reliability of electricity supply.Traditional methods of detecting power theft often rely on periodic manual inspections, which are time-consuming, costly, and prone to errors. These methods often fail to detect sophisticated ways of power theft and can result in significant revenue losses for power distribution companies (Nezhad, Wijaya, Vasirani, and Aberer, 2014).Electricity theft is a widespread problem that affects power utilities, consumers, and economies over the globe. To tackle this issue, innovative solutions integrating advanced technologies have been developed. This study focuses on a GSM-based power theft detection and prevention system, which leverages the Global System for Mobile Communications (GSM) network to enhance the accuracy, efficiency, and immediacy of identifying and addressing power theft incidents.The proposed system consists of several key components, including smart meters, data analytics, and a GSM communication infrastructure. Smart meters equipped with advanced sensing capabilities are deployed at consumer premises to continuously monitor electricity consumption patterns and identify irregularities indicative of power theft(Sundmaeker, Guillemin, Friess, and Woelfflé, 2010). These smart meters capture real-time data, including voltage, current, and power consumption, which are then analyzed by data analytics algorithms to detect suspicious activities.

Once suspicious patterns or anomalies are detected, the system triggers an alarm and sends an immediate alert to the utility provider via the GSM network. This alert includes pertinent information such as the location, timestamp, and nature of the detected power theft event. The utility provider can then take appropriate actions to investigate and address the issue promptly.

The integration of GSM technology in this system offers several advantages. Firstly, it enables real-time monitoring and detection of theft, reducing the time required for manual inspections and investigations. It enables instantaneous and reliable communication between the smart meters and the utility provider, ensuring timely responses to power theft incidents. Secondly, the widespread coverage of GSM networks ensures that remote or rural areas are also covered, extending the reach of power theft detection efforts (Muhammad, 2017). Additionally, the use of GSM infrastructure minimizes the need for extensive and costly physical wiring installations, making the system more cost-effective and scalable.Furthermore, the collected data from smart meters can be used for long-term analysis and forecasting, allowing power utilities to identify trends and patterns related to power theft. This valuable information can assist in developing targeted strategies and policies to prevent power theft proactively.GSM-based power theft detection systems promote transparency and accountability. The technology provides detailed data on energy consumption, allowing utility companies to identify trends and patterns, enforce fair billing practices and efficiently manage energy distribution.The eradication of power theft through GSM-based systems ultimately leads to improved financial performance for utility companies, reduced energy costs for legal consumers, and enhanced safety and reliability of power supply(Giridhar, Balakrishna, and Yogananda, 2017). Furthermore, this technology contributes to sustainable energy management by reducing energy losses and optimizing resource allocation.

RELATED WORK

Power theft has become a significant issue worldwide, leading to substantial financial losses for utility companies and increased electricity costs for consumers. In recent years, researchers and practitioners have focused on developing efficient methods to detect and prevent power theft. This

literature aims to explore the existing research and advancements in GSM-based power theft detection and prevention systems.As a source of power and energy theft, the high voltage distribution system (HVDS) was emphasized. The voltage line is typically 230V, but a voltage regulator is required to raise it to 350V, explaining why it is 350V. However, when it is delivered, the voltage is once more dropped by 230V alternative current (alternating current). Depending on the load, the supply might be made in three or one phases. The availability and use of energy determines a nation's rate of economic expansion (Kumar, and Mahor, 2013). A number of new data transfer services are offered by power line communications (PLC) that do not require the usage of external cables (Cavdar, 2004). As power prices have increased, government organizations all across the world have started to have serious concerns about electricity tampering and safety. Electric metering and energy theft are becoming increasingly common, especially in populous nations like China and India. The AMR (Automatic Metering System) is the mechanism that monitors electricity theft. The power supply, sensors, and controlling process are all part of the system meter module, which is one of the main paths of AMR. Communication systems include things like telemetry, loading systems, and data transport (Biranje, and Lokhande, 2015). The PLC's host modem ought to be the same. The difference in energy use between the host PLC modem and the PLC modem error arises if unlawful load is allowed. The smart energy meter has been proposed as a revolutionary arrangement to encourage moderation and lower utility costs in recent years. Metering et al. (2017) proposed a GSM-based power theft detection system using advanced metering infrastructure (AMI) technology. The system integrated smart meters with GSM modules to monitor and analyze electricity consumption patterns. Any irregularities, such as sudden load changes or abnormal energy consumption, were detected by the system, triggering immediate alerts to utility providers. The authors reported a significant reduction in power theft instances using their proposed system. In their research, Shahid et al. (2019) proposed a novel approach to power theft detection using GSM-based remote monitoring. The authors developed a system that combined smart meters with GSM modules and implemented machine learning algorithms for data analysis. The system detected power theft by comparing the energy consumed with the load profiles of similar households. Real-time notifications were sent to utility providers, enabling them to take immediate action.Doaa, Osama, and Ali (2021) focused on a GSM-based power theft detection system that utilized data mining techniques. The authors used historical electricity consumption data and applied data mining algorithms to identify anomalous patterns indicative of power theft. The system employed a GSM module to send real-time alerts to utility providers, allowing prompt intervention and prevention of theft incidents. It presented a GSM-based power theft detection system that incorporated blockchain technology. The authors utilized smart meters with GSM modules to collect real-time energy consumption data, which was stored securely on the blockchain. Any discrepancies or theft attempts were identified by the system, triggering alerts and generating tamper-proof records. The authors highlighted the transparency and efficiency of their system in detecting and preventing power theft.Smart meters make it verypossible to interpret non-technical loss functions, which were primarily difficult. The smart meter also has functions that measure energy consumption and help consumers better understand their behavior. In a study by Lun et al. (2019), a GSM-based intelligent power theft detection and control system was developed. The system employed a combination of wireless sensor

networks and GSM technology to monitor power lines and detect theft attempts. An algorithm was devised to analyze power consumption patterns and identify suspicious activities. The authors reported accurate detection rates, with timely notifications sent to authorities for appropriate action.

GSM-based power theft detection and prevention systems have emerged as promising solutions to mitigate power theft incidents. The reviewed studies have demonstrated the effectiveness of integrating GSM technology with various approaches such as advanced metering infrastructure, wireless sensor networks, data mining, machine learning, and blockchain. These systems have shown high accuracy in detecting power theft, enabling authorities to take timely action and reduce financial losses. Further research is required to address challenges such as system scalability, cost-effectiveness, and interoperability with existing power distribution infrastructure. Nonetheless, the advancements in GSM-based power theft detection and prevention systems hold great potential in securing the electricity grid and ensuring fair and sustainable energy distribution Viegas et al. (2017), but the proposed system will operate more effectively and will be more economical, as shown in Table 1.

TABLE 1. Comparison of all the systems used for theft discovery

S/N	Methods Used For Controlling	Reliability of System	Efficiency of System	Economic Effect
1	Detection Identification based on HDVS system	Normal	Poor	High
2	Detection using PLC	Good	High	Normal
3	Using smart meter	Perfect	High	High
4	Proposed detection system	Perfect	High	Less

PROPOSED METHODOLOGY

The proposed system methodology provides a systematic approach to developing a GSM- based power theft detection and prevention system. By using this methodology, utility companies can significantly reduce financial losses due to power theft and improve the overall integrity and efficiency of the power distribution network.In this innovative research, GSM innovation will transmit the meter readings and theft suggestion messages to the consumer and electricity board. This procedure will be when demanded that suggests if SMS is gotten from approved server transmittable transmission amongst consumer and government. At that time the energy theft is controlled by Information Retrieval(IR) device. Electricity theft can be done in a variety of ways, including bypassing a meter, modifying meters, billing irregularities, and unpaid accounts. Various scientific and non-technical approaches for detecting electric theft have been enforced in the past. Recognition of clients with suspected load profile is one example of a non-technical process. Periodic inspections can help to reduce robberies, but such measures necessitate a large workforce and a lot of hard work. It fails in the majority of cases due to the staff's dishonesty, hence this method.

HARDWARE IMPLEMENTATION

The circuit hardware of the system is designed with a GSM, PIC Microcontroller, energy meter, relays and load is connected via the power supply. The block diagram of a GSM based power theft detection system to be used is as shown in Figure 1 below.

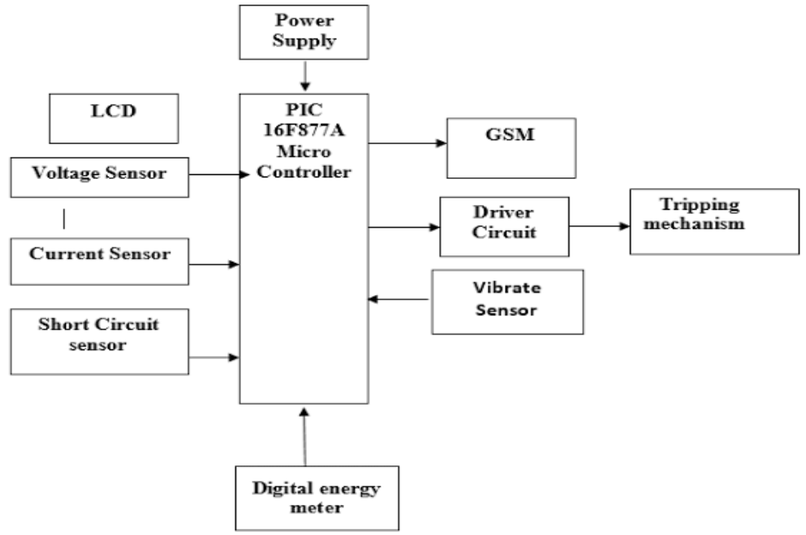


Figure 1: Block Diagram of GSM based power theft detection

A. Seal Tempering circuit:

A seal tempering circuit, also known as a seal integrity monitoring circuit, is a system designed to detect tampering or unauthorized access to a sealed enclosure. It is commonly used in applications where it is crucial to maintain the integrity and security of a sealed environment, such as sensitive equipment, containers, or high-value products.The seal tempering circuit typically consists of the following components:

Sensor: A sensor is placed on or inside the sealed enclosure to detect any changes in the seal's integrity. Various types of sensors can be used, depending on the application, including mechanical switches, magnetic switches, pressure sensors, or optical sensors.

Interface Circuit: The interface circuit connects the sensor to the monitoring system and is responsible for processing the sensor's output signal. It may include amplifiers, filters, or signal conditioning circuits to ensure accurate and reliable detection of tampering.

Monitoring System: The monitoring system receives the signal from the interface circuit and performs the necessary analysis to determine if tampering has occurred. This can be implemented using microcontrollers, programmable logic devices, or dedicated monitoring units.

Alarm or Alert Mechanism: If tampering is detected, the seal tempering circuit activates an alarm or alert mechanism to notify relevant personnel or trigger appropriate actions. This could be in the form of audible alarms, visual indicators, notifications sent to a control center, or remote alerts via communication channels like GSM or internet connectivity.

For every energy meter, there will be a seal which is made by the electricity board for not opening that energy meter. There might be a chance of opening the energy meter and doing illegal activities to decrease their unit readings. In such cases an Information Retrieval (IR) sensor is connected to the energy meter to find out about seal tempering. IR sensor is used to detect the distance between any two objects. By placing an IR sensor between the opening doors of energy meter, it will find distance between the doors

and sends a signal to the pic microcontroller if the distance is increased, which is an indication of opening the energy meter. Then the pic microcontroller knows that there is tempering in energy meter and sends a command to GSM module to send an SMS to registered mobile number in the controller.

B. GSM Module

General packet radio services (GPRS) is a packet oriented mobile data service on the 2G and 3G cellular communication systems global system for mobile communication (GSM). The GSM mode mis a special type that accepts SIM cards and works on a mobile operator's subscription just like a normal mobile phone. From a mobile operator's point of view, a GSM modem looks like a mobile phone. As we know, we use GSM for wireless communication, it uses serial communication to communicate with the micro controller system and needs AT commands to work. These commands are to be sent by the micro controller. It requires a (Subscriber Identity Module) SIM card, just like a mobile phone, and also has an (International Mobile Equipment Identity) IMEI number similar to that of a mobile phone. It has a small profile 24mm x 24mm x 3mm. The configuration of the GSM module is shown in the figure 2.



Figure 2: GSM Module

We can directly connect the GSM modem with microcontroller via driving IC MAX 232.

C. Micro controller:

This system will use AT89C52 micro controller which functions as the main controller. It is 40 pin IC. Port 1 and 3 of this controller are been used. The Receive pin (Rx) and Transmit pin(Tx) are used for serial communication with GSM modem. The Micro controller receiver pin is connected to GSM modem transmitter pin and Its transmitter pin is connected with the GSM modem receiver pin. The AT 89C52 is an 8-bit CMOS micro computer with 4KB of programmable and erasable read-only flash memory (PEROM), manufactured using Atmel's high density non-volatile memory technology and is compatible with the industrial standard instruction set and pin out. The on-chip flash makes it possible for the program memory to be reprogrammed in the system or by a conventional non-volatile memory programmer. Combining a flash on a monolithic chip with a universal 8bit CPU, AT89C52 is a powerful microcomputer that provides a cost effective and very high flexible solution for a wide variety of embedded control applications (Mazdi, Janice, and McKinley, 2000). An AT89552 is built with a static logic for

operation down to no frequency and it support more than one software in the selectable power saving modes. Idle mode suspends the CPU while giving room for the RAM, the timer/counter serial port, and the interrupt system to continue operating. The system power down mode helps to sustain and save the contents in the RAM but will freeze the oscillator thereby disabling all other chip from functioning until the next hardware reset.

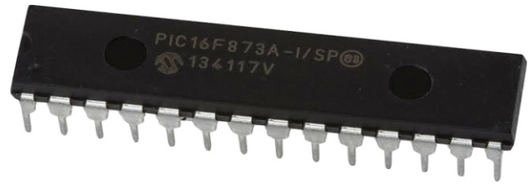


Figure 3: PIC Microcontroller

SYSTEM FLOWCHART

The flowchart is a diagrammatic representation of the algorithm of the system. The system flowchart is as shown in Figure 4. The software design plays a vital role in the working of the entire system; the system doesn't operate without the software. An algorithm was developed to enable pic controllers read the input and respond accordingly. The programming language selected for this project is the C language. The C compiler enable communication between the current sensor and PIC with other different interfaces in the system. Within software programed into it, PIC acts as brain of the whole system to protect and transmit its parameter for system needs to take action. It interfaces the power line information through PC via the RS232 serial port as well as display on the LCD. The module was designed successfully with wireless data transmission capability using GSM module. The design of power theft monitoring system is as per flowchart shown in figure 4.

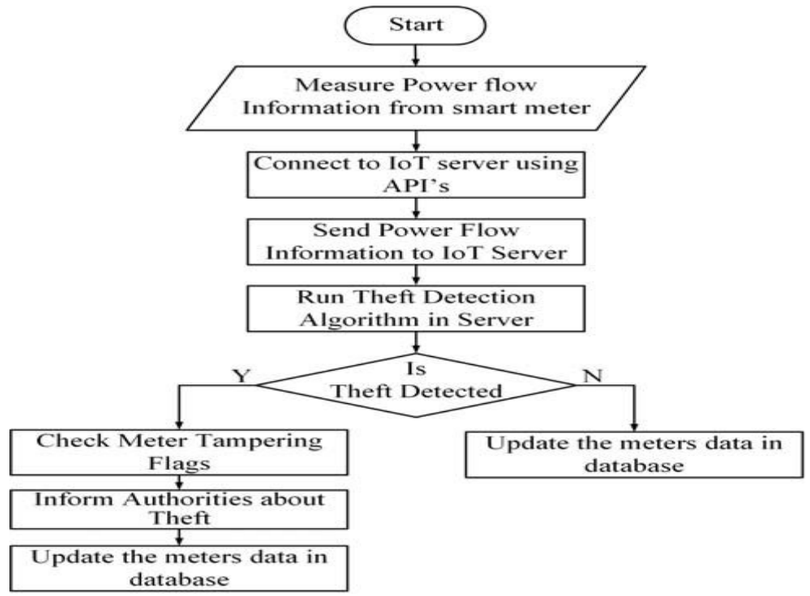


Figure 4: System Flowchart

SIMULATION RESULTS AND DISCUSSION

The work has been performed using the proposed methodology for the detection of power theft using SMS notification. By finding the power theft in the simulation, the micro controller sends an SMS using GSM, which is displayed in the virtual terminal.

Whenever the energy meter is opened for illegal activities, the IR sensor finds about opening energy meter. Through the sensor, PIC micro controller detects that there is tempering of energy meter and sends a command automatically to GSM to send an SMS to a specific number registered in the micro controller while coding the program about disposing of energy meter, which is shown in figure 5.

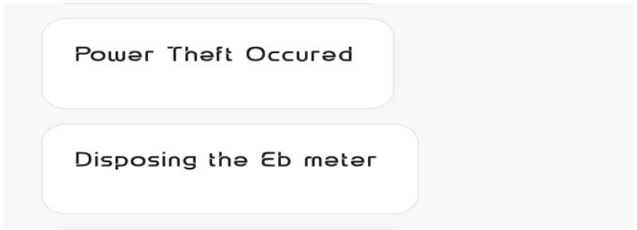


Figure 5: Message From GSM Modem to R egistered Mobile

CONCLUSION

GSM-based power theft detection and prevention is a promising solution for combating electricity theft. With its real-time monitoring capabilities, accurate identification of theft, and instant alert mechanisms, this system has the potential to significantly mitigate the impact of power theft on power distribution systems and ensure a more equitable and efficient energy landscape. It provides an effective and efficient approach to combat electricity theft by leveraging the capabilities of smart meters, data analytics, and the GSM network, the system enables real-time monitoring, immediate detection, and swift response to power theft incidents. This technology-driven solution has the potential to significantly reduce financial losses for power utilities, protect consumers from unauthorized power consumption, and contribute to the overall sustainability and reliability of the power grid. It also reduces the amount of time and finance required for maintenance and troubleshooting as it eliminates the need for labour and manpower.

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FAKES NEWS; A THREAT TO A PEACEFUL NATION AND NATIONAL SECURITY

[1]Okon, Abasiaman Colman,, [2]Anso, Sylvester Bassey [3.] Udoh, Godwin Joseph,

[1.] Department of Computer Engineering Technology, Akwa Ibom State Polytechnic, Ikot Osurua, [2.] Department of Computer Engineering Technology, Akwa Ibom State Polytechnic, Ikot Osurua, [3.] Department of Computer Engineering Technology, Akwa Ibom State Polytechnic, Ikot Osurua

Colmanholdings15@yahoo.com[1.] [2.] Anso4real@gmail.com [3.] Kells54x@gmail.com

ABSTRACT

In recent times in Nigeria, we have witnessed the invasion of fake news on new media. This paper aimed at examining the dangers and impacts of fake news, as a threat to peaceful co-existence in Nigeria. The manners in which people spread fake news internationally within seconds on social media has drastically increased with readers now overwhelmed by the flood of fake news, but older markers of veracity have not kept up, nor has there been a commensurate growth or effort from security agencies in countering this fake news. This paper opined in detail "Fake News and National Security" that the rate of spreading fake news has become worrisome and a national issue that threatens our unity. These developments have allowed those seeking to destabilize our nation or to push their perspectives to have their way of causing ethnic crises and disunity among the citizens. This paper revealed that fake news demoralizes military officers as well as hurts the image of National Security, as they are always painted in a bad light, and further presents approaches to tackling fake news on social media technology that enables fake news to spread and how people are predisposed to believe it. The research employs a mixed-methods approach, combining qualitative and quantitative techniques to investigate the dissemination, impact, and mitigation of fake news within the context of national security and suggests that giving penalties such as imprisonment or financial levy to culprits will play a role in minimizing or curbing the issues of fake news in Nigeria. Finally, it gives a clear national security architecture of Nigeria for a better understanding of Nigeria's national security structure and key functions of the security advisor board in countering fake news & insecurity narratives which can spread en masse at great speed due to technology, and gives recommendations, conclusion with the need to create awareness and sensitized the public to understand the danger of fake news.

***Keywords*:** Fake News, National Security, Insecurity, Nation, and Misinformation

INTRODUCTION

Fake news is fabricated information that mimics media content deliberately created and circulated with the intent to deceive. It is a medium through which social vices like hate speech are circulated to fuel ethno-religious crises, political tension, tribal sentiment, character assassination, and corporate deformation. The primary aim of promoters and mongers of fake news is to instigate acts capable of causing disunity among people. It was hate speech and fake news that contributed largely to the genocide that ravaged Rwanda in 1994. This deliberate dissemination of false or misleading information has emerged as a formidable adversary to the peace and security of nations worldwide. In an era of instant global communication and digital interconnectedness, the threat posed by fake news cannot be understated. This insidious phenomenon has the potential to incite social discord, erode trust in institutions, and sow the seeds of instability within a nation. Furthermore, it transcends borders, capable of igniting international tensions and undermining global security.

The menace of fake news extends its reach across various dimensions, affecting both the internal fabric of nations and their external relations. On the domestic front, it can polarize societies, amplify existing divisions, and undermine the social cohesion necessary for peaceful coexistence. Simultaneously, in the realm of national security, fake news poses a multifaceted challenge. It can be harnessed as a weapon by state and non-state actors to manipulate public perception, provoke unrest, and disrupt the functioning of a nation.

On the other hand, throughout history, the Nigerian government has acted to protect its territories, citizenry, and interests at home and abroad despite numerous security challenges facing almost every sector of our economy. The terrorist events of 26 August 2011, heightened public interest in national security matters, and the Nigerian government has asked all Nigerians to be watchful, suspicious, and alert to signs of danger or potential security threats. Since August 26, 2011, Boko Haram conducted its first attack against a Western interest—a vehicle-bomb attack on UN headquarters in Abuja killing at least 23 people and injuring more than 80. A purported Boko Haram spokesman claimed responsibility for the attack and promised future targeting of US and Nigerian Government interests. rarely does a day pass without media attention focused on national security issues. As new conflicts emerge such as combatting fake news and power shifts occur worldwide, Nigeria's role and responsibilities in terms of ensuring its own and other nations' security are evolving. As a giant of leaders, Nigeria as a nation is challenged to continually revisit its fundamental values and reset its national security agenda accordingly.

Nowadays, journalistic practice is immersed in a context of huge transformations, motivated, among other factors, by the increasingly proactive role of the audience in the production and dissemination of news through the tools provided by Information and Communication Technologies. Pedriza, B.S. (April 2021) Thus, the nature of journalism as a profession that has had to adapt and reinvent itself according to the different circumstances of each historical period is once again evident with the Internet and its new tools being decisive in the 21st century in the evolution of information consumption. In the current communication ecosystem, dominated by a hyper-connected society with high levels of information demands, new narratives and new professional profiles are required to examine content “critically to build a citizenry that is aware of its role in society Calvo, T. Medel (2005). One of the great challenges facing the practice of journalism today is the spread of fake news through social media, which quickly goes viral if unchallenged and assumed to be the truth

McDougall, and J.; Brites, M.J. (2019) of Digital literacy, fake news and education. In addition to the necessary education and digital literacy, fact-checkers are agents that identify, verify and evaluate the veracity of the news. It is one of the professional profiles required to foster a critical spirit of Nation Security in the digital era for the safety of people in society. It is a subject of this paper that arouses the interest of fact-checking due to its relevance and pertinence in contemporary society to combat fake news our nation's national security and sustainable development for peaceful co-existing.

CONCEPT OF DEFINITION:

Misinformation and disinformation are terms that may seem interchangeable. Although there are some similarities between misinformation and disinformation, they're not the same. Unlike misinformation, which people spread without knowing it is false, disinformation is false information that people spread with full knowledge of its inaccuracy.

Bias: a particular tendency, trend, inclination, feeling, or opinion, especially one that is preconceived unreasoned; unreasonably hostile feelings or opinions about a social group.

Clickbait: Internet content whose main purpose is to encourage users to follow a link to a web page, especially where that web page is considered to be of low quality or value.

Content-Sharing: refers to the strategic distribution of webpage and blog content across relevant social media such as Facebook, Twitter, LinkedIn, and Google. It implies distribution with the intent of building engagement and referral traffic.

Disinformation: is false or misleading information that is spread deliberately to deceive. This is a subset of misinformation, which may also be unintentional.

Fake News: Fake news" is information that has been deliberately fabricated and disseminated to deceive and mislead others into believing falsehoods or doubting verifiable facts.

Fact: Something known to exist or to have happened a truth known by experience or observation; something known to be true

Propaganda: Information, ideas, or rumors deliberately spread widely to help or harm a person, group, movement, institution, nation, etc: The deliberate spreading of such information, rumors, etc: To build support for an ideology or leader and demonize the opposition.

Social Media: websites and applications that enable users to create and share content or to participate in social networking.

FAKE NEWS AND NATIONAL SECURITY

Fake news refers to the deliberate propagation of false information with the intent of causing harm to a person's reputation, manipulating people's perception of real facts, inciting the populace against the government, and most disturbingly, causing mayhem in society. The most disturbing area of concern over fake news in Nigeria is, its effect on national security because it is one of the greatest challenges facing the country at the moment. National security is paramount for the social, economic, educational, technological, cultural, and ideological growth of the nation.

The word **"Security,"** implies the protection of lives and properties of people from various forms of threat. "National Security," which occupies the highest level of priority in the hierarchy of interests, is the concern of the government to see that the country is stable and safe for its citizens. It is one of the core values that states cherish as non-negotiable, and that do not admit compromises. In this sense, politicians and policymakers tend to define and conceptualize national security in highly militarized terms by

emphasizing the building of the nation's military capabilities.

This approach portrays the security thinking in Nigeria. The danger posed by this characterization is that it views security from the criminality of the people and not what turns them into criminals. This approach views insecurity not from its causes but from its effects; the answer that this approach provides is empowering the police and the military. But the military approach leads to threat analysis. Transcending the characterization of security in politico-military terms we should look at the socio-economic dimensions of national security. Economic security pre-supposes the existence of political stability, under which a nation can produce, accumulate and distribute its resources-natural, manufactured and human is central to national security. The tight linkage between economic prosperity and national security has made the task of seeking economic development a central concern. In the words of McNamara, In a modernizing society, security means development, security is not military force though it may involve it, security is not a traditional military activity, though it may encompass it; security is not military hardware, though it may include it, security is a development and without development, there can be no security.

RELATED WORK:

National security has become a serious issue of concern in Nigeria because there is a high level of insecurity in the Land. Even with the Global Peace Index (GPI) 2019 report which states that the average level of global peacefulness has improved very slightly in 2019, more than ever before, Security challenges in Nigeria have continued to threaten the peace and progress of the Nigerian State. No time has the country ever encountered such enormous security threats that pose great danger to its very existence as a sovereign nation like the present time. There is no part of the country that is immune to the devastating effects of insecurity. The activities of the deadly Boko Haram especially in the Northeast, banditry, terrorism, insurgency, and farmers/herdsmen clashes are daily occurrences across Northern Nigeria while in the South, kidnapping and armed robbery are everywhere. According to the Global Peace Index (2019) which measures the relative position of nations' and regions' peacefulness, Nigeria is one of the least peaceful places in the ear. The military always refutes such claims and expresses how such stories embarrass officers and men as well as the government and also threaten national security, (Adebajo, 2020). They admit though there may be pockets of cases where the army has been attacked but not on the scale as it is peddled on new media platforms.

