the natural environment in the form of goods and services such as food, wood, clean water, energy, protection from floods, and soil erosion. The ecosystem is also a source of many botanical drugs for human benefits. It is imperative to note that, in the Bayelsa State Rural communities, the local population including women depends on the environment primarily for their livelihood.

Women and children are vulnerable to the effects of environmental degradation because of their close link with nature. This reasoning is hinged on ecofeminism, a theory which states that the oppression of women is fundamentally linked to the wanton destruction of nature by human activities. The close link is derived from the woman's primary role in the family through fetching water, gathering foods and providing fuel for the use of the family and the community at large. The effects of environmental degradation affect the lives of men, women and children, but the impact is more on the female gender in the Niger Delta area in the South-South region of Nigeria (Duflo, 2012 where Bayelsa State centrally located.

Oil production in the Niger Delta has brought about fair share of violence in the region as a result of Oil companies neglect of their host communities which has attracted violence agitations by youths of the host communities. Sometimes oil facilities are size and locked by angry youths. Often times in a bid to restore operation to meet up with production target, military force are deployed by the companies, a situation which used o result to violence clash with the angry youths. Sometimes violence erupts due to communal clash between neighbouring communities dragging land bearing oil facilities. As families are displaced

because of wars and natural disasters, the roles and burdens of women are increasing (Osemeobo, 2001b).

Dexterous environmental conditions compel women to traverse longer distances to obtain resources, thereby exposing them to various risks including sexual violence and harassment. (Ako, 2010). Women also face a range of forms of discrimination based on sex, age, ethnicity, religion, education and other factors in Nigeria. Women experience discrimination from girlhood forward in the form of cultural preference, for male children, female genital mutilation and child marriage. It is against this background that this study is aimed at investigating environmental violence in the Niger Delta and the implication for women development in Bayelsa State.

Aim and Objectives of the Study

The main aim of this study is to examine environmental violence and its implication for women development in Bayelsa State.

Other specific objectives are to;

1. examine how the environmental violence affected female headed households (FHH) and their livelihoods in Bayelsa State?
2. to determine the intervention measures by humanitarian organizations after the effects improved women's livelihoods?

Research Questions

1. How has the environmental violence affected female headed households (FHH) and their livelihoods in Bayelsa State?
2. What are the intervention measures by humanitarian organizations after the effects improved women's livelihoods?

Hypotheses

The following null hypotheses were stated for the study:

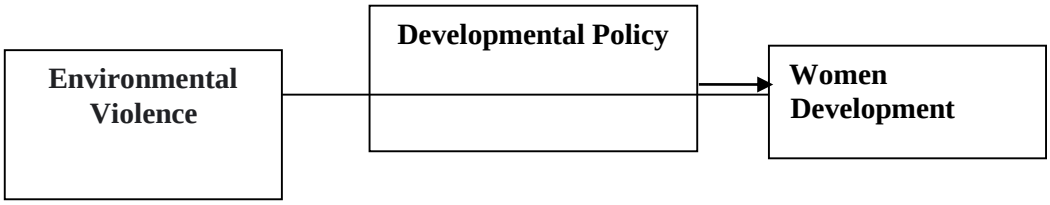
Ho_1: there is no significant effect of environmental violence on female headed households (FHH) and their livelihoods in Bayelsa state

Ho_2: There are no significant intervention measures by humanitarian organizations to improved women's livelihoods after been affected by environmental violence.

2.0 LITERATURE REVIEW

2.1 Conceptual review

The conceptual framework of environmental violence and women development is presented in Fig 2.1



Fig, 2.1 Conceptual framework

Environmental Violence

Environmental violence, as defined here, includes: (a) the violence between people(s) over natural resources; (b) environmental policies that can be violent against people; (c) the secondary violence from the natural world as a result of human degradation of the earth; and (d) direct damage to the environment by humans.

Women Development

It is an approach of development projects that emerged in the 1960s, calling for treatment of women's issues in development projects. It is the integration of women into the global economies by improving their status and assisting in total development.