The Nigerian military fighting insurgency in the North Eastern part of the country as well as other pockets of crimes within the shores of Nigeria always complain about the way people disseminate fake news across various social media platforms. They claim it demoralizes officers and men and also hurts the image of the military as they are always painted in a bad light, (see Usman, 2018). According to Military authorities, Boko Haram churns out propaganda images and videos that often get public attention through the help of social media users, (Usman, 2018).

TECHNOLOGY AND THE SPREAD OF FAKE NEWS IN NIGERIA

The spread of fake news in Nigeria has increased in the past few years. The new media technology, known as Twitter, Facebook, YouTube, LinkedIn, etc. and other news apps have become the core sources of fake news, especially for the younger generation. The spread has changed the way citizens interact with political events and altered the perceptions of Nigeria over authentic reportage. Social media platform such

as Twitter has become the main platform for citizens to spread fake news to the international community by reporting fake information, violence, and fighting against insurgent that is not verified to be the truth. The reach of Twitter and the impact of hashtag trends means that sensitive issues get to a wider audience within and outside the continent. On the other hand, the spread of fake news on social media has been exploited by criminal elements in society to promote activities such as the sexual exploitation of children, payment fraud, cybercrime, and terrorist radicalization. Consequently, the widespread of fake news on social media has increased opportunities for both state and non-state actors to advocate for both good and harmful security policies. The volatility of Nigerian politics means that Fake news spread by social media users is prone to misinformation and radicalization of political violent and religious movements. It is important to evaluate the repercussions of fake news on national security through an in-depth review of the various news spread on social media that have threatened national security policy

STRATEGIES FOR CURBING FAKE NEWS IN NIGERIA

Fake news is harmful to our community, it makes the world less informed, erodes public trust (Mosseri,2017), and threatens national security. Therefore, all relevant stakeholders – telecommunication companies, the media, librarians, and other information professionals as well as teachers have a responsibility to address the menace of fake news. From the telecommunication perspective, it is believed that most fake news is financially motivated; and one of the most effective approaches to fighting it is by removing the economic incentives for traffickers of misinformation who make money by masquerading as legitimate news publishers and posting hoaxes that get people to visit their sites (Mosseri, 2017). However, the increasing incidence of fake news has triggered many reactions and could have triggered another wave of antagonism and mayhem throughout the nation. Curbing fake news completely from social media is a long process but can be minimized if;

I. Government and Security agencies re-strategize their efforts by partnering with NITDA and indigenous innovators to develop technological solutions to aid intelligence gathering and detection of fake news sources.

ii. Take the campaign against fake news to the Local Government and Wards levels using the structure of the National Orientation Agency (NOA) in the country for sensitizing and awareness on the danger of fake news.

iii. Create an effort to reach out to Technology companies like Twitter, WhatsApp, Facebook and Google to work with them to curtail the spread of fake news and hate speech. such as the alliance that came with the advent of the COVID-19 pandemic, where Facebook removed fake stories about COVID-19 & flagged them.

iv. The government should support stakeholders in developing participatory and transparent initiatives for creating a better understanding of the impact of fake news and propaganda on national security as well as appropriate responses to these phenomena.

v. The a need to rebuild trust in the traditional media because political encroachment is having very negative impacts on most media houses in Nigeria, making most Nigerians to believe that every piece of news is either outrightly fake or fake with a touch of real.

vi. Technology companies should include post-verified reaction buttons for news authentication and reactions for the public to observe people's reactions toward a certain post to know whether is fake or real.

WAYS OF IDENTIFY FAKE NEWS

Separating fact from false can be tasking. But getting the truth is a worthy course no matter what it costs. These are ways of identifying fake news:

1. **Consider the Source of the Information:** Click away from the story to investigate the site, its mission, and its contact information.
2. **Read beyond the Headlines:** most headlines are usually sensational to attract people's attention. Read beyond the headlines to get the details of the news.
3. **Check the Author:** do a quick cheek on the author to ascertain his/her credibility.
4. **Investigate the Article:** if you are unsure about a news article, do some quick investigations. First, check the date to ensure that it is current. Most fake news is just old stories being presented as new events.
5. **Develop a Critical and Evaluative Mindset:** fake news is usually sensationalistic. Go beyond the sensations and ask critical mental questions about the ultimate reason behind the story. Does this story sound truthful?
6. **Examine the Evidence:** Credible new stories usually include sufficient facts and figures from credible sources. Therefore, critically examine the evidence to determine that something happened, or if the facts have been twisted to back up a particular point of view.
7. **Look out for Fake Images:** using modern editing software, people now create fake images that look real to support their fake stories. You can use the Google Reverse Image Search to check if an image has been altered or used in the wrong context.
8. **Search for Other Sources:** as a general rule, always have at least two reputable sources for a story before you do anything with such story. Ensure you find other source(s) using search engines to confirm the story.
9. **When in Doubt, ask the Professionals:** you can visit fact-checking websites like FactCheck.org, International Fact-Checking Network (IFCN), PoltiFact.com, Snopes.com, among others to verify your facts.

FAKE NEWS AS A THREAT TO NATIONAL SECURITY

Fake news, hate speech, and disinformation have something in common, they are all capable of destabilizing the unity of Nigeria, inciting people to violence, and weakening the people's confidence in their government. It's worth noting that fake news along with incorrect and inflammatory commentary has the potential to destroy Nigeria's unity and cause both ethnic and religious crises across the country. Nigerians must avoid any act that promotes fake news, or disintegration of the national unity and say no to the separatist movement, terrorism, hate speech, religious bigotry, and any act that tends to divide us as a nation. “Social media and fake news are the biggest threat to human existence not only to a nation. Fake news is a major cause of violence in our society now. As good citizens, we need to always fact-check news and information before publishing. “There is a need to understand that Nigeria is the only country we have and everyone must put hands on deck to ensure that there is peace for the national unity. The media should be up and doing in ensuring that peace is restored in the country by fact-checking news before publishing.

National security includes more than military security. It includes among other things such as economic and financial security, health and social security, infrastructure, transportation, and communication security, power and cyber security, and above all, human and political security. Each of these arbitrary divisions cannot stand alone. They are indeed interconnected. It is therefore futile to think that once a military officer is installed as director of

national security, the country is secured.

In most advanced countries, the work of national security involves coordination and analysis and except in rare cases does one find a military man being put in charge of national security. If it happens, such a man or woman must be gifted with the multi-tasking ability to coordinate all inputs before arriving on the way forward of arriving at the right recommendation of the policy of securing a nation. In the United States, the office of the Director, the Central Intelligence Agency (CIA) and the offices of military intelligence are subordinate to that of the Office of National Security which operates within the presidency.

As the statists argue for a strong military and arms in other to guarantee national security, this section of the paper peeps beyond this stand to examine other critical conditions that trigger insecurity. The point is that a strong or weak military can no longer be considered as the most critical option for national safeguarding. To this end, other predisposing conditions that bother on national security in Nigeria are discussed. As a peculiar nation, Nigeria is under the siege of crises that threaten state and human security, and consequently menace peaceful co-existence and secured livelihood. Among the factors compromising national security is persistent abject poverty. The condition shows that poverty has increasingly worsened from 1980 to 1996 (Federal Office of Statistics of Nigeria, FOS, 1999). The incidence of poverty rose from 28.1% in 1980 to 46.3% in 1985, but dropped to 42.2% in 1992 from where it rose sharply to 65.6% in 1996. Similarly, the data from National Bureau of Statistics of 2005 puts poverty incidence at 54.4% at estimated population of 126.3 million and 68.70 million living in poverty. The trend indicates that there is a drop in the incidence but the population in poverty (68.7 million) National Bureau of Statistics (NBS 2005) 108 Security Strategies Year: 7 Issue: 14 Eugene N. NWEKE Going by the statistics and by the 1991 population figure of 120 million those living below the poverty line were 84 million. If the country's population has grown to 140 million (2006, population figure) by analogous reasoning, the number of people trapped by extreme poverty and living on less than one dollar a day must have risen up to 98 million. This means that another 14 million impoverished people have been unleashed in the country. Given this, there is no doubt that poverty is a serious and salient threat to state and human security. Thus, poverty provides the objective as well as the subjective context for the high level of insecurity in the country. This might have informed Egwuatus' observation that "the distribution of national wealth is very uneven and poverty is the first threat to peace and stability". Similarly, All these anomalies have gone a long way in constraining and obstructing the nation's quest for socioeconomic development. Besides these, Idowu (1999:131) has highlighted sundry conditions that threaten national security to also includes

* Bad and weak government.

* Human rights violation.

* Unjust and inequitable distribution of national resources including political posts, industries, investments, funds, etc.

Disunited and unintegrated ethnic groups.

Ethnic and religious antagonisms and cleavages.

Weak and poor economy marked by corruption, weak currency, etc.

Social-economic hardship, unemployment, hunger, starvation, cashlessness, etc.

Weak military might.

Coups and military rule.

Communal clashes.

Unhealthy competition among the ethnic groups for national resources.

Political domination.

Misappropriation of national revenue.

Abuse and misuse of power by some defense and security agents. On the merit of these conditions, there is need to seek ways of addressing the threats to secure stable polity.

THE NATIONAL SECURITY ARCHITECTURE OF NIGERIA

There is a general tendency in Nigeria and perhaps in most countries in the so-called third world to equate military security with national security. National security goes beyond more than military security. It includes among other things economic and financial security, health and social security, infrastructure, transportation, and communication security, power and cyber security, and above all, human and political security. Each of these arbitrary divisions cannot stand alone. They are indeed interconnected. It is therefore futile to think that once a military officer is installed as director of national security, the country is secured.

In most advanced countries, the work of national security involves coordination and analysis, and except in rare cases does one find a military man being put in charge of national security. If it happens, such a man or woman must be gifted with the multi-tasking ability to coordinate all inputs before arriving on the way forward arriving at the right recommendation of a policy of securing a nation. In the United States, the office of the Director, the Central Intelligence Agency (CIA), and the offices of military intelligence are subordinate to that of the Office of National Security which operates within the presidency. Of course, the president can call on any of the intelligence outfits for briefing and advice as the case may be. A military man may recommend military action because that is what he is trained to do. But military action may lead to all kinds of complications with foreign adversaries. This is why the diplomatic ramifications would need to be examined first before action can commence. The movement of armed forces would involve logistical considerations and consequences it carries with it, especially the kind of relations a country has with its allies and countries in the neighborhood where military action is targeted. It comprises the following:

a. **The National Security Council:** The Constitution mandates the creation of a National Security Council that "has the power to advise the President on matters relating to public security including matters relating to any organization or agency established by law to ensure the security of the federation"12. It meets as occasion's demands, and is composed of the following:

The President who is the Chairman;

The Vice President, Deputy Chairman;

The Chief of Defense Staff;

The Minister in charge of internal Affairs;

The Minister in charge of Foreign Affairs;

The National Security Advisor;

The Inspector General of Police and such persons as the President may in his/her discretion appoint.

b. **Coordination of the National Security in Nigeria**: The Office of the National Security Advisor (ONSA) is the central body for coordination, control, and supervision of national security in Nigeria. ONSA manages national security on behalf of the President of the Federal Republic through the National Security Council

(NSC), the Joint Intelligence Board (JIB), and the Intelligence Community Committee (ICC). The National Security Advisor is the principal officer of the National Security Council and advises the President on national security issues.

INSTRUMENTS OF NATIONAL SECURITY STRATEGY:

Nigeria Instruments for implementing national security in Nigeria are comprised of:

a. **Joint Intelligence Board (JIB):** The Joint Intelligence Board has both advisory and executive functions. These include providing the President with advice reports and current assessments of all matters affecting the security of Nigeria; formulating general security policies and procedures; reviewing current issues of national security; and acting promptly to deal with subversion and unrest, after due consultation with the President. The National Security Advisor is the chairperson of the board. The board meets monthly while its subcommittees meet more frequently as the situation warrants. b. Specialized agencies: State Services Security (SSS), Defense Intelligence Agency (DIA), and National Intelligence Agency (NIA) are specialized agencies for the collection of intelligence and the provision of security services. Notably, SSS provides internal security, The NIA provides external intelligence and DIA provides defense intelligence and security. c. Armed Forces, the Police, and Paramilitary Organizations: They have responsibility for specific aspects of national security and are tasked through relevant ministries, service councils, and established chains of authority.

RECOMMENDATION:

They are an urgent need for the government to create public awareness, especially as it relates to National Security on the consumption of news or the spread of fake news online such as Facebook, Twitter, WhatsApp, etc, is important. Nigeria's government must immediately recognize and seek to understand the concepts of counterfeit narratives and information laundering, as well as the threats they pose to democracy, freedom, and national Security, National Security Advisors, and Policymakers should tackle these issues with laws that are not too broad or fact-checked fake news as it concerns security and hates speech or freedom of the press and be effective enough to provide citizens with the right and accurate report on security matters that posed threat to national security to “secure life” and guides that factors capable of destabilizing nation by establishing and defending cognitive security. Law enforcement and other security officials should make efforts to prepare for, and help mitigate, the confusion and tension that ultimately arise from fake news especially as it relates to ethnicity, religion, and politics, and prepare to protect themselves and all citizens from incidents that, without intervention, could escalate to violence or destabilized the peaceful co-existing of our nation. Finally, there is a need for the Government to regulate the use of the internet, this should be with good technicality not to violate the rights of the citizens but to fact-check or checkmate the activities of unregistered news outlets who post fake news to gain relevance.

CONCLUSION

The Nigerian security theater is complex. Faced with these exigencies, it has developed a comprehensive National Security Strategy to safeguard its national interests. Sectorial strategies integrate responses to complex challenges both at home and abroad. The Nigeria National Security Strategy underscores the need for collaboration and coordination across all spheres. Nigeria's national security architecture is well-designed and articulated. The country is continuously refining mechanisms in the

implementation phase so that strategies can achieve their desired objectives.

Security of life and property is a fundamental human right guaranteed under Nigeria's constitution. Unfortunately, the governments since 1999 have faced a great challenge in efforts to guarantee security in the country. The paper examined the condition that predisposes the citizens and country to security threat;

(i) Spreading of fake news and hate speech which can lead to genocide

(ii) Abject but persistent poverty,

(iii) Religious crises and terrorism attacks,

(iv) Kidnapping and ethnic conflicts.

Also traced to the problems is wide income disparity and inequality, bad governance, corruption, high unemployment, social dislocation caused by massive rural-urban migration, and the breakdown of societal values, leading to community unrest. Moreover, the institutions established to guarantee security are incapacitated by limited personnel and skills, inadequate funding, poor equipment, and a lack of proper orientation and commitment by some officials.

There is need for government to create publics awareness on the effect of fake news on national security, retraining of security personnel, adequate funding of our security structure and improving standard of living of the masses through good governance and provision of social amenities.

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FLOOD HAZARD ASSESSMENT AND MAPPING OF FLOOD RISK IN ABIA STATE, NIGERIA USING REMOTE SENSING TECHNIQUES AND GEOGRAPHIC INFORMATION SYSTEMS

BY

[1.]**EMENYEONU PAUL CHIDIEBERE** 08030925499 EMAIL: emenyeonuchidiebere@gmail.com
DEPARTMENT OF URBAN AND REGIONAL PLANNING
SCHOOL OF ENVIRONMENTAL DESIGN AND TECHNOLOGY
ABIA STATE POLYTECHNIC, ABA.

[2.]**ANYANWU ALOZIE JAMES** 09031256314 EMAIL:
anyanwuaj@gmail.com
DEPARTMENT OF URBAN AND REGIONAL PLANNING
FACULTY OF ENVIRONMENTAL STUDIES UNIVERSITY OF UYO, UYO,
AKWA-IBOM STATE, NIGERIA.

[3.]**IHEANYICHUKWU OKPARA.**
DEPARTMENT OF URBAN AND REGIONAL PLANNING
SCHOOL OF ENVIRONMENTAL DESIGN AND TECHNOLOGY
ABIA STATE POLYTECHNIC, ABA.

ABSTRACT

This study assessed the capabilities of remote sensing (RS) and Geographic Information Systems (GIS) techniques in assessing the devastating impact of flood hazard and gain understanding of flood risks in Abia State, in order to map out and mitigate against flood hazards. Its objectives include: to analyze and model flood hazard and vulnerability of the study area; to generate and produce flood risk map that will suggest flood control programmes in Abia State among others. The study deployed relief and drainage layers as well as landuse and land cover layers to capture and visualize flood hazard mapping. It also used flood hazard layer and population map to capture and generate flood vulnerability mapping. Flood risk was modeled using flood hazard layer and vulnerability layer. The data layers were prioritized, conceptualized and combined in a multi-criteria technique using ArcMap 10.4 software version to generate flood hazard map displaying all areas of risk. The results revealed that Abia State is vulnerable to flood risk owning to extreme heavy rainfall events, poverty, urbanization and deforestation. It recommends that a comprehensive plan, involving multi-hazard risk assessment for mapping hotspot areas through the support of GIS/RS technology, to steer development towards sustainability.

***Keywords**: Flood, Risk Assessment, Remote Sensing, GIS Technology, Abia State.*

INTRODUCTION

Environmental change is a major problem at global level over the years. That is, flooding profiles are the major disaster commonly affecting many countries of the world year after year. It is an inevitable natural phenomenon occurring from time to time at all river valleys, low-lying areas and natural drainage systems which does not only damage lives, natural resources and environment but also causes loss of economy and health (Smith,2001;Daniel and Daniel 200;Ogbonna, Ike and Okiwu-Delunzu,2015). The impact of flooding has increased owing to rising sea level, climatic variability, heavy precipitation, increased inappropriate development on floodplains. This is because of heavy rainfall that lasts for longer times and builds up excess water beyond which percolation can accommodate. This led to the rises of water levels flowing down to the slopy depressions. Besides, the rising of water tables and prolonged infiltration arising from long duration of rainfalls is also a problem (Anyanwu,2015).

Other problems are inadequate drainage network facilities and the few existing ones are poorly maintained. Blocked natural drains, indiscriminate dumping of refuse into the existing drains are all associated with urban sprawl and ill-health. None compliance to building code regulations, high urbanizations and poor town planning measures. Rapid deforestation and urban expansion caused flood hazard and risk to the environment without any mitigation plan. (Ekpenyong,2010).

Therefore, most human settlements of the world are faced today with the highest problems of flood. Flood risk and disaster has continued to handicap the socio-economic development on developed and developing countries. Thus, flood has some serious impacts on human population and livelihood in most parts of the world [Pelling and Vitto, 2001, Usoro, 2010]. For instance, flooding has been identified as one of the major factors preventing African growing population from escaping poverty alleviation [Adelekan, 2010] Flood hazard in Nigeria, have doubled in the last ten to fifteen years, despite the capital outlay of about two percent of annual capital expenditure to combat flood risk disasters, deforestation and urbanization without adequate provisions of drainage facilities (Onokerhoragy and Omuta, 2005). Again, flood hazard in the study area has also doubled. It can be observed that in Abia State, some local government areas, communities, villages or even land uses that are vulnerable to flood risk than others. Similarly, some areas in the study area suffers higher losses than others during flooding. Besides, flood risk assessment lacks empirical basis for a specific causes of flood hazards. Based on the foregoing it is important to investigate flood hazard assessment and risk mapping using GIS and remote sensing technique. This will help encourage effective and efficient control measures in detecting early signs of flooding and areas prone to flood risks in the study area. The potentials of GIS in flood hazard assessment and mapping cannot be over emphasized. This is because GIS has the capabilities of proper integration of physical, socio-economic and demographic data into management. It is a data management instrument and mapping representative tools. GIS can help in exposing new portions of lands affected by flooding. GIS technology and Remote Sensing enhances the ability of preparing flood hazard maps and forecasting. It is a technique that represents all kinds of spatial data of the real-world. Finally, GIS can input, store, search, analyze, display and be applied in any field enterprise of human and environmental lives [Usoro, 2004].

This research seeks to address the following questions:

- How can flood hazard be modelled and analyzed based on certain physical, environmental and climatic changes favorable to flooding in Abia State?.
- How can flood vulnerability be analyzed and modelled considering the socio-economic factors and population characteristics of the study area?
- How can flood risk map be generated using GIS/RS technology for flood risk disaster management in Abia State?

In the light of these, the main objective of this research is to apply GIS/RS in flood hazard assessment and mapping of Abia State.



Fig. 1. Showing the Study Area

THE STUDY AREA

Abia State is situated in South Eastern Nigeria and lies between latitude 4°45'N and 6°00'N of the Equator and Longitudes 7°0'E and 8°09'E of Greenwich meridian. It is bordered by Imo State in the West and shared common boundaries with Anambra, Enugu and Ebonyi States in the North and Rivers State to the South. It is bordered by Cross-River and Akwa-Ibom States to the North-East and East respectively as shown in (figure 1). The area covers about 5420km^2 with a total population of 31.234,203 people and a population density of 57.64 person/km^2 based on a projected population of 2006 (NPC, 2007). Mean annual rainfall over the area decreases gradually form 2200mm-1900mm south to North. The hottest period is between January and March with temperature of above 27°C (dry season starts from November to March). The relative humidity (remain at an average of 70% to 80%) is usually high throughout the year. The area is noted for its low-lying flood plains and rain forest. It is drained by a number of rivers and streams with Qua Iboe River being the most significant. The area has very high agricultural potentials and is rich in crude oil and gas, oil palm trees and many other natural resources.

Relief is typically flat and low-lying terrain with less than 120m above sea level. It is drained by a number of rivers and streams with Imo River being the most significant. Climate is of humid tropical rainforest. The average rainfalls of the study area decreases gradually from 2200mm-1900mm South to North and occurs form March to October with a break in August. The hottest period is between January and March with temperature of above 27^{0}c (Anyanwu and Udoh,2016) Vegetation comprise of grassland, bamboo trees, cassava, yam, cocoyam and maize. Landuse include agricultural lands converted into human settlements such as residential, commercial, recreational, institutional, industrial and utility uses. Other socio-economic activities existed such as deforestation, mining extraction and oil and gas operations. Geological structures of Abia State include the Nsukka formation for upper coal, the false-bedded lgali sandstone formation and the Benin, lower coal formation for coastal plain sand. Abia State soil involves the association of lithosols, alluvial, ferruginous, ferralite and hydromorphic soils which supports extremely low infiltration after intensive rainfall leading to erosion and flooding

in the study area (Anyanwu,2015). Abia State has a total landmass area of about 5833. 753km2 and a total projected population of 40,851,845 people with a population density of 7,002.64 persons/km2 based on 2006 population census (NPC,2006).The small landmass was under intense population pressure land uses.

CONCEPTUAL FRAMEWORK

Botton and Stewart (2002) defined the concept of multi-criteria Analysis (MCA) as a group of formal approaches to the analysis of decision-making process and problem solving aimed at determining an overall preference among different alternative it defines a relationship between the input maps and the output maps.

The procedure therefore, involves the utilization of geographical data, the decision maker's preferences and the manipulation of the data and preferences according to specified decision rules as a function of problem-solving schematic operation under two considerations: One: The GIS capabilities of acquisition, storage, retrieval, manipulation and analysis. Two: The multi-criteria decisions making technique (MCDM) capabilities for combining the geographical data and the decision maker's preferences into unidimensional values of alternative decision (Malczewki, 2004, MCDA/ MCA and GIS /RS provide optimal areas for development by creating a land suitability assessment methodology with multi-disciplinary data from different sources as shown in figure.

Multi –Criteria Evaluation
Techniques (MCET)
Different Sources of Data:

1. Reflief and Drainage
2. Vegetation and Landuse
3. Population Density
4. Human poverty index
5. Human development Index

Zones:
Exposure to Flood hazards and vulnerability and risk involved.

Figure.2. MCA schematic operational method adopted and modified after Anyanwu (2015)

GIS technologies has been useful in enhancing decision making in many field of evaluation such as physical, social and economic characteristics floodplains, suitable land use planning and mining environmental flood damages. Remote sensing is obtaining and interpreting of information on the study area without coming in direct contact with it. GIS is a computer based decision support system that enhances the capturing, storing retrieving and processing of spatial and attribute data or information.

Material and Methods

Research
Objective

Secondary data
Primary Data
Data Acquisition

Thematic maps.
1. Political map
2. Vegetation and land use
3. Relief and Drainage.
4. Population data (2006)

Recommendation survey, site observation

GIS Data Base Creation
1. Data capturing/scanning
2. Geo-referencing
3. Digitalizing/Attribute table
4. Themes layer creation

GIS Mapping/Analysis
Multi-criteria operation

Flood hazard mapping
Flood vulnerability mapping

Flood risk mapping

Results and Discussion

Summary, Conclusion and Recommendations

Figure .3: Schematic Diagram for Research Methodology

A. The data sets used in this work include:

-Administrative map of Abia State

-Vegetation and landuse map of study area

-Population density data of study area

Relief and Drainage map of study area

The Sources of Data include:

1. Administrative Map of the study was area on scale 1:250,000 from Ministry of Lands and Town Planning Authority (1992)
2. Vegetation and Land use map of the study area on scale of 28.5m2 was extracted from Landsat ETM+ (2003).
3. Population Density map of the study area was obtained from 2006 census by the National Bureau of Statistics/ National Population Commission Abia State (2006).

Relief and Drainage map of the study area were extracted from the Encarta maps, a Microsoft documents (2009) /ministry of lands and town planning Authority, Abia State.

B. Description of Datasets such as the administrative maps of Abia State was used to determine political boundaries of the 17 LGA to provide minimum mapping unit to map various thematic layers such as vegetation and land use map, population density and relief and drainage maps of the study area. Thematic maps are representatives of specific maps and data that focused on vegetation land use, population, relief and drainage layers were used for flood hazards assessment and mapping in the study area.

C. GIS Data processing and data base creation were done in all the datasets and were captured in the GIS environment by scanning. Geo-referencing and digitalizing and projecting to the USGS. WGS.84. Attribute table were created using Arcmap 10.4 software version. Datasets was projected to UTM Zone 32 and rasterized using the Data Management Tools and Conversion, Tools of ArcMap 10.4 software.

GIS Analysis of flood Risk Assessment:

Assessment of flood hazard and mapping of flood risk was conceptualized in a GIS environment using Arc Map 10.4 for data manipulation and Analysis. Weight were assigned to the rasterized data layers and using map algebra in the spatial Analyst tools to run a multi criteria analysis. That is flood hazard map was generated by combining, Drainage, Elevation and Vegetation rasterized datasets. Flood Vulnerability Mapping was generated by the combination of flood hazard layers and population density map, using spatial analyst tools of Arc Map 10.4. Flood Risk Mapping was generated by the combination of flood hazard layer and flood vulnerability layer. Ranking was done based on the fitness of a given type of land attributes with regards to flood risk assessment of study area. It describes the reclassification order of Zonation (3,2,1) to reflect the mapped zones/areas which were designed and applied with range numbers:

- For critical areas as **High**----------3
- For less critical areas as **Moderate**----------2
- For areas with marginal or minimal impact as **Low---1**

RESULTS AND DISCUSSION.

The three of flood hazard surface layers in the study area was generated and displayed using Drainage layer, Elevation layers and Vegetation layer as shown in table1.