The Niger Delta region

The Niger Delta region of Nigeria is rich in crude oil otherwise known as black gold. This singular factor has made this region a cause Celebrex and a hotbed of trouble in the Sub-Saharan region. The discovery of oil in the region has affected agriculture, fishing as well the living conditions of the people with lots of ecological problems. This recurring decimal perpetuates itself in the Niger Delta environment, resulting in hardship for the people. Land, streams, creeks etc have been polluted, roofs of buildings in the area have been perforated while “the vapour when it settles on the skin turns into a charred surface in the form of an unsightly skin disease.

Apart from these ecological problems, the Niger Delta region lacks basic social amenities like portable water, electricity, roads, hospitals, schools, job opportunities to enable the people earn a living and become self-reliant, yet the region is the proverbial goose that lays the golden egg that feeds the entire nation. It is against this backdrop of economic, social and political deprivation that Ken Saro Wiwa and eight of his kinsmen were executed. Saro Wiwa views the exploration of oil by multinationals as antipeople exploitation. Saro Wiwa’s fight for social justice and minority rights that made him a man of the people.

Oil spills

The incidence of oil spills arising from pipelines leakages (which cress-cross the communities), pipeline vandalisation, blowouts at well-heads, the wastes and refinery effluents discharged, or the construction of flow stations near communities, have contributed to pollution and severe health problems in the region. This ugly trend has led to the destruction of the mangrove forests and extermination of aquatic lives. Virtually every area of their lives, including the economic, social and natural environment, have been affected by the activities of the oil MNCs. (Lemmy, 2001). The innumerable creeks and streams in the region have in the past provided a habitat for an abundance of fish and marine life. These serve as a means of livelihood for the majority of the people in the Bayelsa State since they depend on the resources of the wetlands for their food. The oil film in water prevents natural aeration and destroys fish and other aquatic animals. The Niger Delta, which was once one of the 10 most important and productive wetland and marine ecosystems in the world, has been described as 'one of the 5 most petroleum severely damaged ecosystems and oil polluted environments in the world.

2 Gas flaring

Gas flaring entails burning off the natural gas associated with the crude oil during extraction in places where there is no capacity or infrastructure to trap and make use of the gas. It is a process by which unusable or excess natural gas is released by a pressure valve and burned thereby releasing tonnes of carbon dioxide into the atmosphere. One of the major causes of ill health in the Niger Delta, particularly among women, is uncontrolled gas flaring and gas leakages. This produces soot, laden with harmful chemicals including hydrocarbons, sulphurous oxides and the oxides of Nitrogen, which negatively affect soil fertility and which have also been linked with many ailments, including bronchial, chest, rheumatic and eye problems.

2.2 Theoretical Review

The theories highlighted in this Exchange Theory:

Exchange Theory

Exchange Theory, according to Peter Blau (1964a), is an understanding of social structure on the basis of an analysis of social processes that govern the relations between individuals and groups. People are attracted to each other for a variety of reasons that induce them to establish social association. Once initial ties are forged, the rewards that they provide to each other serve to maintain and enhance the bonds. Zwingina (1992) posited that we cannot, therefore, disengage the productive forces of capitalism and expect them to develop independent of capitalism to penetrate and automatically develop pre-capitalist social formations without domestic strategies for legitimating the development. The opposite situation is also possible: with insufficient rewards, an association will weaken or break.

When one party needs something from another but has nothing comparable to offer in return, according to Blau, four alternatives are possible. First, people can force other people to help them. Second, they can find another source to obtain what they need from others. Third, they can attempt to get along without what they need from others. Fourth, most important, they can subordinate themselves to the others, thereby giving the others 'generalized credit' in their relationships; the others then can draw on this credit when they want them to do something.