Table1. Flood Hazard Analysis

S/N	Data layer	%	Decimal Weightage
1	Drainage	40	0.4
2	Elevation	35	0.35
3	Vegetation	25	0.25
Total		**100**	**1.0**

The 3 layers were weighted as presented above in table 1 and combined, using single output map algebra of spatial analyst extension a multi-criteria analysis in Arc map 10.4 environment to generated flood hazard layers. This was analyzed using three (3) classes to show ranking zonation of high, moderate and low areas of flood hazard disaster as shown in figure 4.

Table2. Flood Vulnerability Analysis.

S/N	Data Layer	%	Decimal Weightage
1	Flood hazard	60	0.6
2	population	40	0.4
Total		**100**	**1.0**

The two (2) layers were weighted as presented above in table2 and analyzed in a GIS environment. High, moderate and low zonations was used to display flood control measures against flood vulnerability as shown in figure 5.

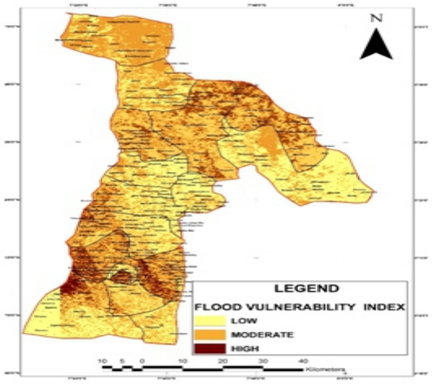


Figure 5. Showing Flood Vulnerability Index

Table 3. Flood Risk Analysis

S/N	Data Layer	%	Decimal Weightage
1	Hazard layer	50	0.5
2	Vulnerability layer	50	0.5
Total		**100**	**1.0**

The two layers were weighted as presented above in table 3 and analyzed in a GIS environment. The flood risk map like the hazard and vulnerability maps also has 3 classes namely: High, Moderate and Low flood risk areas respectively as shown in figure 6.

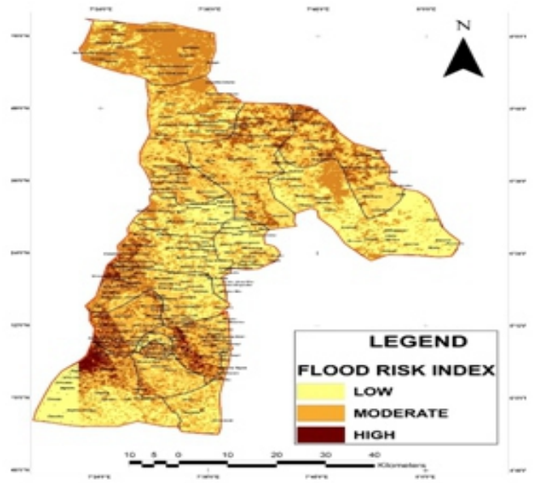


FIGURE 6 Showing Flood Risk Index

Based on the forgoing a map-based GIS analysis in the study area has demonstrated that Abia State environment is vulnerable to flood risk. This is as a result of extreme heavy rainfalls, increased economic hardships, urbanization and industrialization. Besides, basic adaptation needs/resolution remains low or not available (Ekpenyong, 2010). Flood disasters are one of the most common profiles and widely distributed natural hazards to life and property worldwide. Therefore, this study represents a great insight for better understanding of the dynamics of GIS/RS Technology. Findings have also demonstrated that flood hazard assessment and mapping of flood risk (maps) are very useful for

improved information about risk and its threats. Hence, it shows that it is possible to monitor and control urban growth/expansion, deforestation and loss of biodiversity that results to flooding in the study area.

CONCLUSION/RECOMMENDATION

The study integrated various datasets to map flood hazard risk assessment in the study area. GIS has revealed its capabilities, efficiency, reliability and effectiveness in the flood hazard assessment and mapping of flood risk in communicating information that will enable stakeholders to mitigate against flooding and its impact on the study area. In this way flood impact reduction can be achieved leading to a better environmental living condition in the study area. Abia State is noted for its susceptibility to erosion hence there is need for a comprehensive map involving flood hazard risk assessment for mapping out vulnerable hot spots areas. This will help relevant authorities, stakeholders and urban planners to steer development toward sustainability. This is necessary in utilizing GIS as the number one tool for flood risk disaster management and control.

It is recommended from this study that flood hazard assessment and flood risk should involve:

- Effective and efficient flood control measures should target flood prone areas of the study area where there is high risk of flood disaster.
- A GIS based plan implementation strategy involving sustainable flood control measures to reduce flood risk disaster in the study area.
- A map-based flood risk assessment plan should be regularly provided through GIS/RS techniques for flood risk disaster reduction.
- Auditing, financing, emergency response units and government involvement in providing a regular inventory to keep abreast with flood risk and associated environmental problems should be accessible and encouraged.

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FOOD PROCESSING, INNOVATION AND VALUE ADDITION TO SUSTAINABLE FOOD SECURITY IN AFRICA: A REVIEW.

Nwakodo, C.[1], Ikpoh, J. C.[2] and Luke-Aliga, U. L.[2]

[1]Department of Food Science and Technology, Abia State Polytechnic, Aba, Abia State

[2]Department of Chemistry/Biochemistry, Abia State Polytechnic, Aba, Abia State

chinenyeprecious61@yahoo.com

Abstract

Food insecurity is a major challenge in the developing regions of the world including Africa. Post-harvest losses contribute majorly to food shortages and food insecurity in Africa. Food processing, innovation and value addition are key steps in addressing food insecurity challenges. Value addition in each aspect of agricultural produce creates more quality and adequate demand for the products. Food security, a major global challenge, relies on the adequate supply of safe, affordable and nutritious fresh and processed foods to all people. Reducing food losses throughout the supply chain from production to consumption and sustainable enhancement in preservations, nutrient content, safety and shelf life of foods, enabled by food processing will also be essential. To solve the problem of food insecurity in sub-Saharan Africa including Nigeria, innovations to sustainable food security such as aeroponics, aquaponics, hydroponics, selective breeding, genetic engineering and biofortification should be recognized and implemented.

Keywords: Food processing, Innovations, Value addition, Food security.

Introduction

Food is the most basic of all human survival needs. Although, so many efforts have been sunk into improving the quality and production of world food supplies, food insecurity remains predominant, especially in the global southern nations of Asia and Africa. In Africa, malnutrition has resulted in the death of many of its citizens. Approximately one out of every three persons in sub-Saharan Africa is undernourished as assessed by African Food Security Briefs (AFSB) (Akerele *et al.,* 2013).

Sustainable agriculture is based on a commodity value chain approach from primary production through processing and marketing. High post-harvest food losses estimated at 30 - 50%, due to poor post-harvest handling practices and inadequate food processing and storage facilities, weak supply chains and limited value addition are major challenges constraining agricultural development and food security in Nigeria and sub-Saharan Africa as a whole (Aworh, 2020).

From production, harvesting and storage to transportation, processing and packaging of foods and agricultural by-products, Africa is faced with teething challenges, which if not fixed, would perpetually keep the country food insecure, hence the need for innovation. Innovation is another way of demonstrating commitment to enriching lives and empowering commitment by investing in not just the development of the food value chain but in capacity development and access to resources. It is believed by scientific agricultural experts that technological innovations would boost agricultural gains and sustain food security in Africa (UN, 2020).

There are many reasons for post-harvest food loss, most notably agricultural pests, mould, natural shrinkage like moisture loss and climate (Buzby and Hyman, 2012). Therefore, one of the important ways to improve food security is to reduce losses (Kiaya, 2014). Capacity building is needed to enhance the use of post-harvest agricultural technique by traditional or modern methods and raise the awareness of farmers to contribute in production of value-added products from stored and surplus raw materials, increase the human consumption period, and preserve the products from pests and fungi (Gibbon, 2012).

Food processing is required to increase useful life of foods, optimize nutrient availability and food quality and reduce losses and waste. The focus of this review is on the role of food processing, innovation and value addition in ensuring and addressing food availability, access, use/utilization and stability in Africa.

raw materials are processed into more useful shelf-stable and palatable foods or portable beverages for human consumption (IFICF, 2010). Since prehistoric times, food processing has been a key aspect of the food production chains that links agricultural production with the provision of food to people in the form, and at the time it is required (Floros *et al.,* 2010).

The management of risks to food safety and stability constitutes an essential element of food security in Africa. Traditionally, brining and pickling were used. A range of chemical additives (e.g.sulfurdioxide for preservation of wine, nitrite in bacon), antimicrobials (e.g. benzoic acid) and antioxidants (e.g. tertiary butylhyroquinone for retarding oxidation of oils) has been employed over the years. However, there is now a trend towards the incorporation of natural preservatives

account the potential over-consumption of nutrients, changing demographic structure, consumer choice and cultural context of diets.

Over the past 50 years, feeding our rapidly growing global population was achieved through increases in agricultural productivity (Defries *et al.,* 2015). Reducing the prevalence of food insecurity today and in future will require technological solutions through collaborative efforts across agriculture, food, nutrition and health that are acceptable to society. It is clear that many considerations need to be factored into a discussion of food security which also include effective distribution channels between where food is produced and required,the differing food regulations in various regions, the role of indigenous food, religion and culture, urbanization, biodiversity and climate change (Burlingame and Dernini, 2012; Muchenjeand Mukumbo, 2015; Rolle, 2011).

Food Processing and Sustainable Food Security in Africa

Core determinants of Africa food security include the availability, stability and accessibility of foods. The primary causes of food insecurity in Africa are inadequate food production, high post-harvest food losses and high level of poverty (Aworh**,** 2010).

Food processing is any deliberate change in a food that occurs before it is available (Augustin *et al.*, 2016). Typically, inedible raw materials are processed into more useful shelf-stable and palatable foods or portable beverages for human consumption (IFICF, 2010). Since prehistoric times, food processing has been a key aspect of the food production chains that links agricultural production with the provision of food to people in the form, and at the time it is required (Floros *et al.,* 2010).

The management of risks to food safety and stability constitutes an essential element of food security in Africa. Traditionally, brining and pickling were used. A range of chemical additives (e.g.sulfurdioxide for preservation of wine, nitrite in bacon), antimicrobials (e.g. benzoic acid) and antioxidants (e.g. tertiary butylhyroquinone for retarding oxidation of oils) has been employed over the years. However, there is now a trend towards the incorporation of natural preservatives and the phasing out of some synthetic chemical additives. There is increasing interest in the use of natural antimicrobials (e.g. bacteriocins, essential oils), preservatives (e.g. ascorbic acid, citric acid from fruits) and antioxidants (e.g. Maillard reaction products, polyphenols, rosemary extract) to improve food quality and shelf life (Kumar *et al.,* 2015; Vergis *et al.,* 2015).

Traditional Food Processes in Africa

Food processing to a large extent, has been used to preserve food, improve food safety and maintain quality. Over the last 100 years, traditional food preparation and preservation processes have been industrialized. The industrialization of food processing, with its economies of scale, has increased the availability of foods in both local and export markets (Augustin *et al.*, 2016).

African traditional foods and African traditional food processing techniques are part of the rich cultural heritage of the people (Aworh, 2023). Fermentation and sun-drying are two of the most important traditional food processing techniques in Africa used for the production of a wide range of processed food products and for low-cost food preservation.

Processing can occur at various points along the supply chain. It can be applied proximate to food harvest or capture (e.g. initial processing of agricultural commodities such as flour milling or fish canning) or further downstream when it is applied in the manufacture of formulated food products (e.g. bread, biscuit, noodles, yoghurt) (Augustin*etal.*, 2016). Table 1 provides selected examples of the impacts of common food processing operations (Augustine *et al.,* 2016) evolution of food processing, particularly traditional food processing technologies and how processed food has contributed to nutrition over history has been reviewed (Weaver *et al.,*2014; Welch and Mitchell, 2000).

Table 1: Benefits and impacts of food processing operations

Technique	Examples	Outcomes and benefits	Impacts
Preservation	• Pasteurization of milk or juice. • Fermenting diary into cheese or yoghurt. • Pickling or canning produce. • Salting meats	• Distributors can ship products over greater distances. • Retailers can stock products longer. • Consumers can keep foods longer.	A range of local and non-local foods remain available over a longer time frame.
Processing for food safety (cleaning and sterilization).	• Washing, pasteurizing, cooking, salting, drying, refrigerating, freezing.	• Food-borne pathogens and contaminants are removed or minimized, meaning that consumers are at a lower risk of food-borne illness.	A greater proportion of the population has access to safe food.

Processing to change flavor, texture, aroma colour or form.	• Milling grains • Mixing ingredients • Adding flavours and colours • Molding foods and ingredients into shapes.	• Manufacturers may gain higher profits and a foothold in a competitive market. • Consumers have access to a wider variety of products.	Adds value to food products.
Processing to reduce preparation times and make food more portable.	• Ready-to-serve meals • Fast foods • Convenience foods: Bottled drinks, meat jerky, cakes, cookies, breakfast, cereal bars, frozen, pizzas, baby food.	• Manufacturers may gain higher sales by responding to consumer demand for convenience food. • Consumers can eat virtually anywhere, at any time, with minimal effort.	Access to safe (and preferably nutritious) foods for time-poor consumers.
Processing to restore and/or raise nutrient levels in food.	• Fortifying milk with vitamin D, salt with iodine and grains with B vitamins, iron and folic acid.	• Manufacturers can use fortification as a selling point, potentially generating greater sales. • Consumers are at lower risks for chronic nutrient deficiencies.	Adds value and nutrition density to food, can improve bioavailability and population health implemented as public health policies.

Novel and Emerging Food Processes

While traditional food processing will continue to play a major role in providing food for people, it is expected that there will also be an increasing role for the application of novel and emerging food processing technology for improving the quality of food and processing efficiency (Augustin *et al.,* 2016). Novel and emerging technologies, particularly high pressure processing (HPP), pulsed electric field (PEF), cool plasma, UV irradiation and ultrasound have been examined as treatments for improving the shelf life of foods and altering material properties (Knorr *et al.,* 2011; Sanchez-Moreno *et al.,* 2009; Tao and Sun, 2015). The application of emerging, non-thermal techniques was shown to potentially reduce energy requirements for food processing and may contribute to improved energy efficiency in the food industry (Toepfl *et al.,* 2006).

Innovation and Sustainable Food Security

Innovation in this context, involves the "generation of new ideas about a process or phenomenon or the development of new ways of doing things" (Olaopa, 2009). This definition connotes process of change that enables food producers to adapt to modifications in their environmental circumstances, be they natural, cultural, socio-political, economic technology from time to time. Adopting innovation in food production enabled through research, science and technology facilitates sustainable food security. Innovation primarily concerns bringing new ideas or changes in food production in order to confront food insecurity in Nigeria. The introduction of new technology to promote agricultural productivity increases and sustain food security has become a new paradigm shift thinking by many agriculturists and food producers.

In order to improve the quality and quantity of food production, the following innovation methods should be implemented:

Hydroponics, Aquaponics and Aeroponics

These are methods used for growing certain plants. They do not involve the use of soil. These methods require the use of culture solution containing macronutrients and micronutrients. The culture solution is aerated to provide sufficient oxygen for respiration.

- Hydroponics is a method which involves the use of water containing dissolved nutrients to grow plant.
- Aquaponics is a method where fish and plants are grown in a symbiotic environment. The survival of each specie depends on the other. The wastewater from the fish is used to grow plants, in the process of the growth of plant, nitrifying bacteria converts ammonia present in the waste water to nitrites and from nitrites which are absorbed by the plant for their growth. Then, the water is recycled back to the fish pond.
- Aeroponics is a modified method of hydroponics, whereby nutrient solutons are made to diffuse through to the roots of plants. Vegetables like spinach, lettuce, tomatoes and chilies can be cultivated using hydroponics and aeroponics methods (www.scribd.com/document). Both can control the light intensity and temperature to ensure that the environmental factors are at an optimum level for maximum growth. Moreover, plants achieve faster growth because the culture solution provided nutrients that constantly can be absorbed by the roots and scarcity of

water needed for optimum growth is over ruled.

Selective Breeding

Selective breeding involves the use of choice organisms with desirable genetic attributes to produce offspring with similar or improved attributes. Breeding of plants consists of using different plants with beneficial qualities such as high nutritional contents, shorter maturity time, higher yields and higher resistance to diseases and pests are selected. This could be done by crossing two members of the same species that possess dominant alleles of a particular gene, such as long and quick metabolism processing genes from fast growth and high yields. An example is *Tenera*sp. which possesses the beneficial attributes of *Dura* and the *Pisefera* sp.

Breeding in animals involves the cross-breeding of two different animals of the same specie. Examples are dogs, cows and fish could be crossbred. Selective breeding has made it possible to produce animals with higher physical strength, better behaviour, improved immune system and higher milk production.

Genetic Engineering

This method involves the alteration of an organism's DNA. It plays a major role in improving the quality and quantity of plants produced. Several applications for genetic engineering technique includes the following:

"Making food crops more resistant to diseases and insect pests.",

"Creating hardy new plants capable of surviving a marginal soils.",

"Giving staple food crops such as corn, wheat and rice the ability to make their own nitrogen-rich fertilizers by using solar energy to make ammonia from nitrogen in the air.",

"Increasing crop yields by improving the way plants use the sun's energy during photosynthesis" (Tietenberg and Lewis, 2010).

Biotechnology offers "hope of improving the nutritional benefits of many foods. It benefits the consumers through enhanced nutritive qualities that includes more and higher-quality protein, lower levels of saturated fats, increase vitamins and minerals, and many others. Moreover, bioengineering can reduce the level of natural toxins (such as in cassava and kidney beans, and eliminate certain allergies from foods like peanuts, wheat and milk" (Johnson, 2007).

Biofortification

This is a process of adding essential nutrients to crop plants during cultivation to make the final products richer in the added nutrients instead of adding such nutrients during food processing.

Smart agriculture was another innovation suggested to promote sustainable food security in Nigeria. It entails increasing productivity in agriculture and incomes sustainability, adapting and building resilience climate change and removing greenhouse gases emissions (FAO, 2020).

Value Addition and Sustainable Food Security

We need to increase our food production to feed a growing population without using more land and water resources. Value addition is one way of improving food security to reduce food loss both in developed and developing countries such as Nigeria. Food value-addition initiatives exist at small scales around the globe, some of which have export potential. Maintaining food quality and safety remains critical for food value addition to succeed. We need to produce more food to meet the needs of a growing world population. Resources like land and water are not limitless, however using more of them will have sever environmental consequences. Therefore, avoiding food loss and waste can play a vital role in achieving food security. Currently, decentralized and small-scale value-addition techniques show a way forward. One means of increasing food availability without adding pressure on the environment is to prevent food loss and waste. Value addition is one possibility.

Value addition products are defined as follows: A change in the physical state or form of the product (such as milling wheat into flour or making strawberries into yarn). The productions of a product in a manner that enhances its value, as demonstrated through a business plan (such as organically produced products).

A broad definition of value addition is to economically add value to a product by changing its current place, time and from one set of characteristics to other characteristics that are more preferred in the marketplace (Fagbemi and Oluwajuyitan, 2000). As a specific example, a narrower definition would be to economically add value to an agricultural product (such as wheat) by processing it into a product (such as flour) desired by customers (such as buyers). In general, adding value is the process of changing or transforming a product from its original state to a more valuable state.

Value addition increases the worth of agricultural produce, stimulates agricultural production, stabilizes the food supply and ensures adequate intake of nutrients including micronutrients (food fortification) by vulnerable groups (children, women and the elderly); another critical need of Food Science and Technology in Nigeria and other parts of sub-Saharan Africa (Aworh, 2020). Value addition reduces the risks that food systems carry to nutrition and health by ensuring safe, wholesome food supply through control of food-borne diseases caused by bacteria, viruses and parasites and chemical contaminants (Aworh, 2020).

WWF, reported that the portion lost in the farm could be because of surplus, order cancellations, poor infrastructure, or because fresh produce needs to meet size and color standards set by retailers; injury, diseases and poor harvesting techniques can also produce waste. Value addition by processing can use "ugly", cancelled, or surplus food that besides the regular large-scale processing for which farmers produce their crops.

Low-cost Processing

Value addition can occur through low-cost processing at commercial levels or preservation techniques at home and farm. The demand for processed food is increasing globally. So, value addition can fulfill more than one need.

Some examples from developed countries (Nevarez-Morillon*et al.,* 2022);

A juice producer collects ugly and leftover vegetables and fruits from local farmers, distributors and fresh-cut producers to make fresh juice.

Mushroom stalks previously wasted are being processed to dry powders to make vitamin D supplements.

Spoilt grains from breweries, from which only sugar is used, still have intact fibre and other nutraceuticals like antioxidants. A company uses patented technology to make flour from these grains, which is healthier than regular flour.

Examples from developing countries;

Tomato is a global favourite but also perishable. However, it is possible to produce many value-added products like paste, ketchup, jam, juice, sauces or dried tomatoes. This kind of commercial processing requires less capital and tools and could be organized by cooperatives and NGOs for farmers or undertaken by small-scale industries.

In Egypt, women were trained in household-level processes in product development, food preservation and food safety and quality. The technique tried were drying apricots to make leather, canning orange and carrot jams.

South Africans make green banana flour from farm surplus for local and international markets. About 25 – 50 percent of unripe banana harvests are lost yearly due to poor post-harvest handling. The flour can be exported as a gluten-free alternative to improve the local economy.

Conclusion

Application of Science and Technology in agriculture especially in value addition is one of the ways through which sustainable wealth creation can be maintained. This will regenerate production of locally fabricated equipment that will stimulate food processing activities to make products with exportable high added values, create wealth and sustain annual food production. Making our food systems more sustainable will depend on innovative tools and approaches being developed and deployed around the world.

In order to tackle the challenges to feed the world in 2050, a multi-sectorial approach to improving food security is required to address the complex societal challenge to feed the world responsibly and to minimize global food insecurity especially in sub-Saharan Africa.

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FOREIGN DIRECT INVESTMENT AND THE PERFORMANCE OF HEALTH OUTCOMES IN SELECTED WEST AFRICAN COUNTRIES

OGANA Michael

Department of Human Resource Management, School of Business Studies, Delta State Polytechnic, Ogwashi-Uku, Delta State Michaelogana4u@gmail.com Tel: 08035050565

MORDI Kenneth Ejime

Department of Production & Operations Management, Delta State Polytechnic, Ogwashi-Uku, Delta State **Correspondence Email**: mordikenneth11@gmail.com

Tel: 07035525804, 09051143215

IDU Christian Nduka

Delta State Polytechnic, Ogwashi-Uku, Delta State

Ndukachtistian1988@gmail.com Tel: 07033268843

ABSTRACT.

This study aims at ascertaining what significantly affects the health outcomes of West African Countries. The data used for the analysis were gotten from World development indicators (2022). Based on the feature of endogenity of the variables and panel effect, pooled OLS, estimation technique framework was employed via Eviews 9.0 to check the relationship between FDI and health sector in the post pandemic era. The result reveals that FDI significantly affects Health outcomes in Nigeria. On the other hand, all other variables were found to have a uni-directional relationship with health outcomes as proxied by Maternal Mortility Rate (MMR). It was found that there was a vicious cycle between FDI and MMR i.e an increase in FDI affects the level of per capita income leading to increased health care access which leads to improved health indices which attracts FDI into the region. It is recommended among other things that government, non-government and private organizations of West African Countries should adopt policies that attracts FDI inflows and tailored down towards individual specific goals which will affect the lives of the populace residing in the region.

Keywords: *Foreign, investment,, Panacea, Health Challenges, West Africa*

INTRODUCTION

Foreign direct investment have been the subject of immense importance over the last few decades as strong wind of globalization began to blow into most developing countries west Africa in particular. Thus, researchers like Blomstrom, Lipsey and Zejan (1996), Alfaro, Chanda, Kalemliozcan and Sayek (2014) among others alluded to the fact that welcoming continuous FDI inflows into an economy has the tendency to increase the level of national development since such flows tends to complement the available domestic capital availability, widen trade access, yield encouraging institutional and technological externalities for domestic firms, and help gather and raise mental stock. It is pertinent to note that for recipient economy, countries or multinational firms that tend to receive these investments, it helps provide a means and channel for original technologies, stock, means of production, outputs, managerial technologies and managerial skills, and as such can yields a strong foundation for the growth of an economy to thrive (Raul, 2016).

Several scholars have tried to conceptually clarify the term FDI, however, the most accepted conceptually clarification of FDI is referred to as "the IMF/OECD (2011) benchmark definition" *which posits that foreign direct investment (FDI) is a foreign investment in which a domestic businessman leaving in the domestic economy that receives the investment possess a long-term "influence" in the running of a firm in the recipient country*. This conceptual clarification is viewed generally in acceptance because it was given by the joint effort of two foreign organizations with the aim of giving base to domestic statistical department for the gathering of FDI data.

Therefore, based on the above conceptual clarification, the existence of such long-term influence is shown when voting or quest for management by the foreign firm yields up to 10% (minimum) of the sum of voting shares of rights of the multinational firm.

The health sector on the other hand is very germane to every economy reason being that the health outcome has become one of the main macro-economic goals of many countries as it tries to achieve positive indices such as reduction in the rate of her maternal deaths and deaths of her infants to the barest minimum among others. Studies have shown that the health status of a nation may have a significant impact on FDI flows of the nation. To be specific, an economy with a work force that is perceived to be healthy would yield more result in terms output and also attract FDI influx, when compared with its counterpart with work force who are perceived to be sick. As a result, one would believe that the state of health of labour in recipient economies have a great effect on FDI flows. There has been little literature/work done on FDI and health in West African Countries. Most work done looks at the relationship between FDI and economic growth, employment generation, power sector among others mainly in Nigeria, but little has been done on FDI and health. For example, Nwankwo (2015) looked at the impact of FDI on a sector in Nigeria taking power as a case study, Salami and Oyewale (2013) looked at FDI as it affects Employment generation in the Nigerian economy, while Kola and Olalekan (2011) looked at the nexus between FDI and the development of enterprises in Nigeria generally termed small and medium scale (SMEs). Also Ali and Jayanta (2019) looked at the growth consequences of FDI evidence from Turkey. Closely related to the study is the work of Dierk, Korbinian and Peter (2015) how FDI affects Health.

However, there remains a gap in literature as it affects empiricism validation in terms of theory and data as regards the relationship between FDI and Health in West African Countries. The only existing literature looks at FDI and Health in either Sub- Sahara African

Countries (SSA) or in selected developed countries as in Rodolphe and Celine (2018) in Abolghasem Golkhandan (2017) while nothing has been done as regard FDI and its impact on Health performance in selected West African countries establishing both short-term and long-term FDI effects with requite econometric methods. Thus it can be said that the issue of FDI as it tends to impact on the health sector in isolation is one of the most unresolved field of study in international economics. However, this work looks at FDI and the Performance of Health Outcomes in Selected West African Countries thus improving on the scant existing literature available. From the forgoing, the following research questions are pertinent.

1. Is FDI associated with lower maternal mortality rates (MMR) in West African Countries?
2. Is FDI associated with higher Life expectancy in West African Countries?
3. Is FDI associated with lower under 5 mortality rate in West African countries?

OBJECTIVES OF THE STUDY.

The aim of this research is to empirically ascertain the impact of FDI on the performance of health outcomes in the West African Countries. The specific objectives are to:

1. Ascertain if there exists any statistical relationship among Foreign Direct Investment (FDI) and lower maternal mortality rate (MMR).
2. Ascertain if there exist any statistical relationship among FDI and higher Life expectancy in West African Countries.
3. Ascertain if FDI is associated with lower under 5 mortality rates in West African countries.