Blau (1964b) extended his theory to the level of social facts. He noted, for example, that we cannot analysis processes of social interaction apart from the social structure that surrounds them. To give theoretical understanding to environmental violence in the Niger Delta, social structure of exploitation must be understood between the oil companies and the women. Social structure emerges from social interaction, but once this occurs, social structures have a separate existence that effects the process of interaction. Social interaction exists first within social groups. People are attracted to a group when they feel that the relationships offer more rewards than those in other groups. Because they are attracted to the group, they want to be accepted. To be accepted, they must offer group members rewards. This involves impressing the group members by showing the members that associating with the new people will be rewarding. The relationship with the new group members will be solidified when the new comers have received the rewards they expected.

2.3 Empirical Review

Environmental violence in the Bayelsa State and the implication for women development

The implications of oil exploration and Environmental violence on women development Bayelsa State is a serious one and should not be taken with levity. It is important to understand in detail the nexus between the right to health and a healthy environment. There are several international and regional instruments and consensus statements linking environment with the health of women.

In a study, Omoweh, (1998), described how multi-nationals oil companies involved in oil exploration and exploitation paid little attention to environmental degradations caused by their activities and how governments and regulatory agencies are also culpable in this regard. The study specifically used Oloibiri community as case study and found that both the government and oil companies do not care about the consequences of oil exploitations on the environment and the people that depend on it.

Opukri and Ibaba (2008) in their study titled "oil induced environmental degradation in the Niger Delta region" discovered that environmental degradation results to internal displacement of people from their communities. Also, Aluko (2004), in a survey of thirteen communities in Niger-Delta found that poverty and malnutrition in the Niger

Delta region is due to environmental degradation brought about by oil exploration by oil multinationals oil companies.

This finding was also identical to that of Gabriel, (2007) who found that environment degradation negatively affects the ability of the people in oil producing communities to perform their economic activities productively. From gender analysis perspective, women literally feed the world and are the producers, processors, cooks and servers of food, but they are neither well compensated nor appreciated. In the face of poverty, war, violence and unrest women resilience and ingenuity enables families and nations to survive. Women are bread-winners of one-thirds of all households in the world (Howard, 2003). Women use these resources to provide income to sustain household in hunger periods. From these analyses, it is clear that the challenges faced by the women in Bayelsa State through environmental problems are numerous (degradation, pollution, lack of health facilities and poor economy status) and there is the need to understand how these problems affect their ability to own, access and cultivate land. Studies on environmental issues affecting the Niger Delta region are extensive, diverse and rich. Some of these studies focus on the nature and scope of the oil-induced negative externalities especially as it affects human security and social stability.

Most of these studies have concentrated on how oil-related activities of the multinationals oil companies in complicity with the Nigerian government have undermined social and economic stability in oil producing areas (Obi, 2005; 2010; Mahler, 2012; Amnesty International, 2009; 2013). However, limited attempts have been made to draw attention to other aspects of human security challenges (Obi, 2004; 2005; 2010; Mahler, 2012; Pegg and Zabbey, 2013).

An important component of investigating environmental violence in Niger Delta: Implication for Women Development which has received limited scholarly attention. This study examines how the Niger Delta environmental violence affected women and its implication on women development in Bayelsa State of Nigeria attempt to address the gaps in the existing studies in the region.

Some of these instruments and consensus statements are discussed below.

The right to health is guaranteed in numerous international and regional human rights instruments. The most authoritative of these is Article 12 of the International Covenant on Economic, Social and Cultural Rights (ICESCR), which guarantees the right of everyone to the enjoyment of the highest attainable standard of health. The Committee on Economic, Social and Cultural Rights (CESCR) has explained that the right to health guaranteed under the covenant is inclusive and must embrace the determinants of the right to health such as, food, housing, potable water and a healthy environment. It also explains that the right to health intersects with other important rights such as life, dignity, nondiscrimination and privacy. The committee has further noted that the right to health must be guaranteed to all, particularly vulnerable and marginalised groups such as women, children and people with disabilities.

A recent resolution adopted by the United Nations General Assembly expresses the link between health and environment, stating that 'all individuals are entitled to live in an environment adequate for their health and wellbeing'. Other instruments that have guaranteed the right to health include Article 12 of the Convention on Elimination of All Forms of Discrimination against Women (CEDAW) and Article 24 of the Convention on the Rights of the Child (CRC). The CEDAW Committee in its General Recommendation 2432 has explained that the right to health of women includes ensuring that women have unhindered access to the health care services needed for their well-being and refraining from interfering in services that are peculiar to the needs of women. The Committee further requires states to take appropriate measures to ensure adequate living conditions for women, particularly housing, water supply, electricity and a healthy environment. UNEP Report 2011

3.0 METHODOLOGY

3.1 Area of the study

This study was conducted in Bayelsa State. Bayelsa State is one of the Niger Delta States located in the South-South geopolitical zone of Nigeria. Bayelsa State was created on October1, 1996 from the old Rivers State. The State is geographically located within Latitude 4º15' and 5º23'N and Longitude 5º 15' and 6º the people of Bayelsa State are predominantly farmers and fishermen and women. Map of the study area is shown in Fig 3.1.

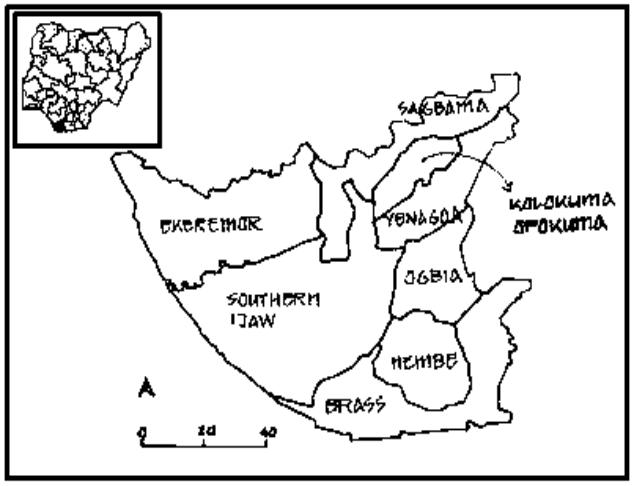


Fig 3.1: Map of Bayelsa State Showing the 8 L.G.As

3.2 Research Design

The study employed the survey research design. This method was considered appropriate because it is useful for the study of non-observable events such as opinions, attitudes, preferences or dispositions (Soyombo, 2002). The study is a correlation, non-contrived and cross-sectional survey having individuals (officials of the local government)

as unit of analysis. The design was used to discover vital predictive relationship and degrees of association among variables.

The population of this study consists of all the eight Local Government Areas. They are Ekeremor, Kolokuma/ Opokuma, Yenagoa, Nembe, Ogbia, Sagbama, Brass and Southern Ijaw local government Areas in Bayelsa State, Nigeria. But for the purpose of accessibility, 25 respondents were selected from each of the eight (8) local government councils which therefore make up to two hundred (200) respondents. It is expected therefore that the findings of the study will have equal applicability to entire local government councils in Bayelsa State.

S/NO	Local Government Councils	Employees
1	Ekeremor,	50
2	Kolokuma/Opokuma,	50
3	Yenagoa,	50
4	Nembe,	50
5	Ogbia,	50
6	Sagbama,	50
7	Brass	50
8	Southern Ijaw	50
TOTAL		**400**

The sample size therefore was determined by using the Taro-Yamen's formula as was adopted by Baridam (2001) and shown below

$$N = \frac{N}{1+N(e)^2}$$

Where n = sample size sought for
e = level of significance
N = population
Hence;

$$n = \frac{N}{1+N(e)^2}$$

N = 400
e = level of significant of 0.05

$$n = \frac{400}{1+400(0.05)^2}$$

$$= \frac{400}{1+1}$$

$$= \frac{400}{200}$$

$$n = 200$$

3.3 Data analysis

Descriptive statistical tools such as frequency tables, percentages, and inferential statistics such as Pearson's Product Moment Correlation Coefficient, (r) were used to analysed the data by means of statistical package for social science (SPSS) version 21.0. Thus our interpretation of r and the level of statistical significance was strictly based on the SPSS output. Descriptive analysis was used to determine environment violence in the Bayelsa State and the implication on women development. While the inferential analyses (Pearson's r) was used to test the hypotheses.