HYPOTHESES OF THE STUDY.

The hypotheses of the study are stated thus;

H_{o1}: There exists no statistical relationship between FDI and lower MMR in West African Countries.

H_{o2}: There exists no statistical relationship between FDI and higher Life expectancy in West African Countries.

$H_{O3:}$ There exists no statistical relationship between FDI and lower under 5 mortality rate in West African Countries.

This study is structured as follows; section 1 is the preamble, section 2 deals with the theoretical and empirical literature on FDI and the performance of health in selected West African Countries, section 3 bothers on the methodology used while section 5 present the results and discussion of findings.

LITERATURE REVIEW

Total FDI flows are the summation of equity funds, reinvested profits, and other direct investment fund; therefore, total FDI flows and stocks comprises of all financial flows aimed at financing of modern investments, in addition to retained profit of conglomerates, domestic credits, and capital of cross-country mergers and acquisitions (M&A). FDI flows can be seen from the aspect of the recipient country, which saves them as FDI inflows along with other liabilities in the BOP, or from the aspect of the recipient country, which saves them as FDI outflows, an aspect of the assets. FDI however assumes so many forms, among which are direct buy over of the international venture, construction of a plant, or investment in a joint venture (JV) or when a local firm makes a strategic alliance with an anticipated increase in terms of tech-know-how, or when the intellectual property licensed.

Studies have clearly shown that the net FDI Inflow into West African as a region from 1980 to early 2000 had been on the steady increase not until 2010 when it was at its peak which was as a result of favorable policy by the government as adopted by UNTAD (1991-2014) cited in Dirk (2015) which attracted FDI inflows that period. However, due to the level of

corruption in the region the FDI inflow began to experience steady decline till 2015. Thus, it is pertinent to note that most West African economies of recent have developed policies that tend to increase its FDI flows. With this, we expect a significant increase in the FDI inflow into West Africa regions in the coming years being that Nigeria is the giant of Africa.

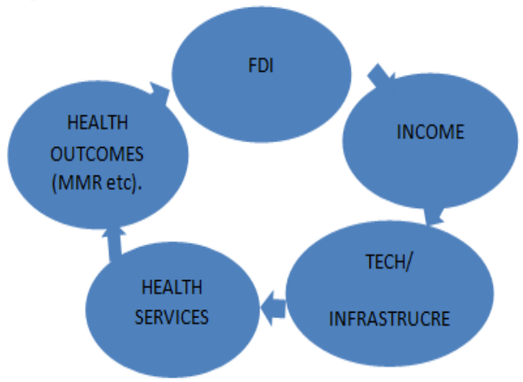
Potential Links Between FDI and Health

It has been observed that FDI is expected to yield an effect that is benefiting to the populace specifically on the health sector by raising the level of demand for all medical/health-related services and goods, and by raising the rate at which such related goods and services are supplied to the populace. Going by the OECD (2022), "the impact of FDI on the level productivity and its factor of production is generally immense especially to the recipient economy and income per capital growth in the recipient countries, above what the home investment would normally trigger. Stiglitz (2020) who is a major critic of the theory of globalization asserts the case for FDI as enforcing as it is that what accompanies it (FDI) is not only resources, but technology, access to markets, and valuable research and development (R&D). FDI-induced capital profits are expected to drive greater private and public spending on balanced diet with high calorie intake, drinkable water, accesses to academics and medical services. From the forgoing, FDI which seeks for market via horizontal trail in the domestic economics' medical sector can drive medical outputs by means of availability of increased medical goods and services available to the populace at an affordable prices for example pharmaceuticals and health equipment. In addendum to the direct effect of supply, FDI has the tendency to improve the yield of home supplies in the domestic economics medical sector via foreign roll over of medical and educational technical skill also known as human/mental capital.

In addendum, higher labour strains is expected to come from strong pressure in terms of competitiveness, strain and socio-economic security challenges connected to FDI as asserted by (Herzer & Nunnenkamp, 2012). From which Scheve and Slaughter (2014) posited that Britian as a nation employs its labour to be more FDI driven which tends to reflect in her industries leaving more insecurity socio-economic wise. Furthermore, empirical works done reveals that socio-economic security challenges has great negative and disdain impact on the health outcomes of a nation (review Ferrie, 1995, 2002; and Rugulies, 2008). Thus negative medical/health impacts as a result of the rising socio-economic instability leading to greater levels of insecurity could be ameliorated to the point that FDI inflows therefore gives room for more government revenue in form of tax thereby increasing the ability of public expenditure on general health and social security especially in the recipient economy. Thus from the forgoing it is seen that the nexus between FDI and health outcomes yields incentive-based externality that spills over to several sector of the economy giving rise to a notion known as the vicious cycle of FDI and health.

Below shows the nexus between FDI and Health outcomes.

Fig 1. Vicious cycle of FDI and Health outcomes.



Source: Researcher.

The diagram above shows the vicious cycle of FDI and Health outcomes. According to Grossman (2019) health capital model, it posits that an individual is assumed to maximize utility subject to his wealth/income and time constraint. Thus according to the researcher above, an economy which attracts high inflow of FDI has the tendency to increase the per capita income of its citizens which could be as a result of increase in employment opportunities which has the possibility of having a spillover effect on the level of infrastructure and technology. Therefore, as a result of this spillover effect there will be technological advancement which will lead to improved health services. Thus, with the increase in income level, the populace will be able to access the improved health care services thereby impacting positively on health outcomes.

From the analysis above, what attracts FDI into an economy is the level of human capital in an economy. With an improvement in health outcomes, foreign investors therefore will have a conducive environment for investment to thrive as supported by David (2018), hence the vicious cycle of FDI and health outcomes.

Microeconomic FDI theory

Lipsey (2004) asserts that the micro-economic view evaluates FDI motivations when looked at from the angle of the investor, this is then seen to be similar in taking the perspective of an industry-level or firm-level in the decision making process. Hence the micro-view looks at the after effect to the investor either positive or negative, and to domestic and recipient economies, of the operations of the Multi-national Companies (MNCs) or their counter-part as invented by these investments, instead of the magnitude of the flows or what weight has the investment stocks or the position of the investment. Putting these after effect which arises from their transaction, production, employment, and their movement and stocks of intellectual property in terms of human capital, measured by the movement of capital and stocks in the BOP (Lipsey, 2004).

METHODOLOGY

The study will employ the use of descriptive as well as causal research design. Research has shown that a causal comparative research also referred to as ex-post facto research is one in which the researcher attempts to investigate possible cause and effect in the state of affairs and searching back in time through empirical fact especially data the possible causal factor for the phenomenon in the model. Thus, this work employs this aforementioned method to ascertain the causal link between foreign direct investment and health performance in selected West African Countries. The World Development Indicator (2020) is the major source of these panel data. Thus, the data sourced in this study are foreign direct investment inflows; Maternal mortality rate, infant mortality rate, under 5 mortality rate and life expectancy all as proxy for health outcomes. Other control variables were gross fixed capital formation used to proxy physical capital captures the effect of investment on economic growth; per capita income was used as a proxy to capture the standard of living of West African Countries.

Model Specification.

The investigation between the relationship between health and FDI follows the theoretical framework above. In this study, the analysis begins with a functional specification as

MMR = f(FDI, GFCF, LEB, IMR, U_5M, PCI) 1

Where;

MMR = Maternal Mortality Rate
FDI = Foreign Direct Investment
GFCF = Gross Fixed Capital Formation
LEB = Life Expectancy at Birth
U_5M = Under five mortality Rate

IMR = Infant Mortality Rate
PCI = Per Capita Income
t, = time factor. ,

The model can be specified econometrically as

$$MMR_t = \beta_1 FDI + \beta_2 LEXB + \beta_3 IMR + \beta_4 U_5M + \beta_5 GFCF + \beta_6 PCI + \varepsilon_t$$

Et = vector of normally and independently distributed error term.

In such a model we do not have any exogenous variable they are treated as endogenous with some variables as target variables as in MMR and FDI in the specification above.

Descriptive Statistics

Here we present the empirical results as well as their analysis. We begin with the descriptive statistics.

Table 1: Descriptive Statistics

	MMR	FDI	LEXB	IMR	U_5M	GFCF	PCI
Mean	510.7692	1.478707	56.86352	84.11538	135.4038	20.50230	560.5419
Median	537.5000	1.022536	56.15538	83.75000	134.5500	21.11752	468.9954
Maximum	577.0000	6.080271	60.58468	107.4000	178.4000	28.59256	943.6866
Minimum	405.0000	-0.900193	53.71395	64.60000	100.3000	12.62155	279.6665
Std. Dev.	56.96133	1.770459	2.120622	12.95761	23.61190	4.519135	208.6652
Skewness	-0.511834	0.850636	0.379822	0.141005	0.163475	-0.144956	0.416098
Kurtosis	1.782554	2.962407	1.673415	1.727440	1.743646	2.036512	1.635266
Jarque-Bera	71.26366	81.56332	65.82228	47.85343	47.46992	28.51473	71.96721
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000
Sum	345280.0	999.6056	38439.74	56862.00	91533.00	13859.56	378926.3
Sum Sq. Dev.	2190100.	2115.804	3035.500	113332.3	376327.4	13785.24	29390292
Observations	676	676	676	676	676	676	676

Source: Author's Computation using Eviews 9

From the description in table 1 above, it shows that the variables of interest are found to be normally distributed. The ratio of mean to median of each variable is approximately one. The standard deviation of each variable is also relatively low (except for MMR), compared to the mean showing a small coefficient of variation, the table also revealed a reasonable range of variation between maximum and minimum values. If the probability value of the JarqueBera chi-square is less than 0.05, then the null hypothesis of the regression is rejected. From the above table, it is apparent that the hypothesis that all the variables are normally distributed cannot be rejected since all the probabilities are less than the JarqueBera chi-square distribution. The skewness coefficient indicates normal curves for all the variables with the values ranging from -3 to +3. Deducing from the table above, all the variables indicate a normal curve as their values ranges from -3 to +3.

Presentation of the Pooled Ordinary Least Squares Model.

Table 2: Pooled OLS Result.

Variable	Coefficients	t-statistics	Prob Value
FDI	-0.973414	-2.750832	0.0061
LEXP	-16.37075	-25.89002	0.0000
IMR	123.5425	33.33595	0.0000
U_5M	-66.54479	-32.19681	0.0000
GFCF	2.406835	14.92964	0.0000
PCI	0.021994	2.661919	0.0080
R-Squared		0.965247	
Adjusted R-Squared		0.964988	
F-statistic		684.8111	
Prob (F-statistic)		0.000000	
D.W Statistics		1.034918	

***Source:** Author's Computation using Eviews 9*

In estimating the Pooled OLS we used MMR as the endogenous variable while foreign direct investment (FDI), life expectancy at birth (LEXP), infant mortality rate (IMR), under 5 mortality rate (U_5M), gross fixed capital formation (GFCF) and per capita income (PCI) was used as the exogenous variables. However, it is pertinent to note that FDI is the impact variable, while others are the control variables. Therefore, the output reveals a negative relationship between FDI and MMR in West African Countries. Showing that a unit increase in foreign direct inflows into most West African Countries would yield a 0.973414 unit decrease in MMR for most West African Countries which conforms to A-priori expectation. However, GFCF and PCI reveals a positive relationship with MMR which does not conform to A-priori expectation. The model model also reveals that 96% of changes in the dependent variable is explained by the model (i.e dependent variables) leaving just 4% to the stochastic error term. Also judging from both the test for individual coefficient (t-statistics) and the F-statistics which is a test for the overall model, it reveals that the model is jointly statistically significant and can be relied for policy implications. However as expected, the pooled OLS is characterized with the problem of autocorrelation as shown by the D.W statistics of 1.034918.

Policy Implication.

In the first place, this study has shown that foreign direct investment is negatively and significantly related to health outcomes using MMR as a case study. Therefore increased FDI inflows into West African Country's health sector improves maternal health in the region with its spill-over effect. In particular, if FDI rises by 10 units, maternal mortality rate falls by 82.90 units in the region. Thus policy towards the increased sustainable maternal health should be driven towards encouraging increased FDI inflows into the region since it is seen to positively and significantly impact on health outcomes. Also, policy towards increased government expenditure on Physical capital which includes capital expenditure on infrastructure should be driven towards the health sector thereby improving health outcomes i.e maternal health, infant mortality, under_5 mortality, life expectancy inter alia.

SUMMARY

The study findings are summarized as follows:

1. Maternal mortality is a key determinant in determining the health performance of a nation, hence a key health indicator. Maternal mortality rate (MMR) a proxy for health outcomes which was found to have a significant impacts on FDI, being that adverse health challenges on an individual or a nation affects the inflow of FDI inflows.
2. There has been an increase in FDI inflows into West African countries and the result reveals that FDI is statistically significant and positively impacts on the health status of the most West African economy and in turn health impacts on FDI flows of the economy as well. Thus they ultimately determine economic growth.
3. Infant mortality and life expectancy was also identified as a component of health and were found to be statistically significant in affecting FDI inflow. Therefore, a nation with positive health indices encourages investors into such nations thereby guarantees greater FDI inflows.

RECOMMENDATION

In view of the findings of this study, the following recommendations are made:

1. Since the study reveals that FDI has a significant impact on health, there is need for policies and programs that drives increased FDI inflows into West African Countries so as to improve the level of maternal health and other health indices.
2. Given the importance of health to a nation to boost her economic growth and development, the study recommends that greater attention be given to health in terms of increased health expectancy, decreased maternal mortality, decreased under 5 mortality rate, decreased infant mortality which are necessary to enhance productivity for all West African Countries.

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GENDER-BASED ANALYSIS OF AGRIPRENEURS' CONSTRAINTS TO ACCESS TO FINANCIAL SERVICES IN SOUTH-EAST, NIGERIA.

Utazi, Churchill O[1];
Nze, John[2];
Obi-Ihebie, Ugochi[3]; and
Ihenacho, Rachel A[4].

Agricultural Extension and Management,
Imo State Polytechnic, Omuma,
Oru East Local Government Area, Imo State.

Churh_ugwu@yahoo.com[1] 08037921525
johnnze2020@gmail.com[2] 08037840082
obiihebieugochi@gmail.com[3] 09056558197
rachaelihenacho@gmail.com[4] 08037149618

Gender-Based Analysis of Agripreneurs' Constraints to Access to Financial Services in South-East, Nigeria.

ABSTRACT

The gender-based disparity in access to financial services among agripreneurs in South-East Nigeria is primarily attributed to certain constraints, consequently resulting in inequalities in gender access to financial services. This study analyzed the constraints faced by gender-based agripreneurs in accessing financial services in South-East Nigeria. A total of 360 agripreneurs were selected using a multistage sampling procedure. Data was collected through questionnaires and interviews, and analyzed using descriptive statistics. The findings revealed the following constraints in descending order of significance: high interest rates (76.11%), lack of collateral (68.33%), lack of awareness (56.67%), lack of support from government and non-governmental organizations (54.72%), short repayment period (51.11%), lack of business records (48.33%), credit discrimination (43.89%), business size (38.33%), traditional barriers (34.78%), discriminatory property rights (36.61%), poor business plan (28.87%), low educational level (27.22%), lack of experience (24.72%), and financial illiteracy (16.67%). Both male and female agripreneurs encountered constraints when trying to access financial services. It was recommended among others that financial institutions should create appealing packages that streamline access to financial services by addressing the bureaucratic barriers that impede accessibility.

Key words: - Gender, Agripreneurship, Access, Constraints and financial services

INTRODUCTION

Nwoye (2007), stated that sex refers to one's biological identity as male or female, while gender refers to the social identities attributed to women and men. He noted that gender is rooted in social institutions and results in patterns within society that structures relationship between women and men and that gives them differing positions of advantage and

disadvantage within the institutions. He further stated that gender relates to concerns, capabilities, societal roles or other differences and divisions between women and men, especially the relative weight of biological and physical difference as distinct from culture and socialization as a cause of those distinctions.

Gender development, according to Central Bank of Nigeria (2015), is an essential structuring component of a system's economic, social, political, and physical life. It is a method of arranging society with the goal of attaining gender equality in the allocation and use of goods and services within that community. It is essentially a method for lowering poverty rates among men and women, improving health and living conditions, increasing social efficiency in eliminating gender discrimination, raising productivity, supporting economic growth, and encouraging long-term development. World Bank (2005), noted that gender analysis is a method for assessing the disparities between the roles that women and men perform, the varying levels of power they have, their differential requirements, constraints and the impact of these inequalities on their lives.

Access to finance is not the same as using financial services (Claessens, 2006). Access refers to the availability of a supply of reasonable quality financial services at reasonable costs, where reasonable quality and acceptable cost must be defined in terms of some objective criteria, with costs including both monetary and nonmonetary costs. The actual utilization of financial services is referred to as use. She stated further that a basic demand–supply model can be used to study the difference between access and use. Access refers to supply, whereas use is the intersection of the supply and demand schedules. She also pointed out that, despite the literature's awareness of the importance of financial inclusion, certain nations continued to struggle to ensure that everyone has access to financial services. She said that developing countries utilize financial services at only 26% of the time, whereas Organisation for Economic Cooperation and Development (OECD) countries according to Demirguc-Kunt *et al.* (2015), utilize financial services at 90% of the time. Just 34% of adults in Sub-Saharan Africa has a formal financial institution account, compared to the global average of 60% in developing nations and 94% in high-income nations.

Asmundson (2011), defined financial services as the process or transaction required to obtain the financial good. According to him, financial services include banking, investing, and insurance.

Financial services also include providing the entrepreneurs including agripreneurs with financial management services such as financial education. Financial education is by the definition of the OECD (2005), a process where the user of financial services/investors improves their understanding for financial products, notions and risks and on the bases of information, instructions and objective advice develop the skills and confidence in strengthening information about financial risks and occasions. Investors make decisions on the bases of good information, and are acquainted with the fact where to find help and take other effective measures for improving their wealth (OECD, 2005).

Nwibo *et al.* (2016), defined agripreneurship as the beneficial combination of agriculture and entrepreneurship that transforms a farm into an agribusiness. They observed that agripreneurship is identical with agricultural entrepreneurship and it refers to the formation of agribusiness in the agriculture and related industry. They further noted that in the face of rising unemployment and poverty in rural regions, as well as slow agricultural growth, agriculture needs more entrepreneurship to increase productivity and profitability.

Unite (2013), noted that the peculiarities of Nigeria's agriculture industry make agripreneurship

development extremely difficult. Agriculture and agribusiness should be regarded as an emergency because they constitute the backbone of Nigeria's economy and employ a large percentage of the workforce. He observed that agripreneurship is a requirement for socio-economic advancement through the establishment of agribusinesses, the expansion of agricultural commodity value chains, and overall economic growth. He went on to say that a paradigm shift from agriculture to agribusiness is required to revitalize Nigerian agriculture and makes it a lot more appealing and profitable company. Agripreneurship development helps to reduce poverty (Lourenco et al., 2013). Agribusiness generates income for its owner(s) and the employee(s). When a greater percentage of a country's population is engaged in agribusiness, the level of poverty will be reduced significantly (Otache, 2017).

The disparity in gender access to financial services among agripreneurs in South-East Nigeria has been attributed largely due to constraints and this has called for serious studies as to identifying the constraints and verifying how these constraints contributed to the inequalities in gender access to financial services South-East Nigeria.

METHODOLOGY

STUDY AREA

This study was carried out in South East Nigeria, Ikenwa (2017), stated that South-East Nigeria is situated in a tropical rainforest between latitudes of 4°301 and 7°151 N and longitudes of 6°501 and 8°151 E. National Population Commission (NPC) (2019) projected report stated that the region has a population of 22,012828. Most of the people that live-in South-East Nigeria are farmers who are on subsistence level rain-fed agriculture.

The rainy season is more pronounced from May to October and the dry periods are witnessed from November to April (Osugiri et al., 2006). Due to climate change, which has made farmers less able to predict the seasons, there appear to be no definite boundary between the rainy and dry seasons (Osugiri et al., 2006). Building Nigeria's Response to Climate Change (2011) highlighted that while the annual rainfall ranges from 2000 to 3000 mm and the mean temperature is 28°C, the wet seasons are frequently longer than the dry season.

SAMPLING TECHNIQUE

The population for the study consists of all agripreneurs in the South- East Nigeria. A multi stage sampling technique was used to select the respondents for this study. The first stage was a random selection of three (3) states out of five (5) states in the South-East. Imo, Abia and Ebonyi States were selected. The second stage was the random selection of three (3) agricultural Zones from each of the selected States. The third stage was the purposive selection of 4 LGAs from each of the Zones in the selected States based on the high numbers of agripreneurs from them, giving a total of twelve (12) Local Government Areas from each of the selected States.

Fourthly, from the merged list of registered agripreneurs with State Agricultural Development Programme (ADP) and All Farmers Association of Nigeria (AFAN), 10 registered agripreneurs with equal numbers of males and females based on the characteristics of agripreneurs which include, fostering innovation, generating growth, risk bearing, profit maximization, starting a nascent business and growing big among others were randomly selected from each of the selected LGAs in the Zones. From the three selected states, three hundred and sixty (360) respondents were used for the study.

DATA COLLECTION

The primary data for the study were collected using structured questionnaire that were administered to the agripreneurs who were the direct primary providers of information for the study. Oral interview was used where necessary.

DATA ANALYSIS

Descriptive statistical tools were which included frequency distributions and percentages employed to achieve the objectives of the study.

RESULTS AND DISCUSSION

Agripreneurs' Constraints to Access to Financial Services

The discussions on agripreneurs' constraints to access to financial services was based on the entries in Table1. Among the constraint, high interest rate ranked first with overall percentages of 76.11% while 77.78% of male agripreneurs and 74.44% of female agripreneurs complained of high interest rate as constraint to access to financial services in South-East Nigeria. This finding corroborated Morsy and Youssef (2017) who noted that the formal credit market excluded women primarily as a result of supply-side restrictions, such as high interest rates and collateral requirements. They added that lack of collateral could mean that women entrepreneurs had less access to loans than their male counterparts and that credit rationing through high interest rates discourage women entrepreneurs from seeking for loans in a disproportionately large way. Women often had to deal with stricter loan terms than males when they did get access. According to Samy (2012), the interest rate was the most important factor in financial transactions. If it was deemed to be too high, entrepreneurs were more likely to reject the loans offered because this determined the return on capital. High interest rates on credit could deter small business owners from borrowing, which would limit their access to credit. Every business needs financing, even though at first glance it may appear that funding was unnecessary. It was imperative that financing be as efficient as possible (Jamal, 2013).

This was followed by lack of collateral which ranked second with overall percentages of 68.33% while 66.67% of the male agripreneurs and 70.00% of the female agripreneurs complained of lack of collateral. According to McKee (2013), insufficient collateral was likely the biggest barrier to funding for SMEs. Tore (2013), asserted that because the entrepreneurs' businesses were not firmly established in some cases, they were unable to provide the necessary collateral. The collateral may occasionally be deemed insufficient by the lender given the requested loan size. This result supported World Bank (2016), which stated that women's access to financial services was also restricted by the fact that they lacked productive assets or property that could be used as collateral by formal financial institutions. For instance, research indicated that women were less likely than men to own, manage, control, or inherit real estate or other types of property. According to Garba (2011), the gender difference in property ownership and control was the main cause of problems for women entrepreneurs in modern society. Nelson *et al.,* (2009), indicated that the main reason given for women's difficulties with collateral ownership was that they were known to be less self-assured, less motivated to pursue entrepreneurship, less educated in advance, and less eager to launch businesses than men. The majority of family properties were typically reserved for men as family surviving representatives (Kirkwood, 2009).

Lack of awareness of financial services ranked third with overall percentages of 56.67% while 56.67% of male agripreneurs and 56.67% of female agripreneurs indicated lack of awareness of financial services as a constraint to access of financial services. Access to important information about credit facilities that offer clients favourable lending terms was a requirement for their existence. However, it was a common occurrence to find that most small business owners in rural areas turn to Shylocks for their credit needs because they lacked access to current information on more appealing bank products. Mira and Ogollah (2013), opined that socio-cultural roles, lack of collateral requirements, low skill and knowledge levels, and information accessibility barriers all had a positive impact on access to credit. Women were less knowledgeable about the financial services available than their male counterparts, and as a result, they were unaware of their rights (World Bank, FAO and IFAD, 2009). Women were uncomfortable as a result of this lack of financial literacy, which made them reluctant to use financial products. Given these limitations, rural women tend to rely on informal networks of women to learn about financial services (Fletschner and Kenney, 2010).

Lack of government and non-governmental organizations support ranked fourth with overall percentages of 54.72% while 46.67% of male agripreneurs and 62.78% of the female agripreneurs complained of lack of government and N.G.O. support to ease access to financial services in South-East Nigeria. The effect of Nigeria small business financial support policies and programs was mixed. According to Okafor and Mordi (2010), there was a correlation between the economic development of women and government-funded services, which "indicated that women's entrepreneurial competitiveness could easily be enhanced through the activities of business support services." Government policy, however, was significantly and negatively related to firm performance. According to a review of financial interventions in Nigeria, the "limited impact" of financial interventions was due to (a) the elitist nature of financial institutions, including "intimidation," which made it difficult for women entrepreneurs to approach lenders for credit; and (b) the terms of short-term lending, such as strict collateral requirements that many cannot meet (Imhonopi *et al.,* 2013). Nziku (2016), noted that 69 percent of women respondents "did not feel that policies for boosting entrepreneurial activities in the country had influenced their decision to start up" in a study of gender-related policies to support Tanzanian women entrepreneurs. Most of the female respondents had little knowledge of any polices pertaining to women's economic empowerment. Among those who were aware of policies, the majority did not understand their intent or had only learned about them from radio and television, leaving them unable to apply the policies to their daily operations. Nziku (2016), also discovered that Tanzanian women entrepreneurs in urban regions had a significantly greater chance of knowing about the policies than those in rural areas.

Short repayment period of accessed financial services ranked fifth with overall percentages of 51.11% of the agripreneurs complaining of the constraint, 56.57% of the male agripreneurs and 45.56% of the female agripreneurs complained of short repayment period of credits as a constraint to access of financial services. Ricupero (2002), stated that commercial bank loans given to SMEs were more often for periods far too relatively short to pay off any sizable investment. Abereijo and Fayomi (2005), also noted that majority of commercial bank loans made available to SMEs were frequently for periods far too short to allow for the repayment of any sizable investment.

This was followed by lack of business records which ranked sixth with 48.33% of the agripreneurs who complained of lack of keeping business record as a constraint to access to financial services in South East, Nigeria. Forty nine percent of the male agripreneurs and 47.78% of the female agripreneurs affirmed lack of business records as constraint

affecting access to financial services. According to the International Labour Organization (2022), demand-side problems affecting Micro, Small, and Medium Enterprises themselves include a lack of understanding of loan application requirements, a lack of financial records and bankable business plans, a lack of credit history and collateral that can be verified, deficiencies in corporate governance, and deficiencies in business management practices and attitudes. Kusi *et al.* (2019), asserted that management problems in the SME sector had been identified, leading to the early collapse of the majority of entities. These problems included mismanagement and insufficient record-keeping procedures. Women were more likely than men to lack credit histories and collateral because of the way that their businesses were set up and the fact that they owned fewer personal assets (Sanusi, 2012).