4.0 RESULTS AND DISCUSION

4.1 Results

The data on the survey instrument for this study is presented in Table 4.1

Table 4.1 Questionnaire Distribution

Numbers	Questionnaire	Percentage (%)
No. Sent out	200	100%
No. Returned	170	85%
No. Not Returned	30	15%

Table 4.1 shows the distribution and collection of questionnaire sent to the respondents. It was shown that 200 copies of questionnaires were distributed to the respondents representing 100%. 170 copies of questionnaires representing 85% were correctly filled and successfully collected from the respondents; however, 30 copies of the questionnaires representing 15% were not retrieved.

However, the researcher used the 170 copies of questionnaires correctly filled to represent 100% as the basis for the analysis. The results of Bivariate data Analysis is presented in below and interpretation of the correlation analysis presented in Table 4.2

Bivariate Analysis

It is important to test the hypotheses having completed the univariate analyses. Thus this section of the study is concerned with the testing of the formulated hypotheses in 1-5. To carry out the testing of the hypotheses, Everitt and Dunn (2001) was adopted as a guide to determine the r value and the extent of the relationship between the variables.

Table 4.2: How has the Niger Delta conflict affected female headed households (FHH) and their livelihoods

Range of r values	**Descriptive level of association of r**
±0.80 – 1.00	Very strong
±0.60 – 0.79	Strong
±0.40 – 0.59	Moderate
±0.20 – 0.39	Weak
±0.00 – 0.19	Very weak

Table 4.3: How has the Niger Delta conflict affected female headed households (FHH) and their livelihoods

		conflict	female headed households
conflict	Pearson Correlation	1	.672**
	Sig. (2-tailed)		.000
	N	170	170
female headed households	Pearson Correlation	.672**	1
	Sig. (2-tailed)	.000	
	N	170	170

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.2 shows the correlation analysis on the extent and direction of the Bayelsa State conflict affected female headed households (FHH) and their livelihoods**.** It showed the correlation coefficient of r = 0.672** with the significant/probability value = 0.00 less than 0.05 level of significant. From the classification in Table 4.2, the value is strong indicating the Bayelsa Stae environmental conflict affected female headed households (FHH) and their livelihoods. Also, the correlation coefficient is positive which indicates that the Bayelsa Stae environmental conflict affected female headed households (FHH) and their livelihoods. Thus the researcher concludes that the Bayelsa State environmental conflict affected female headed households (FHH) and their livelihoods.

Table 4.3 the intervention measures by humanitarian organizations after the conflict period improved women's livelihoods

Correlations

		intervention measures by humanitarian organizations	Women's Livelihoods
intervention measures by humanitarian organizations	Pearson Correlation	1	.640**
	Sig. (2-tailed)		.000
	N	170	170
Women's Livelihoods	Pearson Correlation	.640**	1
	Sig. (2-tailed)	.000	
	N	170	170

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.3 shows the correlation analysis on the extent and direction on the intervention measures by humanitarian organizations after the conflict period improved women's livelihoods. The Table showed a correlation coefficient of r = 0.852** with a correspondent significant/probability value of 0.000, from the classification of r value in table 4.1, the value is strong. Also, the correlation coefficient is positive which indicate that there are intervention measures by

humanitarian organizations after the conflict period improved women's livelihoods. Thus the analysis shows that there is a strong significant relationship between financial audit and faithful representation.