Credit discrimination ranked seventh with overall percentages of 43.89% while 40.58% of the male agripreneurs and 47.22% of the female agripreneurs complained of credit discrimination as a constraint to access to financial services. The result revealed that more female agripreneurs complained. The results supported FAO (2019), which claimed that the absence of collateral made it difficult for women to get loans or use other financial services. Women's ability to continuously improve their production was constrained by a variety of factors. These included limited access to financial resources, technology, and market intelligence, as well as weak connections to support services and an unfavorable policy and regulatory environment (United Nations Industrial Development Organisation, 2001). These constraints were not location- or rank-specific. Women entrepreneurs faced additional challenges despite the fact that many of the limitations were shared by both female and male entrepreneurs. This was because discriminatory socio-cultural values and traditions were deeply ingrained and embedded, particularly in the policy and legal environment as well as in institutional support mechanisms. Many times, women struggled to overcome or avoid discrimination in business circles and were unable to take use of services (UNIDO, 2001).

This was followed by the size of the business which ranked eighth with overall percentages of 38.33% while 37.22% of the male agripreneurs and 39.44% of the female agripreneurs complained of the size of business as a constraint to access to financial services. Large business size on its own was a form of collateral which increased the confidence of the financial institutions and increased access to financial services by the agripreneurs. The study showed that men agripreneurs had larger business compared to the female agripreneurs in South-East Nigeria.

Traditional barriers ranked ninth with overall percentages of 34.78% while 21.67% of the male agripreneurs and 48.89% of the female agripreneurs complained of traditional barriers as a constraint to access to financial services. The result revealed that the female agripreneurs complained more than the male agripreneurs. The findings supported FAO (2019), which asserted that traditionally, women were tasked with a variety of tasks in the productive, reproductive, and social spheres. When compared to males, women worked more hours per day because they spent a significant portion of their time on household duties. This time commitment kept them from doing more productive work, which limited their capacity to pursue financial goals (Braun *et al.,* 2012). In addition to limiting women's time and mobility, gender constraints for women also impeded their access to financial services. Women's mobility was restricted by socio-cultural norms, which made it difficult for them to travel far to financial institutions to deposit funds or pay back loans. This was compounded by the short hours that these institutions were open (Demirgüç-Kunt and Klapper, 2013; World Bank, 2007). A study of barriers facing

entrepreneurs in Akwa Ibom State (Nigeria), for example, reported that women entrepreneurs ranked “poor access to finance/start-up capital” "cultural, religious/traditional barriers, legal issues, high levels of competition, poor motivation, lack of entrepreneurial experience, poor infrastructure/business environment, poor education, household chores, and marketing problems" as the top factors preventing their success (Ekpenyong, 2014).

Discriminatory property right ranked tenth with overall percentages of 36.61% while 21.67% of the male agripreneurs and 45.56% of the female agripreneurs indicated property discrimination as a constraint to access to financial services in South-East Nigeria. The findings showed that more female agripreneurs than male agripreneurs complained about unfair property rights. This finding supported World Bank (2018), which asserted that women were less likely to save, borrow money, or own bank accounts in countries where their legal rights to own property were discriminated against. Sanusi (2012), observed that women's access to and control over assets that could be used as collateral, including land or animals, was frequently constrained by legal restrictions and customary laws. Even when their families own land, women were less likely than males to hold a title to it, and even when they did, they were less likely to have influence over it than men were. Biased inheritance rights frequently gave land to male relatives, which disadvantaged both widows and daughters (Agarwal, 2003).

Poor business plan ranked eleventh with overall percentages of 28.87%, while 47.78% of the male agripreneurs and 10% of the female agripreneurs complained of poor business plan as a constraint to access to financial services in South-East Nigeria. According to Najib and Baroto (2016), one of the factors that contributed to successful management and helping businesses to access financing was an effective business plan. They added that if small and medium-sized businesses (SME) could meet the collateral security requirements in order to reduce the risk associated, the adoption of business plans would help SME's build a solid platform for accessing finance from formal lending financial institutions. Egbuna and Agali (2013), also argued that having a sound business plan could help them access financial services more easily by lowering financial management failures, increasing productivity, and improving profitability.

Educational level ranked twelfth with overall percentages of 27.22% while 28.33% of the male agripreneurs and 26.11% of the female agripreneurs complained of educational level and as constraint to access to financial services. According to UNDP (2016), the utilization of financial services was significantly influenced by educational attainment. Additionally, it noted that persons in Sub-Saharan Africa with tertiary or higher education were over four times more likely to have access to formal accounts than those with only primary or lower education, according to the World Bank's global data base. Olekamma *et al.* (2016), discovered that a manager's or degree owner's of education had an impact on a SME's access to finance in Nigeria. Taylor and Boubakri (2013), noted that financial literacy, was essential for understanding what financial products and services were and how they worked as well as for keeping informed about one's rights as a client.

Also, they stated that even relatively educated rural people had trouble getting financial services and frequently lacked the financial literacy necessary to understand them. According to Sabopetji and Belete (2009), men had more access to financial resources than women, since most women were illiterate and poor; they lacked the necessary collateral to obtain credit. They also revealed that in rural South Africa, more than 90% of women did not have access to

formal banking services. In rural Myanmar, Kaino (2005), discovered that only a small percentage of women had access to financial services.

Lack of experience ranked thirteenth with overall percentages of 24.72% while 31.11% of the male agripreneurs and 18.33% of the female agripreneurs complained of lack of experience as a constraint to access to financial services in South-East Nigeria. According to Pellissier and Nenzhelele (2013), an entrepreneur who had been in business for a long time would have the necessary knowledge and expertise to avoid obstacles that prevent SMEs from accessing loans, and the effective management of debt would boost the performance of SMEs.

Financial illiteracy ranked fourteenth with overall percentages of 16.67% while 21.67% of the male agripreneurs and 11.67% of the female agripreneurs complained of financial illiteracy as a constraint to access to financial services in South-East Nigeria. According to Andoh and Nunoo (2012), it was critical for any entrepreneur to have management skills so they could monitor over the business's growth. World Bank (2009), observed that financial literacy was essential for boosting access to finance in order to encourage desired financial behaviors including saving, budgeting, and responsible credit use. Mutegi *et al.* (2015), also opined that financial literacy had a favorable effect on SMEs' capacity to repay loans. Todaro (2000), observed that in developing nations, women had a higher level of financial illiteracy than men. Devkota (2006), argued that women were mostly illiterate and as a result did not engage in financial activities requiring specialized knowledge, abilities, and information. Beck and Torre (2006), noted that it had been observed that financial institutions in developing countries were inaccessible to rural dwellers because not only they were sparsely populated but also, they lacked the critical financial literacy that was considered to be necessary for financial intermediation in the area. Ladipo (2008), asserted that rural Nigerians with low levels of literacy were excluded from mainstream financial institutions. Babasanya *et al*. (2008), also asserted that rural Nigerians' poverty and pitifully low levels of formal education were directly correlated with their lack of financial literacy.

Table 1. Agripreneurs' constraints to access to financial services

Constraints	Male frequency*	%	Female frequency*	%	Total frequency	%	Rank
Lack of collateral.	120	66.67	126	70.00	246	68.33	2nd
Poor business plan.	86	47.78	18	10.00	104	28.89	11th
Lack of awareness.	102	56.67	102	56.67	204	56.67	3rd
Financial illiteracy.	39	21.67	21	11.67	60	16.67	14th
Education.	51	28.33	47	26.11	98	27.22	12th
Lack of experience.	56	31.11	33	18.33	89	24.72	13th
High interest rate.	140	77.78	134	74.44	274	76.11	1st
Lack of business record.	88	48.89	86	47.78	174	48.33	6th
Credit discrimination.	73	40.58	85	47.22	158	43.89	7th
Traditional barriers.	39	21.67	88	48.89	125	34.72	9th
Short repayment period.	102	56.67	82	45.56	184	51.11	5th
Size of business.	67	37. 22	71	39.44	138	38.33	8th
Discriminatory property right.	39	21.67	82	45.56	121	33.61	10th
Lack of Govt. /NGO support.	84	46.67	113	62.78	197	54.72	4th

Source: Field Survey, 2021

*Multiple frequencies were recorded

CONCLUSION

Both the male and female agripreneurs faced constraints to access to financial services. The male agripreneurs faced more in areas of poor business plan, financial literacy high interest rate, lack of records and short repayment period while the female agripreneurs faced more constraints in the areas of credit discriminations, traditional barriers, size of business discriminatory property right and lack of government and non- governmental organization support.

RECOMMENDATIONS

1. Financial institutions should come up with more attractive packages that will encourage access to financial services by reducing the bureaucratic bottle necks such as high interest rate, credit discrimination, etc. that make access to financial services difficult.
2. Efforts should be made by the government and non-governmental agencies to support the agripreneurs through provision of subsidies, price regulations, and organization of seminars, workshops and trainings on access to financial services to increase economic development in South-East Nigeria.
3. There is urgent need to abolish cultural, traditional and legal laws and barriers such as discriminatory property rights that prevent the access to financial services by the females so as to enable them have more access to financial services which will invariably increase their economic base and the economic development of South-East Nigeria.

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GENERATIVE PRE-TRAINED TRANSFORMER: CHALLENGES AND PROSPECTS FOR EDUCATION

Chike David Ph.D MCPN, MNCS, MIEEE

Email: drchikedavid@gmail.com,

Phone No: 08035245067

Computer Science Department

Abia State Polytechnic, Aba.

ABSTRACT

The Generative Pre-trained Transformer (GPT) is a subset of Artificial Intelligence deep learning application model and a Natural Language Processing (NLP) tool that have transformed the war machine relate to man based on large training dataset. Its revolution has propelled the development of machines that can understand and communicate using language in a way that closely resembles that of humans. Generative Pre-trained Transformer has gained significant popularity among several sectors of the economy in application. This motivated the researcher to use a literature survey and review methodology of available literatures in application of ChatGPT in educational sector to explore the potential challenges and prospects to the average learner, educators, researcher and the educational systems. This research focus on need to discover emerging risk factor associated with unethical conduct in the deployment of GPT for advancement of knowledge can make or mare the educational systems, the learners and educators progress.

***Index Keys**: Generative, Pre-trained Transformer, Artificial Intelligence, Education, Challenges, Prospects.*

INTRODUCTION

Artificial Intelligence (AI) era is here with us and it has come to stay with advances in Artificial Neural Network (ANN), Machine Learning (ML) algorithms development and further researches in progress. Advances haves been made on the processing of Natural Language (NL), coding and tagging the natural languages for proper identification by algorithms. One notable evolution is the concept of Generative Pre-trained Transformer (GPT) from its initial version to the latest and present GPT-4 that have changed the game of Natural Language Processing (NLP) and artificial intelligence in the whole.

The Generative Pre-trained Transformer (GPT) is a subset of Artificial Intelligence deep learning application model and a Natural Language Processing (NLP) tool that have transformed the war machine relate to man based on large training dataset.

Its revolution has propelled the development of machines that can understand and communicate using language in a way that closely resembles that of humans.

Generative Pre-trained Transformer has gained significant popularity among several sectors of the economy in application. It can understand and communicate via Prompt issued language and has vast application area in the globe today. It is deployed in all forms of research and literature sourcing in Medicine, Agriculture, Science, Industries, Businesses, Entertainment, Programming, and Finance etc. For sure the ChatGPT released by OpenAI gained popularity to the extent of shutting down their server base as a result of over subscription and sign-up by persons fascinated by its vast application in several areas on launch.

There is currently, calls for concern among the educators, researchers, policy makers and learners on the need to explore the potentials of deploying GPT for educational advancement of knowledge, with focus on uncovering the potential dangers, challenges and prospect to the young learners, the instructors/educators, and the entire educational sector as a whole. The salient questions being: Can ChatGPT affect the leaning process of learners? Will critical thinking abilities and reasoning of humans be affected negatively? How reliable are the sources of knowledge gained from pre-trained data set since one computational law said "Garbage in – Garbage out". What potential bias and risk is associated with vast and uncontrollable use and application of GPT in the near future on education generally?

PROBLEM STATEMENT

The GPT revolutionary trend is unprecedented and has enabled machines to do fantastic work when prompted. It can generate precisely and correctly only if the dataset used to train it is reliable, transform in a given logical sequence of ideas that makes sense to humans and possibly create other meaningful materials based on its algorithmic ideas. The experimental assessment of the GPT model using ChatGPT 4 during the trial period showed a vast improvement over GPT-3. The researcher was able to experiment using it to develop lecture materials based on curriculum of Computer Science and Programming. Codes written by the GPT model runs easily in the compiler during trail phase.

Laudable idea someone will say, but how will the utilization of this tool in education affect the learner, the educator, the educational systems and the cognitive and critical thinking and reasoning ability of humans. Guaranteed, that its potential benefits are fascinating, are there identifiable risk factors associated with the over dependent on the use of such machine tool. This research paper concentrated in the use of literature to uncover the knowledge gap associated with use of GPT technologies in educational system, focusing specifically on the challenges and prospects of use.

AIMS AND OBJECTIVES

The major aim of this paper is centers on using literature search of some reputable journals on Generative Pre-trained Transformer (GPT) and related and aspire to discover the challenges and prospects of its deployment in Educational sectors of our economy. Other objectives to achieve include:

I. To uncover the rate of use and dependency on GPT by learners to solve problems.
ii. To uncover associated risk of over dependent on GPT algorithms solutions.
iii. To explore the positive and negative potentials of using GPT in educational advancement.
iv. To contribute to the knowledge gap on ethical deployment of GPT in education.

SIGNIFICANCE OF STUDY

There exist knowledge gap as per the real application consequences of GPT in educational sector to the extent of not harming the learning process, the learning system and the learner/educator. It is also significant in that it addresses the associated risk factor of unethical use of GPT and/or over-dependent on machine prowess on humans in respect of, critical thinking and reasoning abilities and skills. This study will share light on the need to ethically abide by the best practice in deployment of GPT and other artificial intelligence related tools in a way as not to harm humans.

It has become imperative and significant to respond to recent calls for research on applications of artificial intelligence tools like GPT algorithms, to investigate the pros and cons associated with its deployment and several educational roles it can solve. The outcome of the research concerns the minimal and ethical use of GPT and other artificial intelligence tools to avoid negative or adverse impact on humans.

MATERIAL AND METHOD

This manuscript was based on a literature review of relevant scholarly articles, only published in peer-reviewed journals. The search was conducted using keywords such as "ChatGPT," "AI-generated text," "Academic writing," and "Natural Language Processing". The analysis was carried out using a quasi-qualitative approach, which involved reading and critically evaluating the sources, and identifying relevant data to support the research questions. To ensure the reliability and quality of the sources used in this paper, the researcher excluded preprints from our references.

LITERATURE REVIEWS

The literature review was conducted by collecting and analyzing literature relevant to the theme of this research, including journals, scientific publications and press releases. This activity is important to understand the broader context and support the researcher's analysis of the potential and challenges in implementing GPT as a learning tool in education. AGI-driven educational systems can take advantage of the wide range of cognitive capabilities and adaptability inherent in AGI to better comprehend individual students, meet their specific needs, and create tailored learning experiences (Mohammed and 'Nell' Watson, 2019).

DEFINITION AND DEVELOPMENT OF GPT ALGORITHMS

ChatGPT is an artificial intelligence chatbot developed by OpenAI, an artificial intelligence research laboratory consisting of the non-profit foundation OpenAI Foundation and the for-profit limited partnership OpenAI Limited. ChatGPT was launched on November 23, 2022, and is built on OpenAI's GPT-3 family of Large Language Models (LLMs) (Cruz, 2023). ChatGPT works by predicting the most likely next word in a sentence based on prompts and previous chat history. Although chat bots have been around for a long time, the arrival of ChatGPT has been considered a significant turning point in the development of artificial intelligence applications and has become a rapidly adopted technology in the Internet era (ChatGPT and Journal of International Affairs, 2022)

GPT is a language model developed by OpenAI that is capable of generating response text that is virtually indistinguishable from natural human language (Dale, 2017). The concept behind GPT was refined through a two-step process: generative, unsupervised pre-training using unlabeled data and discriminative, supervised tuning to improve performance on specific tasks (Erhan & Bengio, et al 2010, Budzianowski &. Vuli´cvuli (2019). During the pre-

training phase, the model learns naturally, similar to the way one might learn in a new environment, while the tuning phase involves more directed and structured refinement by the creators (Radford. & Salimans 2018, Dale, 2021).

GPT technology is a powerful tool for NLP (Natural Language Processing) tasks (Dale, 2021), but it has its limitations. One of the main limitations is that GPT models are based on statistical approaches that learn patterns from large text datasets, which can retain biases and stereotypes present in the data (Lucy & Bamman, 2021). This means that the model might produce offensive or harmful output.

The development of ChatGPT mainly contains the following five phases differing in features, data participants, pre-training data, as shown in Table 1. GPT1.0 is the earliest GPT model, which mainly performs unsupervised learning and implements a large language model by unsupervised training and supervised fine-tuning of the model according to a specific task. The auxiliary objective function also plays an important role in the training process. GPT2.0 is concentrated on multi-task learning, using unsupervised training model to achieve a supervised task.

Practically speaking, it uses known text data to infer subsequent text content (Jingdong, 2023). GPT3.0 adds a little example information to make the model more easily capture different information and adapt to various tasks. After that, GPT3.5 adds a feedback reinforcement model to GPT3.0 by evaluating GPT3.5's performance and giving rewards and punishments to make the task performance close to human level. GPT4.0, proposed a few months ago, has more powerful features which makes image input and the application of image data a reality, enabling the connectivity from language to multimodal (Luo Ge & Zhang Xinpeng, 2023).

Table 1: ChatGPT Development Phases

Stage	Features	Data Participants	Pre-Trained Data
GPT1.0	Unsupervised Learning	117 Million	Approx. 5GB
GPT2.0	Multitasking Learning	1.5 Billion	40GB
GPT3.0	Large Number of Parameters	175 Billion	45Terabyte
GPT3.5	Feedback-Reinforced Learning	-	-
GPT4.0	Multimodal Connectivity	100 Trillion	-

Source: (Jiayong Wang 2023)

It is based on the development of ChatGPT that related technologies have also been innovatively applied in the field of education. In the international Chinese language education field, ChatGPT, as a language interaction-based tool has been widely researched in the field due to the cross-regional and multicultural nature of the subject. With its powerful language generation capability and generative data output method, ChatGPT has received much research in the field (Rao Gaoq,2023). In 2023, Hua Liu et al. proposed the application of using ChatGPT for intelligent teaching reading and writing Chineses, and constructed a human-computer collaborative teaching model in which the instructor set the tasks and requirements first, and then ChatGPT generated the task material (Lin Yun & Liu Hua, 2023). However, since the current AI technology cannot ensure the accuracy of the generated materials, the content output using ChatGPT may be distorted, incorrect, or even meaningless. In response, Xiaobing Zhou et al. introduced multimodal supply and full feedback for ChatGPT large model technology to achieve continuous optimization of interactive platform functions (Zhou Xiaobing & Gao Xuesong,2023).

EDUCATIONAL TECHNOLOGIES AND LEARNING

The application of educational technology is undoubtedly indispensable in the education field today (Jiayong Wang, 2023). Education has been around for centuries, with traditional education being the most common form. Traditional education involves a teacher imparting knowledge to a group of students in a physical classroom. While successful, traditional education can be restrictive and inflexible, limiting students' ability to learn at their own pace and in their preferred style. It can also be limited by geography, as students need to be physically present in a classroom to learn. (Gokul & Ramalingam et al (2023)

Gokul & Ramalingam et al (2023) opined that technology has come and revolutionized how learning takes place, allowing personalized learning experiences, enshrined more engaging, accessible resources from digital platforms. They further stressed that online learning platforms, digital textbooks, and multimedia tools offering students access to a vast array of resources from anywhere in the world. Technology also facilitates collaboration and communication among students and teachers, leading to a more dynamic and interactive learning experience. Today, hybrid learning, distance learning models and online classes are examples of how technology can help break down the barriers of traditional education, making learning more flexible, efficient and effective. By integrating technology into traditional education, we can create a more personalized and effective learning experience, benefiting students worldwide.

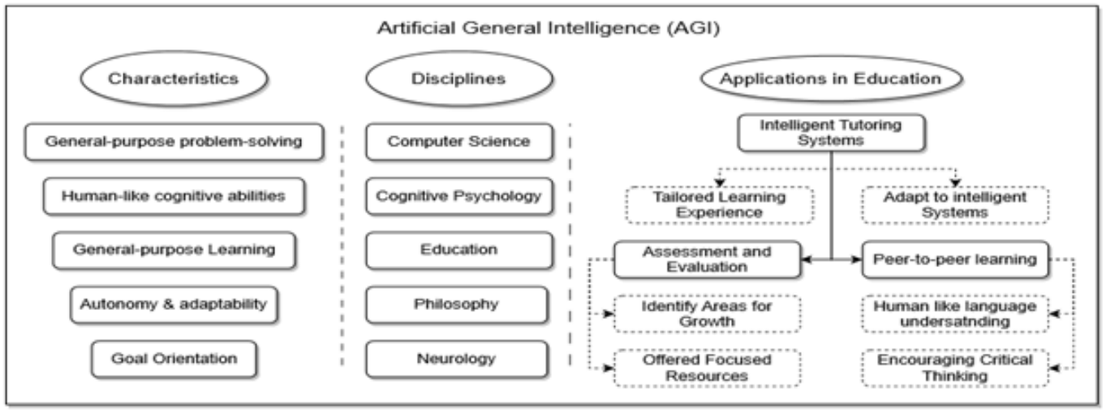


Fig 1.0 Source (CS.AI, May 2023): A High-level Perspective: Artificial General Intelligence; Characteristics, Disciplines and

The field of education is fast changing with advancements in technology playing significant role in shaping the way we learn and teach. One such technology that has the potential to transform the education sector is Generative Pre-trained Transformer (GPT). As a Large Language Model trained on a vast amount of data, GPT can generate human like text that is coherent and informative, making it a valuable tool in development of educational content such as textbooks, study guides, and course curriculums and materials. GPT has the potential to change the way we learn and teach courses and curriculum contents (David Baidoo & Leticia Owusu,2023).

Fig 1.0 .shows A High-level Perspective: Artificial General Intelligence; Characteristics, Disciplines and applications. A sample of what is obtainable from a GPT model and their respective implementation and outcomes on students learning. AGI can be used

by ITS to dynamically modify the pace, material, and teaching tactics according to the student's progress, preferences, and learning styles, fostering a more enjoyable and productive learning environment (Graesser et al., 2005). AGI can also learn from its interactions with students, which helps it develop its teaching abilities over time. In addition, AGI would help define new ways of evaluating student performance beyond scoring and help produce a personalized assessment framework. AGI-based educational technologies may ensure that students receive high-caliber training by the most recent standards (Woolf, 2010). AGI can improve educational assessment and evaluation procedures. AGI-driven systems can comprehend and evaluate complex material, identify areas for growth, and over focused resources to assist students in strengthening their decencies.

GPT output is an Artificial General Intelligence (AGI) with capacity for understanding and producing human-like language can aid in creating systems that promote peer-to-peer learning and cooperation, imitating real-life human interactions and encouraging learners to use critical thinking and problem-solving abilities (Rosenschein and Zlotkin, 1994). In conclusion, using AGI in education can result in individualized, flexible and successful learning experiences that better prepare students for a constantly changing global environment. It consequently can be applied in development of language learning model with learning objectives (LOs) and Learning Outcome (Loc) explicitly defined by research while training the model.

Pragnya & Aiden et al (2023) took a study on harnessing LLMs in curriculum design using GPT-4 to support authoring of learning objectives (LOs) and opined that the generated learning objectives (LOs) follow certain best practices such as beginning the action verbs from Bloom's taxonomy in regards to the level of sophistication intended they Corroborated that GPT analysis as sensible properly expressed affirming that it can be leveraged on by instructors and curriculum designers wishing to take advantage of the state of the art generative models to support their curriculum and course design efforts.

Jorge & Javier et al(2023) took another study on exploring the ethical considerations of using ChatGPT in University education and came out with the argument that ChatGPT integration was moderately accessible and had moderately positive social attitudes., it promote the intelligence and creativity of teaching strategies and methods, support the generative and personalized feedback and evaluation of teaching. They ascertain that it posits some risks such as questioning academic integrity and imbalance of evaluation mechanisms, excessive dependence leading to addition and potential weakening of teacher status, it can result to inaccurate transmission of information and limited knowledge level, insufficient ethical awareness and difficulty in coping with ethical risks, creation of unthinkable and unverifiable low quality information content capable of polluting internet space.

Learning Objectives (Los) are the blueprint against which course content is designed. They provide instructors with framework for content creation, instructional and assessment strategies, as well as enable learners to reflect on and plan their own learning of course knowledge and skills. According to Xin (2023) American Linguist Norm Chomsky opined that ChatGPT as a high-tech plagiarism and believes that the system has no value for understanding language and cognition. He further points out that using ChatGPT is only a way to escape learning emphasizing that people cannot gain any real knowledge from it.

Similar views came from Li Zhumin as he argues that the technology cannot be compared with the four previous information technology revolutions in human history. Other researcher have argued in favor of ChatGPT and generative artificial intelligence by affirming that generative artificial intelligence like ChatGPT has enormous potential to subvert the existing educational paradigm, because the way and manner humans acquire information and interact with machine has undergone tremendous changes since the emergence of ChatGPT. In more and more educational researches, learning and scientific research fields ChatGPT have been used to sort and source for information and data in timely fashion.

From the research conducted with American College Students, it was discovered that 89% of students choose to use ChatGPT to write assignment, which has raised concerns about crossing the bottom line of education. ChatGPT has also show potentials to empower teaching innovation, improve the completeness and creativity of teaching outcome of teachers. It enhances the sense of role and interaction of digital mentors, improve the usability and accuracy of adaptive learning systems.

Gokul and Ramalingam et al (2023) in their study GPT- a comprehensive Review on enabling technologies, potential applications, emerging challenges, and future directions vividly outline the prospects and challenges in educations as outlines:

- Intelligent tutoring using AI and ML to provide personalized and adaptive instruction capable of providing immediate feedback, personalized guidance, remedial support, improving learning outcome, increasing students engagement and reducing learning time.
- Learning assistance and material development that can be tailored to meet the diverse learners, make learning engaging and effective, support teachers to create more dynamic and interactive learning environment.
- Assisting the teacher in creating learning materials by automating content generation, providing multilingual content creation, language correction, personalized content creation, conducting topical research and generating assessments.
- Automated Assessments use for evaluation of students' learning outcome, providing immediate feedback and reducing potential bias in grading, identify student's areas of need and additional support.
- Fostering Creativity by imbibing creativity thinking plays in education by encouraging students to think beyond traditional boundaries and develop innovative solutions to complex problems.

Moreover, they attributed the associated risks and challenges to be that:

- GPTs can quickly generate information that may impede student's critical thinking and problem-solving skills.
- Learners who benefits from personal interaction with instructors may find the lack of human involvement disadvantageous.
- GPT reliance on statistical patterns may mean they cannot provide comprehensive understanding of the material being taught.
- Privacy concerns on using sensitive students data in GPTs for educational purposes.
- GPTs lack capability to citations and give more challenge to identify the source of information generated.
- Cost implications for institutions with limited resources to maintain GPT
- Distinguishing reliable and unreliable information from GPT can be difficult.