4.2 Discussion of Finding

United Nations (1995:121) defines violence against women as any act of gender-based that is likely to result in Physical, sexual or psychological harm or suffering of women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in Public or private life. (IUCN,2021) asserts that gender based violence can be used as a means to enforce land and property grabbing from women and extort them when they aim to secure it, hindering economic opportunities and the means to abandon relations. Izumi (2007) opined that gender based violence ranges from mental and physical harassment and abuse to violently evict women from their land. According to Tauli Corpuz (2015), women, especially indigenous women, are also at greater risk of land grabbing for large scale use and of other forms of gender based violence being used to obtain it, due to greater land rights insecurity and intersecting forms of discrimination and violence. At times women are subjected to sexual extortion to gain access to agricultural land and land titles from corrupt authority figures (Transparency international.

Violence occurs in various forms and whatever form it comes, women and children are usually the worst affected set of persons. Destruction of environmental resources that deprive women the opportunity to make economic use of such resource is violence against women. Because they need this resource to make a living.

This research has examined environmental violence in Bayelsa State and the implication for women development. The results revealed the following findings.

1. That the Environmental conflict in Bayelsa State, affects female headed households (FHH) and their livelihoods.
2. there are intervention measures by humanitarian organizations after the conflict period improved women's livelihoods. The findings of this study corroborate Ali and Mousa (2022) study which reported that ecological violence against women can lead to more serious destruction of environment by eliminating the women as the protectors of the environment and natural resources.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This study examined environment violence in the Bayelsa State and implication for women development. In Nigeria, gender discriminatory practices are promoted by norms, customs and values hinged on patriarchy, and these pose challenges to women in realising their full potential in the society. Some of these discriminatory practices have been addressed in the decisions of Nigerian courts addressing the issues of discriminatory practices against women in Nigeria. This study has explored how the activities of the multinational oil corporations in the Niger Delta region have culminated in massive environmental degradation as a result of oil pollution, gas flaring and indiscriminate disposal of toxic chemical waste products. The devastating destruction of the Niger Delta region has caused untold hardship for the people, its farmlands and rivers, which are the source of income and sustenance.

The understanding of development among women in different cultural and ethnic settings is unique. Women identified good roads, provision of pipe borne water, good housing scheme, modern market-structure, good transportation system, environmental protection, adequate management of oil-wealth as components of development. The ‘construction’ of globalization as a veritable mechanism for spreading development around the World increases women knowledge and awareness. Women have absolutely resolved to participate in public issues as they form a variety of organizations and actively participate in the political process in order to contribute meaningfully to the overall development of their society. It is in this light that it has become imperative for them to develop strategies to challenge inadequacies arising from environmental problems, of which they are most affected.

The socio-economic problems encountered by women in the Niger Delta are attested to in this study. The harrowing experiences of women in the hands of foreign oil-companies are painstakingly highlighted such as oil spillage, land degradation, water pollution, and air pollution. Also, unemployment, unequal treatment, crisis, and other problems encountered in the hands of governments by women were examined.

Oil is explored from the Niger Delta in commercial quantity on daily basis. The level of development is abysmal. Struggle for local participation becomes appalling. Women are not left out in this struggle. Such demand becomes more compelling since the area is so viable; yet the people are blatantly denied development and the common necessities of live. If Nigeria government continues to fail in doing something to drastically improve the lot of the people, inevitably, a point of saturation will be reached. Oil companies in the area would bear the brunt of the new social order- turbulence and ‘permanent’ crisis.

The lingering crisis in the Niger-Delta which also involved women was discussed. The crisis has implication on the traditional status of women. It is believed traditionally, that women are for the private life, while men enjoy the public life. The exploration and exploitation of oil in the Niger Delta and indeed Bayelsa State has a theoretical implication for women’s studies, which hitherto treated women as the weaker sex

The theoretical implication of this study is explained by various assistances given by various women’s organizations

such as soft loan, grants, vocational education, training, peace meetings, and scholarship among others to women in the Niger Delta. This is a radical departure from the ways by which men counterpart approached problems associated with oil exploitation and exploration in the Niger Delta, this include assassination, kidnapping, war, extortion, pipeline vandalization, oil smuggling, and bunkering.

The scourge of neglect, divide-and-rule, and insensitivity of government to the plights of peoples in the Niger Delta is also examined in this study. The policy option left for government is to find a long-lasting solution to the problems in the Niger Delta rather than drafting military and police force to maim, kill, rape, and dehumanize people, most especially women. It is high time government stopped the act of depending on the military and mobile police to violently disperse women's peaceful protests, and embrace a non-violent resolution of crisis. Government must realize that nothing is won through intimidation and brutality. It behooves on the oil- companies to support the demands of the women a safer and conducive environment necessary for human survival. Oil exploitation is essential for the economic growth of Nigeria. However, the irresponsible way in which this is carried out results in serious air, land and water pollution, which subsequently impacts negatively on the health and well-being of the local inhabitants of the Niger Delta, particularly the women, who are often ignored.

Thus, rather than be an agent of development and growth, the article contended that oil exploration and production activities in the Niger Delta (Bayelsa State) have become an instrument of oppression, inequity and a means of violating the rights – health, food, water, environment – of the local inhabitants, particularly women, of the region. The article stresses the need to recognise the particular impacts of oil exploration activities on the health of the Niger Delta women, and the vital role that women can play as stewards of natural resources and the environment.

The women of the Niger Delta will continue to sacrifice their health and livelihoods for the benefit of the nation and the oil MNCs until they are brought to the forefront of the decision-making structures in matters of the environment. Government must show a strong political will in bringing an end to gas flaring in the Niger Delta. All of this can only be achieved through clear and time bound commitments by the government. If, according to the WHO, about one-third of Africa's disease burden is attributable to environmental hazards. The Nigerian government and the oil MNCs must understand and respond to the oil exploration activities that are negatively impacting the health and livelihood of the women and children in the region.

The resulting health hazards cannot be overemphasised, as the people are exposed to respiratory diseases from air-borne pollutants and gastrointestinal infection from contaminated drinking water, as well as high incidences of new cases of cancer. The reproductive health of Niger Delta women has been compromised from the impact of oil exploration, as pregnant women are predisposed to miscarriage and cancer and their children to congenital fetal defects from consumption of high quantity of benzene from pollution of crops, fish and other seafoods. Nigeria has adequate laws to regulate and monitor the activities of the multinational oil companies but the enforcement mechanism is weak and needs to be strengthened by the government providing the necessary equipment for the agencies to operate effectively to curb the incidences of environmental degradation in the Niger Delta region.

5.2 Recommendations

In view of the findings of this study therefore, the following recommendations are made

a. First, the federal government of Nigeria should put an end to discriminatory customary practices against women by engaging the custodians of customary laws, a category that includes the elders, chiefs and age–grade groups, and sensitize them on the need to end such practices.
b. Women groups need to assert their presence in their various communities; relate cordially with governments so that they will be fully and actively represented among delegates to both the oil-companies, and governments.
c. Women must be educated on how to challenge any process of deprivation, deforestation, bio-diversity as well as loss in their communities.
d. As a matter of urgency, there is a need to amend the Petroleum Act and Associated Re–Injection Act to put an end to gas flaring and curtail the incidence of oil spills in the Niger Delta region.
e. Multinational oil companies should collaborate with the government to provide socio-economic programmes to empower the women and strengthen women's groups in the Niger Delta region.
f. Stringent enforcement mechanisms should be put in place by the federal government, through its agencies, to ensure proper monitoring of the activities of the multinational oil companies and ensure that they operate within the ambits of existing global best practices to minimise pollution of the environment, with stiff penalties for defaulters.
g. Corporate social responsibility should be a platform for empowering women. There should be an affirmative principle mandating a certain number of women to be employed by the multinational oil companies alongside men to promote gender equality and involvement of women in positions of authority.
h. Finally, institutions protecting the environmental from degradation, such as National Oil Spill Detection and Response Agency (NOSDRA) and other agencies, should take steps to enhance participation by women in their programmes,

because in their daily activities of farming and fishing, women can easily detect oil spillage or leakages and report promptly to the designated agencies.

i. Finally, equal participation of women in decision-making, employment, financing cottage-industries, micro-credit loans with token interest, the upgrading of socio-economic infrastructures could bring about expected development to the Niger Delta.