RESEARCH RESULT AND DISCUSSION

Research Result

Generative Pre-trained Transformer shows an

increase in expertise and understanding that is far superior to earlier models as at today. GPT can be applied in several areas of education without specific area of specialty. GPT has passed a software developer level programming test and thus can be applied in training students of programming in any language of choice. GPTs answers to questions are factual even though with minor errors and repetition. GPT models has multimodal capabilities, cross-system understanding meaning it can be classed as versatile in application areas. GPT can make trivial mistakes like in arithmetic calculations, a factor of training set. Short memory of GPT can make the model incoherent if too many inputs are feed. GPT model output may be inaccurate and offensive. GPT can contribute suggestions to questions faster and in concise and quick manner giving researchers clues to research approach. It can also suggest and list Uniform Resource Locator (URL) and recommend book sources for educators and students alike for knowledge harvest.

RECOMMENDATION

The pre-training of transformers is a good milestone achievement in artificial intelligence, on this premise it is expected that all outcome of training and use of Generative Pre-trained Transformer (GPT) in educational sector can be innovative. It is recommended as follows for the better application and deployment of GPT in education:

i. GPT can be used as a learning support tools especially in the areas of software training, mathematical coaching and general reasoning, but it cannot completely replace the role of lecturers and emotions attached to teaching and learning process, the empathy shown by a teacher to a slow learner.
ii. Since GPT still houses biases and prone to errors, the result provided by the transformer need to be constantly checked and scrutinized for correctness before acceptance. An article produced for learning, book etc should be proofread by humans to trace and correct recurring errors.
iii. GPT model can help the learning process by summarizing journal works and making analogies that are easy to understand, however its use need to be tailored to students needs, expected learning outcome, skills and curriculum.
iv. GPT model training data in the local languages is still limited. Therefore, further research and development of the model in local languages are needed for specific learning focus.
v. The role of teachers and lecturers is still needed as leaders and supervisors in the learning process. While government policies geared on further research for improvement based on available dataset for training same in the local languages is suggested.

CONCLUSION

Conversational Artificial Intelligence models and technologies will increasingly impact all stages of scientific publishing, teaching and learning processes, research and development. It is expedient for researchers in several institutions and academics to act proactively in the field of academic research capable of shaping its efficiency and accuracy. They can focus on educating research students on the basic principles and ethical considerations involved in academic research while using machine generated output like that of GPT.

As for whether Generative Pre-trained Transformer has come to stay, the affirmative answer is yes. The best we can do is only to be proactive in professing its mitigating effect on the young learners and researcher. Otherwise, critical thinking skills, constructive reasoning and memorization will be jeopardized in a short while. Prospects and challenges are certainly inevitable using GPT, so we need to be wiser now than before.

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The Research about the Innovative Application in Education Field Based on ChatGPT Foundation Model

Jiayong Wang1,International Education College, Henan University, Zhengzhou, China *Corresponding author: WjyVanessa@henu.edu.cn

From human writing to artificial intelligence generated text: examining the prospects and potential threats of ChatGPT in academic writing AUTHORS: Ismail Dergaa1,2,3, Karim Chamari4, Piotr Zmijewski5, Helmi Ben Saad6,7,8

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ICT-ENABLED PEDAGOGICAL INNOVATIONS IN TVET INSTITUTIONS: CATALYZING THE SCALING UP OF TECHNOLOGICAL INNOVATIONS IN NIGERIA

DrMrsEmeagiIjeoma nee Agwamba[1], OnyemecharaIdong-esit Comfort[2], AgwambaNnaemeka Abiodun [3]

DEPARTMENT OF COMPUTER SCIENCE, FEDERAL POLYTECHNIC NEKEDE OWERRI, IMO STATE NIGERIA

[1]ijemeagi@gmail.com, 08089836911
[2]ecomforth@gmail.com, 08035917177
3godsonagwams2020@gmail.com, 08063381844

ABSTRACT

Technical and Vocational Education and Training (TVET) institutions in Nigeria play a vital role in equipping individuals with the necessary skills for the evolving job market. However, these institutions often face challenges in adopting and scaling up technological innovations and integrating them into their pedagogical practices. This paper aims to address the research gap by investigating the impact of ICT-enabled pedagogical innovations in TVET institutions in Nigeria and their potential to catalyze the scaling up of technological innovations.

To achieve the research objective, a mixed-methods research approach was employed. Initially, an extensive literature review was conducted to identify existing ICT-enabled pedagogical innovations and their outcomes in TVET institutions globally, with a specific focus on Nigeria. Subsequently, a survey was administered to TVET instructors and administrators across various regions of Nigeria to gather data on the current level of ICT integration, perceived benefits, challenges, and readiness for scaling up technological innovations. Additionally, in-depth interviews were conducted with key stakeholders, including policymakers, industry experts, and representatives from educational institutions, to gain insights into the strategies and policies necessary for successful implementation.

The results of the study indicate that ICT-enabled pedagogical innovations have a positive impact on teaching and learning outcomes in Nigerian TVET institutions. The integration of digital tools, such as learning management systems, virtual simulations, and online collaborative platforms, enhances student engagement, fosters active learning, and facilitates skill acquisition. However, several challenges were identified, including limited access to ICT infrastructure, inadequate technical support, and the need for capacity building among instructors. Despite these challenges, the study reveals a readiness among TVET institutions in Nigeria to adopt and scale up technological innovations, provided they receive the required support and resources.

Based on the findings, this paper concludes that ICT-enabled pedagogical innovations have the potential to revolutionize TVET education in Nigeria and bridge the technological skills gap. It emphasizes the importance of addressing infrastructure limitations by investing in the development of ICT infrastructure and expanding internet connectivity. Additionally, providing adequate technical support, offering comprehensive capacity building programs for instructors, and formulating policies that prioritize ICT integration in TVET curricula are essential for successful implementation and scaling up. By embracing these recommendations, Nigeria can harness the transformative power of technological innovations and ensure a skilled workforce for the digital era.

Keywords: *ICT-enabled pedagogical innovations, TVET institutions, scaling up, digital tools, capacity building.*

INTRODUCTION

Information and communication technology (ICT) has brought innovative approaches to teaching and learning introducing pedagogical innovations which has led to a paradigm shift in education. Adaka (2010) says that ICT applications provide assistive technology and bring to mind high-tech (hi-tech) devices that help meet the needs of all types of students. The advent of the corona virus (CoVID-19) that ushered in about eleven months of partial and total lockdown brought about a paradigm shift in the education sector. According to Emeagi (2021) Information Communication Technology (ICT) has been and will continue to play a great role to support education before, during, and after the COVID-19 lockdown. ICT innovations in the field of educationwill positively affect and will keep affecting all the stakeholders in the education sector. She also asserts that due to the use of ICT at a large scale in various sectors and countries, the innovation of new ideas on the digital platforms will have a great impact on teaching-learning methods for delivering education in TVET institutions.

The following are examples of ICT applications that should be utilized in TVET instruction: open learning, fixed learning, blended learning, mobile learning, and virtual reality are just a few examples. These applications are meant to achieve success assuming the ICT instruments and assets, for example, PCs, brilliant board, projectors and other projected materials that work with learning and further develop execution are accessible. In light of the fact that "use of ICT in education has brought new possibilities for learning online" (Pangeni, 2020), educational establishments must improve their infrastructure, revise their curricula, and introduce policies for alternative teaching and learning methods in order to incorporate technology into pedagogical innovations. In addition, teachers must develop their competencies by combining solid knowledge of content, pedagogy, and technology. It necessitates significant interventions in teacher education as well as ICT infrastructure that facilitates the integration of technology with content and pedagogy by educators. Hence, school systems in Nigeria need to study how to contextualize and coordinate encounters of current ICT devices for e-learning on the web and distance training. Institutions should find ways to connect our teachers and students beyond classrooms, reaching out to their workplaces and homes for success. Such exertion would likewise work with in emergency times like Coronavirus and other cataclysmic events. The delivery of technical and vocational education and training (TVET) has been impacted in many ways by the development of new digital technology. Specialized and professional instruction and preparing (TVET) is a program presented at various foundations that is focused on procurement of logical information and down to earth abilities for monetary and specialized development of a nation (Ijeoma, et al, 2022). TVET is perceived as involving instruction, preparing and abilities improvement connecting with a large number of word related fields, creation cycles, administrations and occupations (ILO, 2020). This is offered at the secondary, post-secondary, and tertiary levels, and it has the greatest potential to reduce poverty and create and maintain employment. This study focused on the advancements in the instructing and growing experiences (informative conveyance) of specialized, professional schooling and preparing projects, and how it is fundamental for the Increasing of Mechanical Developments in Nigeria. Inventive computerized innovation can possibly upset our conventional instructive establishments (Vassiliou and McAleese, 2014) furnishing learning valuable open doors with an adaptable timetable for understudies to advance past the study hall settings yet give a social constructionist learning climate (Kafai and Resnick, 2011). The term "innovations in TVET instructional delivery approaches and techniques" refers to the creation and implementation of novel and pertinent teaching and learning procedures with the goal of increasing TVET programs' efficacy, equity, and delivery. The utilization of information and communications technology (ICT) is primarily responsible for innovations in TVET instruction and learning. ICT should be visible as any gadget, organizing parts, applications and frameworks that permit individuals to cooperate in the computerized world. It is additionally viewed as the utilization of mechanical devices for investigating information, supporting advancing by development to work on the viability of educating and learning (Ijeoma, et al, 2022). Technology connects "virtual" (via the internet) and "real" (in person) settings. Such innovation furnishes us with the valuable chance to embrace all conceivable academic techniques that are utilized in the actual settings into virtual settings. In any case, uppoint of production, businesses, schools, and close and personal overwhelmed culture of schooling in Nigeria TVET establishments (Pangeni, 2016) has made the whole of web based learning plan and teaching method practically speaking. It might take some time for people's mindsets to shift and they will realize how powerful the technology is for pedagogical innovations. According to Seatter and Ceulemans (2017), traditional TVET instruction, such as lecture-driven delivery, has not adequately prepared students to make the transition from classroom instruction to today's real-world work. This can be attributed to the difficulties that arise when employing cutting-edge instructional methods in TVET programs. Therefore, the purpose of this study was to investigate the impact of ICT-enabled pedagogical innovations on Nigerian TVET institutions and their capacity to spur technological innovation expansion.

CHALLENGES TO THE INTEGRATION OF ICTS IN TVET

Africa like every other developing continent has its challenges which mitigate against the smooth adoption of ICT in TVET. We shall highlight these problems as follows:

1. Poor Infrastructural Development: Inadequate infrastructure, such as inconsistent power supply, are one of the major obstacles that stand in the way of Africa's development as a continent with great potential in terms of both human resources and natural resources. According to Kafka (2018), ICT in TVET faces challenges such as lack of infrastructure, high initial and ongoing costs, etc. ICT in TVET also faces the challenge of overcoming technical infrastructures as well (UNEVOC, 2015). Numerous nations in West Africa economy have experienced a hindered development in innovation because of this element. Due to the on-and-off power supply at the individuals experience production and experimental process breakdowns. For ICT to be coordinated in schools there ought to be consistent power supply (UNESCO, 2017; UNESCO, 2015). All of the equipment will be affected, either directly or indirectly, if internet services and ICT equipment are adequately provided and the power supply is insufficient or inconsistent, resulting in untimely damage to these facilities. Because it has an effect on the economy's productivity as a whole, this kind of scenario prevents technological advancement from occurring. Birshir and Hisyam (2016) think that these foundations don't have the specialized ability for the ICT advancement in Nigeria. Poor electricity in some parts of Malawi makes the issue of ICT in online distance learning worse, preventing students from having access to learning resources.

2. Insufficient Knowledge: TVET instructors must receive adequate training in the latest technology trends. Most TVET educators are generally low

gifted or have obsolete abilities due the way that the public authority neglects to relegate sufficient assets that will assist them with keeping up with the degree of advancement and improvement in the TVET educators calling. The organizations given the obligations to prepare educators has not had the option to join academic preparation with down to earth preparing in the advancing advancements in our general public these days as would be expected by certain ventures in the work market. There is a proverb that says "You don't give what you don't have". At the point when the educators and teachers are not satisfactorily prepared to support the progressions in advances, they will end up creating crazy understudies who don't have the necessary information and skills needed in the field. Mlunghish and Dominique (2014) are of the possibility that deficient ICT traiing has an immediate relationship with the instructors' ability and may compromise their knowledge about educating and learning.

3. Misconception of ICT in TVET through Distance Learning: There is a widespread misconception that distance learning does not meet the standards of traditional learning. ICT-based TVET delivery appears to be less realistic. Studies at the technical level frequently contain significantly more theoretical and cognitive components that are more suited to the methodology of distance learning. Likewise, understudies at the specialized level will more often than not have more elevated levels instructive achievement and are more ready to embrace self-study. The test of giving manual/psychomotor abilities can be defeated through mixed program models that consolidate practical workshop-based parts. The number of ICT TVET-based institutions in West Africa is evidence of this misconception. Countries like Nigeria, Ghana & Benin Republic have very few ICT TVET institutions. Zurina and Maizam (2018) says the lower center around the emotional learning objectives is exceptionally amazing as progress in full of feeling learning credits is one of the strength of ICT.

4. Stakeholders Resistance to Technological Change: Partners in Customary learning organization go against the acquaintance of distance learning due to the dread of loss of jobs and the restriction of students who might favor distance learning against the conventional learning schools. Because distance learning frequently necessitates a shift in job functions and the professional intellectual upgrading of faculty, instructors, and support staff in order to support new delivery models. Numerous teachers and workforce express worries in regards to mechanical or technological change and potential employment cutback if distance learning models become more pervasive (World Bank, 2001).

Impact of ICT-Enabled Pedagogical Innovations In TVET Institutions In Nigeria and West Africa

Several West African countries have been incorporating ICT into their TVET curricula to enhance the skills and competencies of their workforce. A few examples include;

1. Ghana – Ghana has been promoting the integration of ICT in TVET through various initiatives such as the Skills Development fund and the TVET Voucher Project (Agyekum, 2019).

2. Senegal – Senegal has been making efforts to incorporate ICT in TVET to improve the quality and relevance of vocational training. Initiatives such as the “YeksiNaa” project aims to introduce digital skills in TVET centers (Dioufet al, 2017).

3. Ivory Coast (Cote d'Ivoire) – Ivory Coast has been working on integrating ICT in TVET to enhance the employability of its workforce. The Ministry of National Education and Technical Education (2019) has implemented programs such as the National Agency for Vocational Training (AGEFOP) and the National Strategy for Technical and Vocational

Education and Training (NSTVET) to promote ICT skills in TVET.

Nigeria has been working on integrating ICT into TVET to meet the demands of the digital economy. The National Board for Technical Education (NBTE) has developed guidelines and standards for incorporating ICT into TVET programs. Many TVET institutions now offer training programs in areas such as software development, networking, digital media, etc.

Toghioff (2013) says that there has been a lot of interest lately in how computers and the internet can be used to make education more efficient and effective at all levels and in both formal and non-formal settings. There are numerous ways that ICT affect education. Most importantly, in the school system, the ICT has produced many educating and learning exercises that never existed for a really long time. As a result, ICT technologies are frequently utilized in combination rather than as the sole means of delivery. ICT-driven pedagogical techniques in education include:

(a.) E-learning or Online learning:

This envelops advancements at all levels of learning both formal and non-formal that utilizes a data network for example the web for course conveyance, association, assessment and help (Oduma and Ile, 2014). The following are additional e-learning strategies:

i. ***Web-based Learning***: This is a flexible and accessible form of learning that uses technology components to deliver educational content to learners anytime and in anyplace.

ii. ***Blended Learning*****:** One of the most famous ICT driven actions in the school system today is the mixed learning. Learning methods that combine e-learning solutions with traditional classroom instructions are referred to as blended learning. In a traditional class, for instance, students can be assigned both print-based and online materials, participate in online mentoring sessions with their instructor via e-chat, and sign up for a class email list. "Mixed" was provoked by the acknowledgment that not all learning is best accomplished in an electronically-intervened climate, especially one that gets rid of a live educator out and out. In order to find the best combination of instructional and delivery methods, the subject matter, learning objectives and outcomes, learners' characteristics, and the learning context need to be taken into consideration.

iii. ***Open and Distance Learning:***The Commonwealth of Learning has defined this learning strategy as a way to provide learning opportunities in which the teacher and the learner are separated in time or place, or both. Learning is confirmed here and there by a foundation or office; the utilization of a variety of media, including electronic and print with the possibility of having occasional meetings in person; what's more, a specific division of work in the creation and conveyance of courses. Ololube, Ubogu and Ossai (2012) stated that distance training likewise called open or distance learning is a type of schooling where there is regularly a partition among understudies and instructors. As a result, it includes the telephone, computer conferencing, or teleconferencing which is used to bridge the physical gap between the instructor and the learner, which others may refer to as a means of writing and speaking. The provision of any educational opportunities that are required by anyone, anywhere, at any time, for those who otherwise would have been denied is the same as distant education or learning.

iv. ***Learner-centered Environment:*** ICT emphasizes much on learner-center environment. It defines environments that are learner-centered as those that pay close attention to the knowledge, abilities, attitudes, and beliefs that students bring to the classroom. Hernes (2012) further reiterated that the stimulus for student centeredness is gotten from a hypothesis of learning called constructivism.

Learning, according to constructivism, is a process in which people "construct" meanings based on previous knowledge and experience. Learners can gain experiences that enable them to build mental modals or schemas, which in turn provide meaning and organization to subsequent experience. These experiences can be gained through constant interaction in web surfing and collaborative chats (Harris, 2011).

v. *Teleconferencing*: Interactive electronic communication between individuals residing at two or more distinct locations is referred to here. Video chatting is utilized in both formal and non-formal learning settings to work with educator and student conversations, as well as to get to specialists and different assets people remotely (Bates, 2011). Teleconferencing is a useful tool for providing direct instruction and student support in open and distance learning. Remotely coordinating ICT driven instructing and learning techniques or exercises can take any of the accompanying shapes:

(b.) Audio-Conferencing:

This involves the live (real time) exchange of voice messages over a telephone network.

(c.) Audio-graphic conferencing:

This refers to situations in which voice messages and low-bandwidth text messages, such as graphs, diagrams, or pictures, can be exchanged through a network.

(d.) Video Conferencing:

In addition to voice and graphics, this makes it possible to exchange moving images. Video conferencing doesn't utilize phone lines but either a satellite connection or TV station (broadcast/cable).

(e) Web-based conferencing:

As the name suggests, this includes the transmission of text, and illustrations, sound and visual media through the web. It requires the utilization of a PC with a web application program. According to Harris (2011), these various ICT-driven actions, strategies, and activities contribute to teaching and learning, particularly in ICT-driven environments (like schools).

vi. The Tele-Collaborative Interaction: Web based picking up including understudies signing into formal courses online is maybe the most normally considered use of the web in training (Harris, 2011). In any case, it is in no way, shape or form the main application. Online cooperation devices, for example, email, (list serves), message loads up, ongoing visits and electronic conferencing, associate students to different students, educators, teachers, researchers and analysts, researchers and specialists, industry pioneers and lawmakers - in short, to any person with admittance to the web who can enhance the educational experience. Tele-collaboration is the coordinated utilization of web assets and joint effort devices for educational program suitable purposes (Oduma and Ile, 2014). An instructive undertaking affects individuals in various areas utilizing web devices and assets to cooperate. Much instructive cooperation is educational program based, instructor planned and educator facilitated. The best tele-collaborative learning are those that are completely incorporated into the educational plan and not simply extra-curricular exercises.

ICT in TVET - Scaling up of Technological Innovations in Nigeria.

Education and training are just two of many areas of life that have been altered by technology. Digital transformation prompts enormous changes in the ranges of abilities required for work and life. One of the most important aspects of achieving the Sustainable Development Goals is making effective use of digital technologies. In almost every field, the introduction of Information and Communication Technologies (ICT) presents new opportunities and challenges for education. To provide adequate education, TVET institutions must make the most of

emerging technologies (UNESCO, 2020). Technical and vocational education and training (TVET) has become more accessible to students and of higher quality as a result of technological advancements. To effectively manage their tasks and engage students in digitally rich environments, all teachers and trainers in Nigeria need to use digital tools. Students can also learn new skills, collaborate, and interact with instructors and trainers through technology. However, the COVID-19 pandemic has highlighted the current challenges in successfully integrating technology into education and training. This helps TVET establishments to comprehend the authoritative plans expected to develop their ability to invigorate advanced learning. It likewise directs educators in Nigeria the need to foster their abilities, work on their academic methodologies with utilization of innovation, and gain from existing practice (UNESCO, 2017). The skills needed for work and life have changed a lot as a result of digitalization. In order for technical and vocational education and training (TVET) institutions to continue to be attractive and relevant, they must identify and introduce digital skills and competencies for the ever-changing workplace and make better use of digitalization's opportunities, especially distance learning. Their progress in saddling the advantages and handling the difficulties of digitalization to a great extent relies upon the computerized capacities of TVET educators and mentors.

REVIEW OF RELATED LITERATURE

In this section, we examine some of the previous approaches used by researchers forICT-Enabled Pedagogical Innovations in TVET Institutions. Below, we give a brief review of research studies that have been conducted using these approaches and tools.

According to (Kanwar, Balasubramaniam and Carr, 2019), TVET courses ought to zero in on creative use of ICT devices in long lasting learning to set up the students availability participating in profession connected with ICT work scopes. When incorporating technology into TVET education systems, ongoing upskilling and reskilling are required. They recommended the implementation of dual systems, community-based learning through social media, the innovative use of ICT tools in teaching and learning pedagogy, the training requirements of TVET educators to get them ready to adapt to the paradigm shifts in line with Industrial Revolution 4.0 and Industrial Revolution 5.0, and career advancement recognition prior to learning to get trainees ready to enter the workplace with the skills they need to survive and improve their quality of life, which contributes to the nation's development. Okoye and Nkanu, (2018) explored about the impacting variables of ICT devices combination in TVET training.The necessities of TVET courses showing functional conveyance approaches through fitting capabilities. Transformation of ICT apparatuses in educating and learning teaching method is disturbing in setting up the students for this present reality 21st century work. Requirements of teachers' preparation in ICT combination as the essential component, organizations' approaches to empower teachers' commitment to mixing ICT devices in educating and learning instructional method, teachers' mentality towards coordinating ICT in TVET courses, poor ICT and fundamental frameworks, unsound organization and lack in monetary help were featured.

Chan and Mohammad (2019) demonstrated through research about ICT incorporation that instructors' information while conveying course related matters online is fundamental by getting powerful variation of ICT devices. Implanting ICT apparatuses application preparation stages as a piece of the teachers' expert turn of events, elevating innovation functional skill, interest and educational practices are

urgently deprived to be focused. The researchers also emphasize the importance of ICT tools for facilitating communication between educators and trainees in the transition to online teaching and learning in TVET education.

Akom, et al, (2016) revealed that TVET instructors and students are keen on utilizing ICT apparatuses in educating and learning teaching methods in arrangement with current mechanical advancement to adapt to Modern Transformation 4.0 and Modern Upset 5.0. However, the institution's financial problems necessitate government intervention in order to implement appropriate policies. Additionally, inadequate ICT tools and computer labs, insufficient ICT educators, and poor quality of ICT educators made course delivery difficult. Therefore, in order to plan, engage, and train educators in the use of ICT tools in TVET education, further and in-depth research is required.

Wang, et al, (2018) highlighted that basic and commercial learning services for effective collaborative learning are offered by social networking sites (SNSs) like Google, LinkedIn, and Facebook in Nigerian tertiary institutions, particularly by lecturers teaching TVET courses. In order to successfully incorporate social networking sites into teaching and learning pedagogy, they identified 13 primary obstacles. As a result, it was suggested that TVET instructors participate in continuing professional development (CPD), which would improve the development of soft skills necessary for the smooth delivery of courses via mobile learning applications.

According toChi, et al (2020) the authors stressed the need for educators in training institutions to have the online teaching skills they need to implement and engage trainees in online learning. They emphasized the need for specialized training in teaching and learning pedagogy to be implemented online during Movement Control Order (MCO) immediately in order for educators to keep up with current trends and improve teaching performance and learning abilities throughout the course delivery process. Multiple factors, including the readiness of educators and students for online learning, insufficient soft-skills competency, poor network issue, and a lack of devices, create barriers to the use of ICT tools in teaching and learning pedagogy at this stage.

Samuel (2020) examines the use of ICT in TVET in Nigeria and distance learning. The global perspective of distance learning as a means of transmitting TVET through ICT is then emphasized. It further gave a concise history of distance schooling in Nigeria and the issues of distance learning in conveying TVET programs which incorporate poor infrastructural improvement and lacking information by the educators and so forth. The review, accordingly, suggests that states ought to be given independence in creating energy, teachers in TVET establishments ought to be given satisfactory preparation and can team up with Global TVET foundations through the distance learning program. ICT as a device for advancing distance learning conveyance will set out a major freedom for optional school graduates who will go to higher foundations to be enlisted into distance learning program as this likewise lessens the expense of running customary organizations in the country. Additionally, it will assist in providing educational opportunities to our youth who are moving to Asia and Europe to pursue higher education.

METHODS AND MATERIALS

This study adopts a quantitative data collection approach and analysis from participants. The method helps systematically by investigating the impact of ICT-enabled pedagogical innovations in TVET institutions in Nigeria and their potential to catalyze the scaling up of technological innovations, from the

age group: 18 – 29 30 – 39 40 – 49 50 – 59 60 and above, Highest educational qualification: Bachelor Master PhD Others , Teachers Experience: 1 -5years 6-10years 11-15years 16years - above in Nigerians. Quantitative approach (using survey questions) from the respondents using questionnaire to collect data and analyzed collected data in order to produce the numerical results.

Instruments Design

The questionnaire was designed using Google form and distributed via various platforms. The questions were organized under the above items, and a total of twenty two (22) questions. All these questions were asked to answer the research objective. To answer the question each participant is required to indicate the level of agreement and disagreement with the statements using the concept of a five-point Likert scale from strongly disagree “1” to strongly agree “4” as Table 1 shows the instrument used in data collection. 130 participants were selected to participate, all 120 feedback were returned, and 10 feedbacks were deleted after filtering the completed questionnaires. Therefore 120 feedbacks were used for the analysis. The surveyed country is Nigeria. The expected time to complete the questionnaire is estimated to be 5 minutes. Table 1 shows the responders' representation details.

Data Collection

This study is anICT-Enabled Pedagogical Innovations in TVET Institutions: Catalyzing the Scaling up of Technological Innovations in Nigeria'**.** Questionnaire and literature review (articles, internet sources, published and unpublished journals by professionals) were used to collect the data. Quantitative approach (using survey questions) from the respondents (TVET teachers in Nigeria) using questionnaire, it was designed using Google form and distributed via various platforms to collect and analyze the collected data. A sum of 120 participants and total of twenty two (22) questions were distributed to various platforms. The researcher adopted SPSS for data analysis through the frequencies and percentage for demographic information. The participants include; policymakers, industry experts, and representatives from educational institutions etc.