REFERENCES

Ake C. (1981), A Political Economy of Africa, London, Longmans.

Ali Mashhadi and Mousa Karami (). Ecological Violence against Women: Alegal Reflection on the impact of Environmental Degradation on the increase of violence against Women (in Perssian) [research Gate]

Aluko, M. A. (2004). Sustainable development, environmental degradation and the entrenchment of poverty in the Niger-Delta of Nigeria. Journal of Human Ecology 15(1): 63-68

Bankole. O (2008), Niger Delta Militants Asked to Suspend Armed Struggle, Nation on Sunday, January, 2008. Vintage Press Ltd. Lagos.

Blau. P (1964), Exchange and Power in Social Life. New York: Wiley.

Eteng I. A. (1998), The Nigerian State, Oil Exploration and Community Interest, Human Rights Defender Quarterly Journal, (October – December).

Gabriel, A. O. (2007). Women in the Niger-Delta. Environmental issues and challenges in the third millennium

Hancock, G. (1989) Lords of Poverty: London Macmillan W.L.

Howard, P. (2003). Women and plants, gender relations in biodiversity management and conservation. London ZED Books

Ifeanacho & Irikana (2006),The State, Legitimacy Crisis, and Social Disorder in the Niger Delta, Socio-Anthropology Perspective on Africa Development, Owerri, Nigeria: Springfield Publishing Ltd.

Ihonvbare J. (2000) A Recipe for Perpetual Crisis: The Nigerian State and the Niger Delta Question, in W Raji et.al. (eds.) A CDHR Publication on the Crisis in the Oil Producing Communities in Nigeria, Ikeja, Lagos, CDHR.

International Union For Conservation of Nature (IUCN, 2021). Gender-based violence and environment linkages. Global program on Governance and Rights. Summary for policy makers

Izumi, K. (2007). Gender –based violence and property grabbing in Africa: a denial of women's liberty and Security. Gender and Development 15(1):11-23

Neil, O W.L. (1971) A History of Feminism in America. Chicago: Quadrangle Books.

Oil-watch (2002), Protest against Use of Violence against Unarmed Women in Peaceful Protest. Environmental Rights Action, Nigeria. [Online] Available at http://www.oilwatch.net [Accessed February 10, 2010].

Omoweh, D. (1998). Political economy of the operations of shell development company in Oloibiri area of Nigeria. Germany: Stuttgart Press.

Onasode G. (2008), Insinuate Niger Delta Problem from Politics Cross-Border Crime under United Nations Microscope. [Online] Available at http:// www. africa_co_ee.mht [Accessed February 10, 2010].

Opukri, C. O., & Ibaba, I. S. (2008). Oil induced environmental degradation and internal population dispalcement in the Nigeria's Niger-Delta. Journal of Sustainable Development in Africa 10(1), 173-193

Osemeobo, G. J. (2001a). Give us our land: Tenure crisis in Nigerian forest land use. The Nigerian Journal of Forestry, Patel 31(1):21-26

Perlmutter H.V. (1972), The Development of Nations, Unions and Firms as Worldwide Institutions in H. Gunter (ed.), Transnational Industrial Relations New York: St Martin's Press.

Rose J.O (2004), Chevron Dredged our Creeks at a Gun Point. Environmental Rights Action. [Online] Available at http://www.oilwatch.net [Accessed February 10, 2010].

Tauli-Corpuz, V., Alcorn, J. And Molnar, A. (2018). Cornered by Protected areas. Available at https: rightsandresources.org/wp-content/uploads/2018/06. Cornered-by-Pas-Brief RR June-2018

Transparency International (2018). Women; and Corruption: Resources for Practitioners and Policy Makers. Available at https://www.transparency.org /whatwedo/publication/women land and corruption resources for practioners and policy makers

Zwingina D.S (1992) Capitalism Development in Africa, [Online] Available athttp://www.ipsnews_net.mht [Accessed February 10, 2010].