Respondents' General Profiles

There are eight (8) questions in this part which are; (i) gender, (ii) years of experience, (iii) education qualification (iv) employment status, (v) level using computer (vi) preferred ICT device (vii) ICT tools often use (viii) E- learning. Information from this part aimed to know the respondents' background who were involved in the research. In table 1 below, the frequency distribution and the percentage of respondents are involved. Based on Table 1, this research's respondents were made up of 120 respondents of which 46.67% were female and 53.3% were male. In terms of years of experience, 35% were between 1-5years. 20% were between 6-10years, 33.33% were between 11-15years and 10.85% were between 16years above. In terms of employment status, 27.5% were students. 45.83% were civic servant, 5% were private servant, 15% were self-employed and 6.67% were others. In terms of level using computers, 35% were professionals. 34.16% were very good, 25% were good, 5.83% were others. For preferred ICT device, 45.8% were laptops. 12.5% were desktop, 20.83% were mobile phone, 4.16% were tablet and 16.67% were others. In terms of E-learning, 68.33% were effective and 31.67% were less effective. For ICT tools often used, 32.5% were white/blackboard, 4.16% were Microsoft teams, 8.33% were Zoom, 29.16% were Whatsapp and 36.67% were others. It was found that the majority of the respondents were Nigerians. While in educational qualification, 50 were bachelor

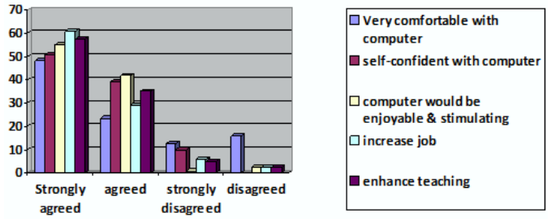
degree holders. 39 were Mastersdegree holders, 19 were PhD holders and 12 were others (ND, HND etc).

Evaluation of Respondents' Demographic Data Collected

Variable	Respondent Background	Frequency	Percentage (%)
Educational Qualification	Bachelor	50	41.67
	Master	39	32.5
	PHD	19	15.8
	Others	12	10
Years of experience	1-5years	42	35
	6-10years	25	20
	11-15years	40	33.33
	16years above.	13	10.83
Gender	Male	64	53.3
	Female	56	46.67
Employment status	Students	33	27.5
	Civil servant.	55	45.83
	Private sector.	6	5
	Self-Employed	18	15
	Others	8	6.67
Level using computer	Professional	42	35
	Very good	41	34.16
	Good	30	25
	Others	7	5.83
Preferred ICT device.	Laptop	55	45.8
	Destop	15	12.5
	Mobile phone	25	20.83
	Tablet	5	4.16
	Other.	20	16.67
E-Learning	Effective	82	68.33
	Less effective	38	31.67
	Others.	-	-
ICT tools often use	White/blackboard.	39	32.5
	Google classroom.	-	-
	Microsoft team.	5	4.16
	Zoom	10	8.33
	Whatsapp	35	29.16
	Others.	44	36.67

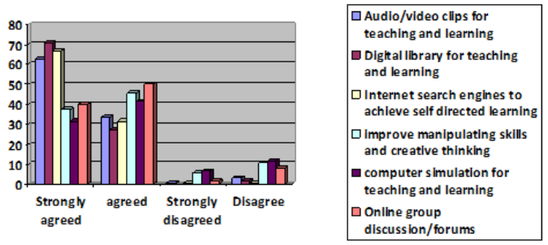
Level of Attitude towards ICT Tools

S/N	Items	Frequency	Percentage
1.	Working with computer would make me very comfortable?		
	Strongly agree	58	48.3
	agree	28	23.33
	Strongly disagree	15	12.5
	Disagree	19	15.83
2.	I have a lot of self-confidence when it comes to work with computers?		
	Strongly agree	61	50.83
	agree	47	39.16
	Strongly disagree	12	10
	Disagree	-	-
3.	I think working with computers would be enjoyable and stimulating.		
	Strongly agree	66	55
	agree	50	41.67
	Strongly disagree	1	0.83
	Disagree	3	2.5
4.	Knowing how to work with computers will increase my job possibilities.		
	Strongly agree	73	60.83
	agree	35	29.16
	Strongly disagree	7	5.83
	disagree	3	2.5
5.	I'm willing to learn new software to enhance my teaching		
	Strongly agree	69	57.5
	agree	42	35
	Strongly disagree	6	5
	Disagree	3	2.5



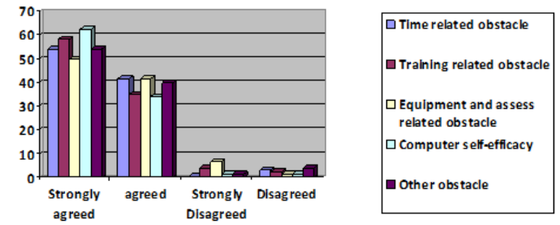
To what extent is ICT applied in the teaching and learning process of TVET programmes in Nigerian Institutions.

S/N	Items	Frequency	Percentage
1.	Audio/video clips are used for teaching and learning?		
	Strongly agree	75	62.5
	agree	40	33.3
	Strongly disagree	1	0.83
	Disagree	4	3.33
2.	Digital library for teaching and learning?		
	Strongly agree	85	70.8
	agree	33	27.5
	Strongly disagree	-	-
	Disagree	2	1.67
3.	Internet search engines (Google, Opera mini) to achieve self-directed learning?		
	Strongly agree	80	66.67
	agree	38	31.67
	Strongly disagree	1	0.83
	Disagree	1	0.83
4.	Educational video games in the classroom to improve manipulating skills and creative thinking?		
	Strongly agree	45	37.5
	agree	55	45.8
	Strongly disagree	7	5.83
	disagree	13	10.83
5.	Computer simulation (simulating real world phenomenon in 3-D to demonstrate difficult, complex concepts) for teaching and learning?		
	Strongly agree	38	31.67
	agree	50	41.67
	Strongly disagree	8	6.67
	Disagree	14	11.67
6.	Online group discussions/ forums?		
	Strongly agree	48	40
	agree	60	50
	Strongly disagree	2	1.67
	Disagree	10	8.33



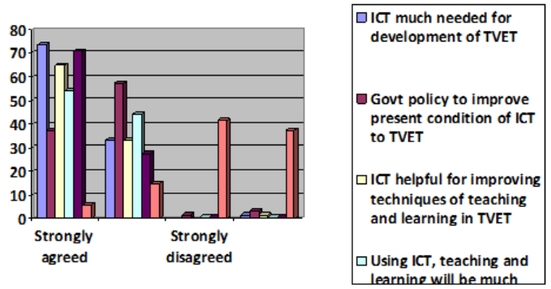
Level of obstacles in technology integration among the TVET educators

S/N	Items	Frequency	Percentage
1.	Time related obstacles?		
	Strongly agree	65	54.16
	agree	50	41.67
	Strongly disagree	1	0.83
	Disagree	4	3.33
2.	Training related obstacles?		
	Strongly agree	70	58.33
	agree	42	35
	Strongly disagree	5	4.16
	Disagree	3	2.5
3.	Equipment and assess related obstacles.		
	Strongly agree	60	50
	agree	50	41.67
	Strongly disagree	8	6.67
	Disagree	2	1.67
4.	Computer self-efficacy.		
	Strongly agree	75	62.5
	agree	41	34.16
	Strongly disagree	2	1.67
	Disagree	2	1.67
5.	Other obstacles faced by educators.		
	Strongly agree	65	54.16
	agree	48	40
	Strongly disagree	2	1.67
	Disagree	5	4.167



To what extent will the impact of using ICT in teaching and learning process be determine.

S/N	Items	Frequency	Percentage
1.	ICT is very much needed for development of TVET?		
	Strongly agree	88	73.7
	agree	40	33.3
	Strongly disagree	-	-
	Disagree	2	1.67
2.	Government has enough policy to improve the present condition of ICT in TVET?		
	Strongly agree	45	37.5
	agree	69	57.5
	Strongly disagree	2	1.67
	Disagree	4	3.33
3.	ICT is very much helpful for improving the techniques of teaching and learning process in TVET?		
	Strongly agree	78	65
	agree	40	33.33
	Strongly disagree	-	-
	Disagree	2	1.67
4.	Using ICT, teaching and learning will be much easier, interesting and time saving?		
	Strongly agree	65	54.16
	agree	53	44.16
	Strongly disagree	1	0.83
	Disagree	1	0.83
5.	Students will be more motivated to learn if ICT tools are used in TVET?		
	Strongly agree	85	70.83
	agree	33	27.5
	Strongly disagree	1	0.83
	Disagree	1	0.83
6.	ICT tools are too complicated to use in teaching and learning process?		
	Strongly agree	7	5.83
	agree	18	15
	Strongly disagree	50	41.67
	Disagree	45	37.5



RESULTS AND DISCUSSION

This research shows the rate at which the respondent is conscious of the impact of ICT-enabled pedagogical innovations in TVET institutions in Nigeria and its potential to catalyze the scaling up of technological innovations. The survey sample of 120 respondents includes gender, years of experience, education qualification, employment status, level using computers, preferred ICT device, ICT tools often used and E- learning.

48.3% respondents strongly agreed that they are comfortable working with computer, 23.33% agreed, 12.5% respondent strongly disagreed and 15.83% disagreed.

50.83% respondents strongly agreed that they have self-confidence working with computer, 39.16% respondents agreed and 10% strongly disagreed.

55% respondents strongly agreed that working with computer would be enjoyable and stimulating, 41.67% agreed, 0.83% strongly disagreed and 2.5% disagreed.

60.83% respondents strongly agreed that knowing how to work with computer will increase job possibilities, 29.16% agreed, 5.83% strongly disagreed and 2.5 disagreed.

57.5% respondents believe that learning new software will enhance their teaching, 35% agreed, 5% strongly disagreed and 2.5% disagreed.

Also, 62.5% respondents strongly agreed that audio/video clips are used for teaching and learning, 33. respondents strongly agreed that audio/video clips are used for teaching and learning, 33.3% respondents agreed, 0.83% strongly disagreed and 3.33% disagreed.

70.8% strongly agreed that digital library helps for teaching and learning, 27.5% respondent agreed, 1.67 disagreed.

66.67% respondents strongly agreed that internet search engines help to achieve self-directed learning, 31.67% respondent agreed, 0.83% strongly disagreed and 0.83% respondent disagreed. 37.5% respondents strongly agreed that educational video games in the classroom helps in manipulating skills and creativity thinking, 45.8% respondents agreed, 5.83% strongly disagreed and 10.83% respondents disagreed.

54.16% respondents strongly agreed that time is one of the related obstacles in technology interaction among the TVET educators, 41.67% respondents agreed, 0.83% strongly disagreed and 3.33% respondent disagreed.

58.33% respondents strongly agreed that training is also a related obstacle in technology interaction, 35% respondents agreed, 4.14% strongly disagreed and 2.5% disagreed. 50% respondents strongly agreed that equipment and assess are also a related obstacle, 41.57% respondents agreed, 6.67% strongly disagreed and 1.67% respondents disagreed.

62.5% respondents strongly agreed that computer self-efficacy is a related obstacle also, 34.16% respondents agreed, 1.67% strongly disagreed and 1.67% disagreed. 54.16% respondents strongly agreed that there are other obstacles faced by educators, 40% respondents agreed, 1.67% strongly disagreed and 4.16% respondents disagreed. 73.7% respondent strongly agreed that ICT is very much needed for development of TVET, 33.3% respondent agreed, 1.67% respondent disagreed. 37.5% respondent strongly agreed that government has put enough policy to improve the present condition of ICT in TVET, 57.5% respondents agreed, 1.67% strongly disagreed and 3.33% respondent disagreed.

65% respondent strongly agreed that ICT is very much helpful for improving the techniques of teaching and learning process in TVET, 33.33% respondents agreed and 1.67% disagreed. 54.16% respondent strongly agreed that using ICT in teaching and learning will be much easier, interesting and time saving, 44.16% respondents agreed, 0.83% strongly disagreed and 0.83% disagreed. 70.83% respondents strongly agreed that students will be more motivated to learn if ICT tools are used in TVET, 27.5% respondents agreed, 0.83% strongly disagreed and 0.83% disagreed. Lastly 5.83% respondents strongly agreed that ICT tools are too complicated to use in teaching and learning process, 15% respondents agreed, 41.67% respondents strongly disagreed and 37.5% respondents disagreed.

CONCLUSION AND RECOMMENDATIONS

From smartphones to social media, technology has transformed the way we communicate, work, and learn. And when it comes to TVET education, the integration of technology has opened up endless possibilities for pedagogical innovations which isa key contributor to sustainable national development.

ICT has enabled educators and learners to access information more quickly and efficiently, communicate and collaborate with others, and engage with learning in new and exciting ways.ICT-enabled pedagogical innovations has been proven to enhance teaching and learning, improve students' performance, and provide access to quality education, regardless of geographical barriers.

Despite several challenges, the study has revealed a readiness among TVET institutions in Nigeria to adopt and scale up technological innovations, provided they receive the required support and resources from the government and stakeholders in the education industry.This research has shown thatICT-enabled pedagogical innovations have the potential to revolutionize TVET education in Nigeria and bridge the technological skills gap.

It is strongly recommended that the Government create reliable and ICT-friendly policies which prioritize the integration and utilization of ICT in TVET curricula to enhance teaching and learning.

Stakeholders in the education sector need to invest in the necessary infrastructure which should include reliable electricity supply, internet connectivity, equipment and relevant training for instructors/teachers.

There should exist a formidablepartnership and collaboration between the government, TVET institutions, and relevant organizations in the private sector to share best practices and ICT initiatives for scaling up. Also to ensure the successful implementation and sustainability of ICT-enabled pedagogical innovations in TVET education.

Routine training of instructors/teachers with capacity building programs to enhance their intellectual capacity to meet up with current innovations in ICT pedagogical processes, enabling them to use technology effectively in teaching and learning processes and in turn provide improved learning outcomes to the learners.

TVET institutions should embrace and adopt the blended learning approach which is the combination of traditional learning instruction and online learning components.

Continuous evaluation and improvement of pedagogical innovations in TVET institutions.

By embracing these recommendations, Nigeria can harness the transformative power of technological innovations and ensure a skilled workforce for the digital era.

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INDENTIFICATION OF NEW TECHNOLOGY SKILLS REQUIRED BY LECTURERS OF OFFICE TECHNOLOGY AND MANAGEMENT FOR INSTRUCTIONAL DELIVERY IN TERTIARY INSTITUTIONS IN ONDO AND EKITI STATE

Omidiji, Samuel Ajetomobi
Office Technology & Management Department
Federal Polytechnic, Ado
Omidijisamuel17@gmail.com

ABSTRACT

The study examined new technology skills required by lecturers of office technology and management for instructional delivery in tertiary institutions in Ondo State. The descriptive research design of the survey type was adopted for the study. Two research questions guided the study and one hypothesis was used for the study. The population of the study comprises of 50 office technology and management lecturers drawn from the selected five tertiary institutions in Ondo and Ekiti State. The entire population was adopted as the sample because of the manageable size. The instrument used for data collection was a four rating scale questionnaire with 20 item questionnaire titled: Questionnaire on new skills required by lecturers of office technology and management for instructional delivery in tertiary institutions in Ondo and Ekiti State. (QINTSRL). The instruments was validated by three experts. The instrument reliability was ensured using Cronbach's alpha formula which yielded a reliability coefficient of 0.81. Data collected were analyzed using mean and standard deviation for the research questions while inferential statistic of test retest was used to test the formulated hypothesis at 0.05 level of significance. The findings revealed that, OTM lecturers highly required new technology skills in the use of digital tools, artificial intelligence software, web design software, internet connectivity software, mendeley, dreamweaver, online collaborative tools and Google search engine. It was concluded that OTM lecturers needed new technology skills to produce skilled and qualified graduates for global competiveness. Thus, it was recommended amongst others that government and other relevant stake holders should improve the funding of OTM programme through the procurement of new technological facilities and software for teaching OTM courses. Free internet facility, computer aided instructional delivery and regular training and retraining of the lecturers should be provided.

Keywords: New Technology Skills, Office Technology and Management, Instructional Delivery and

Contemporary literature revealed that new technology has revolutionized the educational sector across the globe. The technological winds that is blowing across the educational sector in the world has continue to gain widespread popularity in office technology and management programme. There are many rationale for this integration in the instructional delivery by the OTM lecturers. The quest to mainstream from analogue teaching and learning process into digital instructional delivery. Also the expectation of the 21st century employers of labour who are agitating for graduates with requisite skills and competencies in the digital skills needed in the global world of work. Instructional delivery in OTM programme as a course of study is a dynamic force that bring about a transforming needed change in the life of the students. It also enhances and influence the students' psychological development, physical, social and emotional changes and development.

Instruction delivery is an aspect of leaning that demands and requires a systematic and gradual process for the aim of facilitating learning and also transferring knowledge, requisite skills and competencies and understanding through the use of modern technological facilities. (Nwaodume 2020). The conventional method of teaching and learning process in office technology and management programme has received a transformation and advanced into technological based learning through the advancement in the technological facilities and devices.

The paradigm shift from analogue method of teaching and learning brought as a result of application of new technologies that has the potentials for improving and enhancing instructional delivery. Timya and Moris (2019) averred that since employers of labour are looking for the graduates with the right technological skills like digital competencies to employ in their workforce, hence, traditional environment dominated by obsolete skills is no longer required in the labour market. Any graduates that fails to possess the technological skills and competencies cannot secure a place in the global job market dominated by digital competencies. No wonder the 21st century employers of labour claimed that, the graduates produced by tertiary institutions are not employable. It is in view of this that Timya and Moris (2019) remarked that the instructional delivery in office technology and management programme by the lecturers must reflect the latest trend of adoption and utilization new technologies in order to produce a graduates with global competiveness in the labour market.

OTM as a programme of study is one of the programmes, disciplines/occupations offered by university/polytechnic and colleges of education under the aegis of the various supervisory bodies. Office technology and management is a sub-set of business education, it is a programme of study that should inculcate employable skills into the recipients in addition to general education. The objective of OTM programme is to produce modern secretaries who are proficiently prepared for both public and private enterprises of the global economy. Zakka and Wetnwan (2018) averred that office technology and management is a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related science and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of economic and social life. The programme is designed to equip student with the competencies required to work in a modern office environment which is information and communication technology driven.

The wind of technological advancement that in blowing across the globe has brought a tremendous improvement in OTM programme with integration of new technologies. Fully adoption and utilization of new technology in OTM programme allows flexibility in teaching and learning process and ability to carry out multitasking exercise.

New technology according to Timya and Moris (2019) are the software, hardware, facilities, devices and gadgets which are categorize as resources available for instructional delivery which aided the activities of the lecturers and the students to optimize their performance. The students thereby acquired the required requisite competence skills and proficiencies and the lecturers produces a world class graduate that can compete favourably in the global

job market.

Skills acquisition is defined by Omidiji (2019) as the acquisition of the right knowledge, attitude, occupation, experiences and understanding through the application of technology that allows the recipient to be self-reliant and also secure a paid employment and be effective and efficient. Skills acquisition needed expertize and dexterity and creative reasoning in the course of carryout a particular job or tasks. Ability to possess mastery of basic rudiment in performing tasks with new knowledge and experience showed that such student has undergone skill acquisition and training. Teaching and learning in OTM programme is a process between the learners and the facilitators. Effective instructional delivery by the lecturers in OTM programme requires the dexterity in demonstration of technological skills and competencies which will invariably transferred to the recipients and enable them to learn by improving their requisite knowledge, competencies, understanding and attitude. Thus, it is imperative that lecturers of OTM must be very efficient and effective in the new technology because you can only give what you have to the students.

Thus, employers of labour and global competiveness requires technological competencies for an employees. Angela, Ijeoma and Ikpeama (2022) posited that new technology competencies is a range of dexterity in using digital technological facility, devices and gadgets including hardware and software such as prezi, animoto, flipgrid, socrative, tonation, Alison, hawkit, linkedin, google classroom, iskillpro, built and Microsoft PowerPoint for accessing, process, format, edit store and disseminate information to the end user and for teaching and learning activity. Technology proficiency required sound knowledge and skills in the utilization of software like coding, collaboration, cloud software, screen casting, personal archiving, digital information evaluation and social media savvy form their employees. Employers in the global world of work dominated by digital skills and technology requires proficiency and competencies from their staff in the digital skills such as consumer skills, creative skills, communication skills, problem solving skills, technical skills and information management skills.

The employers are ready to pay high salaries to the employees with high technological skills because they are not ready to send any staff on training rather looking for the best skills to employ.

Digital learning has come to stay as a result of advancement in technological application of pedagogical method of instructional delivery in tertiary institutions. Digital learning has moved skills acquisition in OTM programme beyond the four walls of educational classroom setting where the lecturers are the sole dominant into interactive digitalized skills acquisition. Digital based application in tertiary institutions has launched the method of facilitating learning in OTM programme into a knowledge-based economy in which ideas and technological principles with digital skills and digital software application are employed for maximum output. (Oyinloye and Umoru 2022) Thus, in order to accomplish the goals and objectives of teaching and learning in OTM skills acquisition which is to graduate students who would fit properly into the office of any automated or paperless oriented and show professional dexterity in carrying out the functions of secretary which ranges from relating the functions of automated office to the job specification such as attending meeting online with digital proficiency, organizing zoom meeting using digital technology, providing information through digital skills for the executive, digital application in making accurate record of proceedings, cloud and online filing and retrieving of information through competency and proficiency in digital skills assumes responsibility by taking independent action in

problem solving using digital skills in tandem with global best practices. In order to accomplish the goal and objective, full integration of digital skills by the OTM lecturers is imperative. It will compel teachers and educators in tertiary institutions to utilize the benefit of digitalized based skills acquisition in educational sector for the instructional delivery and harness digital technology facility, devices and gadgets into the teaching and learning process for improved and enhanced learning outcome.

The comprehensive integration of digital technological facilities into teaching and learning in OTM program. Globally, digital technological skills has now be fully embraced across the globe regarding education system. Student-centred approach in learning has been accorded priority and this has changed the way lecturers in OTM programme facilitate teaching and learning after the post pandemic era. The integration of digital technological facilities in educational sector has altered the changes in skills for enhanced effective teaching and learning in OTM programme. Harnessing digital skills into OTM programme for improved learning outcomes requires a new digital skills in the 21st century world of work which is ICT driven.

However, Timya and Moris (2019) opined that despite the numerous opportunity and innovation provided by the adoption of new technology in OTM programme for instructional delivery and facilitation teaching and learning process as well as huge amount invested in the procurement of such facilities, it seems that issue like insecurity challenges brought by unemployment, social vices, poverty and youth restiveness were found among the OTM graduates. it was also observed that, there was lack of instructional effectiveness on the part of the lecturers because the graduates produced by them were found roaming around the street looking for job and the employer remarked they do not possess the required technological based skills, hence they were not employable. Thus, the researcher believe that , it could be that the lecturers showed strong apathy towards the full utilization of the new technological facilities or they devoid the requisite knowledge and competencies in using the new technology because they were not train with such technology when they were in school. Regrettably, empirical study revealed that majority of the new technology were not available in the tertiary institutions of learning for utilization by the lecturers. It was on this premises that the study tends to identify the new technology skills required by lecturers of OTM for instructional delivery in tertiary institutions.

Research Questions.

- What are the new technology skills required by lecturers of office technology and management for instructional delivery in tertiary institutions in Nigeria.
- What are the level of availability of new technology for the lecturers of office technology and management for instructional delivery in tertiary institutions in Nigeria?

Research Hypothesis

There is no significant difference in the mean response of male and female lecturers on the level of utilization of new technology for instructional delivery by lecturers of office technology and management in tertiary institutions in Nigeria.

METHOD

The study adopted descriptive survey design. The population of the study constitutes 50 lecturers of office technology and management from five tertiary institutions in Ondo and Ekiti State respectively. The tertiary institutions include: Federal University, Oye Ekiti, Ekiti State. Ekiti State University, Ado Ekiti, Ekiti State. Bamidele Olomilua University of

Education, Science and Technology, Ikere Ekiti, Ekiti State. Adeyemi College of Education, Ondo Town, Ondo State and Rufus Giwa Polytechnic, Owo. Ondo State. The entire population was adopted for the study because of the manageable size. The instrument used for a self-designed questionnaire titled " Questionnaire on the new technology skills required by lecturers of office technology and management for instructional delivery in tertiary institutions in Ondo and Ekiti State. (QNTSRLOTMID)" The questionnaire consisted of 20 items. Each of the items was assigned with four options of Highly Required (HR-4 points) Moderately Required (MR- 3points) Slightly Required (SR- 3 points) and Not Required (NR- 1 point). The data collected were analyzed using mean and standard deviation. The hypothesis formulated was tested using test retest at the 0.05 level of significance. The decision rule for the research work was established at a mean of 2.50 and above while any mean obtained that is less than 2.50 was regarded as rejected. Hypothesis tested was rejected when the table value was less than or equal to 0.05 and accepted when the table value was less than 0.05 level of significance.

RESULTS

The data collected in order to answer the research questions are presented in tables one to two below.

RESEARCH QUESTION 1:

What are the new technology skills required by lecturers of office technology and management for instructional delivery in tertiary institutions in Nigeria.

Table 1: Mean ratings and Standard Deviation of Respondents on the New Technology Required by Lecturers of OTM for Instructional Delivery in Nigeria?

S/N	ITEM	X	SD	REMARK
1	5G Technology	3.75	0.40	Agree
2	GPT-4	3.64	0.85	Agree
3	Dreamweaver	3.43	0.80	Agree
4	Datafication	3.55	0.89	Agree
5	Collaboration Technology	3.64	0.85	Agree
6	Cloud Based Software	3.69	0.75	Agree
7	Online Social Media	3.55	0.89	Agree
8	Net Working Software	3.58	0.81	Agree
9	Smarter Devices	3.74	0.84	Agree
10	Digital Tools	3.55	0.90	Agree
Source: **Field survey, 2023**		**Ground Mean 3.61**		

The data presented in table 1 revealed that all the items identified are the prevailing new technology skills required by lecturers of OTM for instructional delivery in tertiary institutions in Nigeria. They had their means ranged from 3.43 to 3.75. Thus, they all agreed with the items raised as new technology that is required by OTM lecturers for instructional delivery in tertiary institutions in the country

RESEARCH QUESTION 2

What are the level of availability of new technology for the lecturers of office technology and management for instructional delivery in tertiary institutions in Nigeria?

Table 1: Mean ratings and Standard Deviation of Respondents on the level of Availability of New Technology by Lecturers of OTM for Instructional Delivery in Nigeria?

S/N	ITEM	X	SD	REMARK
1	G5 Technology	1.55	0.64	NA
2	Smarter Devices	1.81	0.79	MA
3	GPT-4	1.61	0.79	NA
4	Digital Tools	1.47	0.69	NA
5	Mendeley Software	1.85	0.83	NA
6	Dreamweaver Software	1.55	0.64	NA
7	Datafication	1.11	0.31	MA
8	Internet Connectivity	1.23	0.42	MA
9	Collaboration technology	1.49	0.64	MA
10	Cloud Computing Software	1.47	0.69	MA
Source: **Field survey, 2023**		**Ground Mean 1.51**		

The data presented in table 2 revealed that all the items raised on the level of availability of new technology for lecturers of office technology and management for instructional delivery in tertiary institutions in Nigeria as their means ranged from 1.11 to 1.85. Each of these means were lower than the cut-off point of 2.50, indicating that the ten (10) raised on the level of availability of new technology by lecturers of office technology and management for instructional delivery in tertiary institutions in Nigeria. This implies that new technologies were not adequately available for instructional delivery.

DISCUSSION OF RESULTS

The findings of research question one revealed that the ten (10) items raised were identified as the new technology skills required by lecturers of OTM for instructional delivery in tertiary institutions in Nigeria. They had their means ranged from 3.48 to 3.74. Thus, the respondents agreed with the items raised as various types of new technology skills required by lecturers of OTM for instructional delivery in tertiary institutions in Nigeria. The implication of this is that, it is imperative for lecturers of OTM programme to embrace the utilization of the new technology for instructional delivery in order to produce a competent graduates that can face the 21st century global world of work and its challenges. This finding was in agreement with the findings of the study conducted by Agwazia and Ordu (2023) who conducted a research on the new technology required for employability skill in tertiary institutions in Nigeria. The finding was also in agreement of the report of Anioke (2019) who submitted that the identified new technology are required by lecturers for the teaching and learning business education programme in tertiary institutions in Nigeria.

Findings on research question two showed that all the items raised on the level of availability of new technology for the lecturers of office technology and management for instructional delivery in tertiary institutions in Nigeria revealed that nearly all the new technology are not adequately available for lecturers of OTM usage. The implication of this is that, you can only talk of availability before utilization. It is what only available at your disposal that you can utilize. The findings of the study was in consonance with the findings of the study conducted by Njoku (2019) whose findings revealed that new technology are not

available in tertiary institution in Nigeria and it has led to the production of half-baked graduates.

CONCLUSION

The study investigated new technology skills required by lecturers of office technology and management for instructional delivery in tertiary institutions in Ondo and Ekiti State.

Based on the findings of this study it was deduced that new technological skills are required by OTM lecturers for instructional delivery. It was also discovered that, the skills demanded by the employers of labour in the global world of work differs from the skills possess by the graduates of OTM programme making them unemployable in the labour market. It was also discovered that new technology identified were not adequately available for usage by the OTM lecturers for instructional delivery in the institutions. Thus, in order to reduce the menace of unemployment among the OTM graduated and their restiveness in Nigeria, it is imperative to inculcate into them the new technological skills required by the employers of labour in the market to make them employable

RECOMMENDATIONS

The following recommendations were drawn from the study.

1. Government should improve the funding of OTM programme through procurement of new technologies needed for instructional delivery in order to make it functional in line with global standard and practices.
2. Philanthropies and all relevant stakeholders should provide aids and assistance in a bid to procure the latest technological facilities for instruction delivery to corroborate government efforts in ensuring the availability of the new technological facilities.
3. There should be training and retraining programme for the lecturers in OTM for skilling and up skilling of their proficiency in the usage of the new technology for optimum performance in instructional delivery.

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IMPACT OF VOTE BUYING ON GOOD GOVERNANCE

By

Udochukwu Precious Nwakodo,

Goodluck Eguzoikpe Ubani,

Okafor Ogbonnaya Okafor

Public Administration Department

Abia State Polytechnic, Aba

preshy1973@gmail.com

ABSTRACT

Vote buying is a pervasive electoral malpractice that exerts a detrimental impact on the principles of good governance. This article explores the impact of vote buying on the integrity of democratic processes and good governance. Vote buying erodes the very essence of democracy by substituting the will of the people with financial incentives. It distorts the electoral process, as voters are incentivized to cast their ballots not based on their genuine beliefs and convictions but rather in exchange for material gain. Consequently, the elected representatives may not reflect the true preferences of the electorate thus compromising the legitimacy of the government. In addition to undermining the democratic process, vote buying fosters corruption and perpetuates a culture of impunity. When politicians engage in this practice, they divert resources that could otherwise be used for public goods to fund their campaigns, leading to a misallocation of resources and reduced public service delivery. The documentary method of gathering data from secondary sources was applied. In conclusion, the impact of vote buying on good governance is profound and far-reaching. It weakens accountability, fosters corruption, distorts policy priorities, and exacerbates social inequalities. To uphold the principles of good governance, it is imperative to combat and eliminate this practice through robust legal frameworks, public awareness campaigns, and the promotion of transparency and accountability. One of the recommendations made was that the Independent National Electoral Commission (INEC) and the Economic and Financial Crimes Commission (EFCC) should develop a strategic collaborative framework for effective monitoring of political parties' campaign funds in order to effectively curb electoral fraud, including vote buying.

***Keywords*:** Vote buying, good governance, elections, democracy.

INTRODUCTION

Good governance is the cornerstone of stable and prosperous societies, characterized by transparency, accountability, rule of law, and citizen participation. It is essential for ensuring that governments act in the best interests of their constituents. However, one of the persistent challenges that hinders good governance is vote buying, a practice where individuals or groups offer material incentives to voters in exchange for their support. Vote buying has grown dangerously widespread, particularly during elections. Voters are frequently given money, food, or other items by candidates and political parties in an effort to win their support. Poverty, illiteracy, and a lack of knowledge about the significance of choosing the best candidate over the most expensive one are only a few of the variables that contribute to this issue (Osoba, 2018). Vote buying, a dubious practise that has pervaded Nigeria's recent political process, is nicely captured by this process of offering goods for auction, receiving bids, and then selling them to the highest bidder. The practise of purchasing votes is not unique to Nigerian elections or to Africa in general. However, about 80% of voters in 36 African nations think that bribery occurs occasionally, frequently, or constantly. In addition, 16% of African voters claimed they had been given money or commodities in return for their vote in the most recent election (Matenga, 2018).

Although it has been a common practise in recent elections, vote buying has existed since before the restoration of democracy in May 1999. It was widespread during the 1992 Jos Social Democratic Party presidential primaries. In fact, General Ibrahim Badamasi Babangida cited vote buying as one of the justifications for invalidating the June 12, 1993 presidential election, which had been acclaimed as the freest and fairest in Nigerian history (Jimoh, 2021). Vote buying has always been a crucial component of Nigerian money politics. Recent events, however, demonstrate that vote buying occurs throughout the electoral process, but is most conspicuously seen during voter registration, the nomination process, political party primaries, campaigning, and election day. On election day, just before or during voting, it is particularly prevalent. The ugliness of vote-buying in Nigerian politics is not a recent development; there are some underlying causes behind it. According to Davies (2016), vote-buying in Nigeria is made easier by the political parties' and candidates' incapacity to create thorough and understandable manifestos for voters to review. Meaningless slogans, demagogic rants, and rabble-rousing speeches are given precedence over concise manifestos that would allow the voter to make an informed political decision.

CONCEPT OF VOTE BUYING

The concept of vote buying encompasses the act of providing voters with financial or material rewards in return for their electoral support. In the context of Nigeria, the prevalence of this phenomenon has reached a concerning level, particularly in relation to electoral processes. In order to win the support of voters, candidates and political parties sometimes engage in the practise of distributing monetary funds, food items, or other things. This problem is driven by a multitude of causes, including poverty, low literacy rates, and insufficient understanding about the significance of voting for the most suitable candidate rather than one influenced by financial incentives. In Nnenna's (2023) study, it is asserted that vote buying is an act of corruption that typically involves the provision of a gift or gratuity with the intention of influencing the behaviour or actions of the recipient. This can include the offering of money or other valuable considerations in exchankmge for the breach of a position of trust or the unethical execution of a designated responsibility, such as those held by fiduciary agents, judges, legislators, public officers,

witnesses, or voters. Vote-buying may be defined as a dishonest practise when an individual suggests financial benefits to another person with the purpose of influencing their voting behaviour (Nnenna, 2023). This encompasses not only the act of offering a straightforward bribe, but also the act of providing exorbitant travel reimbursements and compensating an excessive number of poll workers. The concept of political bribery pertains to a scenario in which financial incentives are used to influence the voter's stance on their preferred candidate (Mwesigye, 2022; Ugwu, 2023). In this particular scenario, individuals who are eligible to vote are contacted in public establishments and residential settings, where they are presented with incentives of a monetary kind in exchange for casting their vote in favour of a certain candidate (Eze, 2023). Vote buying, as stipulated in Section 24 of the Nigerian Electoral Act 2006, encompasses the act of selling or attempting to sell a voter's card, regardless of whether it is issued in the name of a specific voter or not. Additionally, it includes the act of buying or offering to buy a voter's card, irrespective of whether it is issued in the name of a particular voter or not. This prohibition applies to both the buyer's personal interest and on behalf of any other individual. Section 131 of the Electoral Act 2006 (Prohibition of Bribery and Conspiracy) further delineates some behaviours that are classified as vote-buying:

(a) The act of directly or indirectly providing or assisting in providing incentives, in any form, to an individual or a political campaign with the intention of corruptly influencing that individual or any other person to either support or abstain from supporting a political party or candidate.

(b) The act of directly or indirectly giving or offering to give money or valuable consideration to any individual during a political campaign, with the purpose of inducing that individual or any other person to either support or refrain from supporting a political party or candidate.

(c) The act of accepting any form of inducement, money, or valuable consideration from any individual, candidate, or political party, with the intention of compelling that individual or any other person to either support or refrain from supporting a political party or candidate (Nnenna, 2023).

However, according to Beetseh et al. (2015), it has been suggested that vote-buying proposals may be aimed at influencing either election choices or electoral participation. These messages may aim to influence people' voting behaviour, either by encouraging certain voting choices or by dissuading them from voting altogether. The authors further contend that efforts to manipulate voter participation might be directed towards either demobilising engaged adversaries or rallying apathetic proponents. The occurrence of vote-buying poses a potential threat to the process of democratisation. Vote-buying may be seen as a contractual agreement or an auction process, when the voter exchanges their vote for monetary gain, ultimately favouring the highest bidder.

CONCEPT OF GOOD GOVERNANCE

Good governance is a multifaceted concept that plays a pivotal role in the functioning of modern societies. It encompasses a range of principles, processes, and institutions that contribute to the effective and accountable management of public affairs. Good governance can be understood as the manner in which public institutions and officials conduct their affairs, ensuring transparency, accountability, participation, and the rule of law. A seminal work by the World Bank in 2019 outlined eight key characteristics of good governance, including public accountability, political stability, and the protection of human rights(World Bank, 2019). These characteristics provide a foundational framework for understanding the concept. According to Bovens (2017), transparency is a fundamental element of good governance, referring to the accessibility of information related to government decisions and actions. Transparency ensures that citizens are well-informed about government activities, enabling them to hold officials accountable for their actions. Accountability, on the other hand, involves mechanisms through which individuals and institutions are held responsible for their actions. These mechanisms can include elections, oversight bodies, and the legal system (Przeworski, 2010).Inclusivity and citizen participation are crucial aspects of good governance. It entails involving diverse segments of the population in the decision-making process. A study by Sintomer et al. (2018) highlights the importance of participatory budgeting as a means to enhance citizen engagement in local governance, ultimately leading to more accountable and responsive institutions.

The rule of law is a foundational principle of good governance, ensuring that decisions and actions are made in accordance with established laws and regulations. Tamanaha (2014) emphasizes the importance of the rule of law in promoting stability and predictability within societies, which are essential for economic development.Efficiency and effectiveness in governance processes are vital for the optimal allocation of resources and the delivery of public services. A study by Behn (2011) underscores the significance of performance measurement and management in achieving these goals. Governments that prioritize performance management tend to be more efficient and responsive to citizens' needs. Accordingly, ethical leadership is another critical aspect of good governance. Leaders must act with integrity, prioritizing the public interest over personal gain. Treviño et al. (2013) highlights the positive impact of ethical leadership on organizational effectiveness and public trust.

However, civil society organizations play a crucial role in promoting good governance. They act as watchdogs, advocating for transparency and accountability in government actions. Research by Edwards and Foley (2007) discusses how civil society can enhance governance through mobilization and advocacy efforts.International organizations, such as the United Nations and the World Bank, have increasingly emphasized good governance as a key component of development programs. These organizations provide technical assistance, promote best practices, and monitor progress toward good governance (UNDP, 2014).Good governance is a complex and multifaceted concept that encompasses transparency, accountability, participation, the rule of law, efficiency, and ethical leadership. It is essential for the effective functioning of modern societies and the promotion of development and stability. Civil society and international organizations play pivotal roles in advocating for and supporting efforts to enhance good governance. As societies continue to evolve, the concept of good governance remains a dynamic and evolving framework that adapts to new challenges and opportunities.

HISTORICAL BACKGROUND OF VOTE BUYING IN NIGERIA

Vote buying is a pervasive and deeply rooted issue in Nigerian politics. It refers to the practice of politicians or their agents offering material incentives, such as money, goods, or services, to voters in exchange for their votes during elections. This practice undermines the principles of free and fair elections and threatens the integrity of Nigeria's democratic system.Following Nigeria's independence in 1960, political patronage became a dominant feature of the country's political landscape (Adebanwi, 2013). The First Republic (1960-1966) witnessed intense competition among political

parties, resulting in a rise in vote buying as a means to secure electoral victories. Parties and candidates began to distribute gifts and cash to voters, often in exchange for their support. This practice persisted through subsequent military regimes and civilian governments, contributing to the normalization of vote buying in Nigerian politics(Kura, 2012).The roots of vote buying in Nigeria can be traced back to the early days of the country's political development. Nigeria gained independence from British colonial rule in 1960, but the transition to democracy was marked by significant challenges. The country's early political parties, such as the Northern People's Congress (NPC), Action Group (AG), and National Council of Nigeria and the Cameroons (NCNC), struggled to build popular support and faced intense competition (Nwankwo, 2018).During this period, vote buying was often a means for political elites to secure loyalty and influence among the electorate. In the 1950s and early 1960s, political leaders often distributed gifts, cash, and patronage jobs to garner support from voters. The scarcity of resources and limited access to information made voters more susceptible to such offers.One notable example of vote buying in Nigeria's early political history was the "Cocoa House Scandal" in the Western Region in 1962. The ruling AG party was accused of using public funds to finance a grand cocoa house project as a means of securing votes. This incident highlighted the connection between public resources, patronage, and electoral manipulation (Ojo, 2019).

The emergence of military rule in Nigeria further exacerbated the problem of vote buying. Between 1966 and 1999, the country experienced a series of military coups and dictatorships, which disrupted democratic processes. During this period, the military regimes often manipulated elections to maintain their grip on power, and vote buying continued to be a tool used to influence outcomes. Adejumobi (2014) stressed that the military rule in Nigeria did not eliminate vote buying; instead, it mutated into a more covert form. The military regimes often manipulated elections and used state resources to secure loyalty from politicians, fostering a culture of corruption and electoral malpractice. This further entrenched the practice of vote buying within the political system. The return to civilian rule in 1999 marked a turning point in Nigeria's political history. However, the legacy of military rule left a lasting impact on the country's political culture. Suspicion of electoral fraud and the belief that votes could be easily bought persisted, leading to a heightened sense of distrust among the electorate (Kukah, 2013).In the 21st century, vote buying has evolved into a more sophisticated and widespread practice. Nigeria's transition to multi-party democracy in 1999 brought about an increase in the number of political parties and candidates vying for public office. With greater competition, the incentives for vote buying grew stronger (Agbiboa, 2014).The proliferation of social media, increased monetization of politics, and the influence of wealthy individuals in politics have amplified the practice. Politicians and parties now deploy vast financial resources to purchase votes and secure electoral victories (Adebanwi, 2013). However, the historical background of vote buying in Nigeria reveals its deep-seated roots and evolution over time. From its origins in the early days of Nigerian independence to its contemporary manifestation as a widespread and sophisticated practice, vote buying has posed significant challenges to the country's democratic development.

VOTE BUYING AND ITS IMPLICATIONS ON THE QUALITY OF DEMOCRACY

Vote buying is a pervasive electoral malpractice that undermines the very foundations of democracy. This practice involves the exchange of money, goods, or favors in return for votes during elections, and it has detrimental consequences for the quality of democracy in a society. Vote buying, also known as electoral clientelism, occurs when political actors offer material incentives or services to voters in exchange for their support in an election. These incentives may include cash, food, jobs, or access to public resources. It is a widespread phenomenon in many democracies, both established and emerging, across the globe.Empirical studies have documented the prevalence of vote buying in various countries. For example, a study by Klašnja and Tucker (2018) examined the occurrence of vote buying in 23 countries and found that it was prevalent in all of them to varying degrees. This prevalence challenges the integrity and fairness of elections and consequently impacts the quality of democracy.Vote buying can significantly influence electoral outcomes. Candidates and parties that engage in vote buying often secure votes from individuals who may not necessarily support their policies or ideologies. This distorts the will of the electorate and can lead to the election of candidates who do not represent the genuine preferences of the people. Research by Wantchekon (2013) in Benin demonstrated that vote buying had a substantial impact on electoral results. His study found that individuals who received gifts from political actors were more likely to vote for them, leading to the manipulation of election outcomes. Such distortions erode the credibility of the democratic process and diminish the quality of democracy.One of the fundamental principles of democracy is political accountability. Citizens should be able to hold their elected representatives accountable for their actions and decisions. However, vote buying weakens this accountability mechanism. When politicians buy votes, they establish a patron-client relationship with voters, where the latter become dependent on the former for their material needs. A study by Stokes et al. (2013) in the context of Latin American democracies found that vote buying reduced political accountability. Voters who received gifts or benefits were less likely to criticize or challenge the actions of the politicians they supported. This lack of accountability hampers the quality of democracy by limiting the ability of citizens to scrutinize their leaders and demand transparency and accountability.

The quality of democracy is closely linked to the level of trust citizens have in democratic institutions. When vote buying becomes widespread, it erodes trust in the electoral process and democratic institutions. Citizens may perceive elections as mere transactions rather than opportunities to express their political preferences. Research conducted by Hyde (2011) in the Philippines demonstrated that the prevalence of vote buying reduced citizens' trust in the electoral process. Voters who had experienced vote buying were more likely to express doubts about the fairness and legitimacy of the elections. This erosion of trust has far-reaching implications for the overall quality of democracy.Vote buying tends to perpetuate socio-economic inequalities within society. Politicians and parties often target vulnerable and economically disadvantaged groups with material incentives in exchange for their votes. This exacerbates existing inequalities and creates a cycle of dependence on political elites. Studies by Magaloni and Kricheli (2010) in Mexico and Labonne and Chase (2011) in the Philippines have shown that vote buying disproportionately benefits the poor. This not only reinforces economic disparities but also perpetuates a system in which politicians prioritize the interests of their clients over the broader welfare of society. In this way, vote buying contributes to a decline in the quality of democracy by exacerbating inequality. Efforts to combat vote buying and improve the quality of democracy must involve a combination of legal reforms, civic education, and increased transparency. Many countries have implemented legal measures to

criminalize vote buying, but their effectiveness varies.A study by Stokes et al. (2013) suggests that civic education can be a powerful tool in reducing vote buying. Educating voters about their rights and the importance of free and fair elections can empower them to resist offers of material incentives. Additionally, improving transparency in campaign financing and monitoring election processes can help deter vote buying.However, vote buying is a pervasive electoral malpractice with profound implications for the quality of democracy. It distorts electoral outcomes, undermines political accountability, erodes trust in democratic institutions, and reinforces inequalities. Addressing vote buying requires a multi-faceted approach that includes legal reforms, civic education, and increased transparency. Only through these efforts can we hope to safeguard the integrity of elections and preserve the quality of democracy in our societies.

FACTORS CONTRIBUTING TO THE PERSISTENCE OF VOTE BUYING ON GOOD GOVERNANCE

Good governance is an essential element of a thriving democracy. It encompasses transparency, accountability, the rule of law, and the effective delivery of public services. In many countries, the quality of governance is influenced by factors such as corruption, electoral practices, and the behavior of political actors. One such practice that has gained attention in recent years is vote buying, which can have a significant impact on the overall quality of governance. Several factors contribute to the prevalence of vote buying, including poverty, weak political institutions, and the desire for short-term gains.

I. Economic Factors

*a. Poverty and Economic Vulnerability:*Research has shown that poverty plays a significant role in facilitating vote buying. Citizens living in poverty are often more susceptible to offers of financial incentives, as they may view voting as an opportunity to address their immediate economic needs. In a study by Blais and Nadeau (2014), it was found that individuals with lower incomes were more likely to accept vote-buying offers.

*b.Unequal Distribution of Wealth:*Economic inequality can exacerbate the problem of vote buying. When wealth is concentrated in the hands of a few, political candidates and parties may find it easier to target vulnerable populations with monetary incentives (Svensson, 2017).

II. Political Factors

*a.Weak Political Institutions:*Weak political institutions can create an environment conducive to vote buying. Institutions responsible for electoral oversight and regulation may lack the capacity to enforce anti-vote buying laws effectively. As a result, candidates and parties can engage in such practices with relative impunity (Treisman, 2017).

b. Electoral Systems: The type of electoral system in place can also influence the prevalence of vote buying. In some cases, proportional representation systems may reduce the need for vote buying, as parties are allocated seats based on their share of the vote. In contrast, first-past-the-post systems may incentivize vote buying, as candidates vie for a smaller number of winner-takes-all seats (Persson & Tabellini, 2015).

III. Social and cultural factors

a.Norms and Acceptance: The acceptance of vote buying as a cultural norm can perpetuate the practice. In some societies, voters may view it as a customary way to receive benefits from political candidates (Kramon&Posner, 2013).

b. Information Asymmetry: Information asymmetry, where voters lack access to accurate information about candidates and their policies, can make them more susceptible to vote buying. When voters are uninformed, they may be more inclined to accept monetary incentives without fully considering the consequences of their choices (Conover & Feldman, 1981).

IV. Electoral competition

a. Competitive Races: Highly competitive elections can lead to an increase in vote buying, as candidates seek every advantage to secure victory. In such situations, vote buying can become a strategy to gain an edge over opponents, even if it undermines good governance principles (Kitschelt& Wilkinson, 2017).

b. High Stakes: Elections with high stakes, such as presidential elections, may witness more extensive vote-buying efforts. The potential benefits of winning a high-level office can make candidates and parties more willing to engage in unethical practices (Magaloni & Kricheli, 2010).

Furthermore, vote buying is a complex phenomenon influenced by various economic, political, social, and cultural factors. Its prevalence can have profound implications for good governance, as it distorts the electoral process, weakens political institutions, and erodes trust in democratic values. To promote good governance and strengthen democracies, efforts must be made to address the root causes of vote buying and implement effective regulations and oversight mechanisms.

Vote buying and the fundamental principles of democracy

Democracy is a cornerstone of modern governance, built upon a set of fundamental principles that include free and fair elections, political representation, and the protection of individual rights. One of the most concerning challenges to these principles is the practice of vote buying, a phenomenon where individuals or groups offer material incentives to voters in exchange for their support in an election.

The Essence of Democracy: At its core, democracy represents the will of the people, where citizens have the power to elect their leaders and hold them accountable. Scholars have highlighted several fundamental principles that underpin democratic systems:

Free and Fair Elections: Elections should be open, transparent, and accessible to all eligible citizens. They must provide a genuine choice between different candidates and political parties (Schumpeter, 2012).

Political Representation: Elected officials should represent the interests and values of their constituents. Representation ensures that the government reflects the diversity of the population.

Equality and Inclusivity: Every citizen should have an equal voice in the decision-making process, regardless of their socio-economic status, gender, or ethnicity.

Protection of Rights: Democracy safeguards individual rights and liberties, preventing the tyranny of the majority and protecting minority rights (Celis&Mazur, 2012).

Vote Buying as a Threat to Democracy: Vote buying is a practice that undermines these principles, jeopardizing the very essence of democracy. It often involves the exchange of material goods, cash, or services for votes, thus distorting the will of the people. Several aspects of vote buying illustrate its threat to democratic principles:

Erosion of Free and Fair Elections: When voters are coerced or tempted with monetary incentives, the fairness and freedom of elections are compromised. Citizens may feel pressured to vote against their true preferences, reducing the authenticity of election outcomes (Stokes, 2015)

Subversion of Political Representation: Vote buying can lead to the election of representatives who do not genuinely reflect the interests and values of their

constituents. Instead, they may prioritize the interests of those who bought their votes, undermining the essence of political representation(Wantchekon, 2013).

Inequality and Exclusion: Vote buying perpetuates inequality in political participation. It can disenfranchise marginalized groups who lack the means to compete with vote-buying campaigns. This exclusion runs counter to the principles of equality and inclusivity in democracy.

Rights Violation: When voters are coerced or influenced through financial incentives, their individual rights to free expression and choice are violated. This undermines the democratic ideal of protecting individual rights (Magaloni & Kricheli, 2010).

IMPACT OF VOTE BUYING ON GOOD GOVERNANCE

One of the fundamental aspects of good governance is the integrity of elections, as they serve as a vital mechanism for citizens to express their will and hold their representatives accountable. However, the practice of vote buying, which involves offering material incentives or other inducements in exchange for votes, has become a pervasive issue in many democracies worldwide. However, below are the multifaceted impact of vote buying on good governance, drawing on both academic research and real-world examples to shed light on the detrimental consequences of this practice.

I. Erosion of Democratic Values

Vote buying undermines the very essence of democracy by eroding core democratic values. In a democratic system, the principle of equal representation is paramount, and each citizen's vote should carry equal weight. However, when vote buying is prevalent, it skews the electoral process in favor of those with resources, allowing them to exert disproportionate influence over political outcomes. This compromises the fairness and legitimacy of elections, undermining public trust in the democratic system (Larcinese et al., 2019).

II. Weakening of Accountability

One of the primary functions of elections in a democracy is to hold elected officials accountable for their actions. Vote buying disrupts this accountability mechanism by enabling politicians to secure reelection without delivering on their promises or fulfilling their obligations to the electorate. This weakens the incentive for elected representatives to govern in the best interests of the people and hampers the ability of citizens to replace ineffective or corrupt officials (Stokes et al., 2013).

III. Impacts on public policy

The prevalence of vote buying can also have detrimental effects on public policy. When politicians prioritize winning elections through the distribution of material incentives, they may be less inclined to pursue policies that are in the long-term interest of the public. Instead, they may focus on short-term measures aimed at appeasing specific voter groups, which can lead to suboptimal decision-making and hinder the implementation of much-needed reforms (Wantchekon, 2013).

IV. Weakening of Institutions

Vote buying can undermine the strength and independence of democratic institutions. When politicians engage in this practice, they may exert undue pressure on election commissions, the judiciary, or law enforcement agencies to turn a blind eye or even facilitate their activities. This interference erodes the checks and balances that are essential for the proper functioning of a democratic system and can lead to the consolidation of power in the hands of a few (Khemani, 2014).

V. Perpetuating Inequality

Vote buying exacerbates socioeconomic inequalities within society. It allows affluent individuals and interest groups to influence political outcomes in their favor, while marginalized and disadvantaged groups have less influence. This perpetuates inequality by entrenching the power and privilege of the wealthy and further marginalizing vulnerable populations (Khan, 2017).

VI. Political Violence

In some cases, vote buying can lead to political violence. When multiple groups or individuals attempt to buy votes to secure their preferred candidates' victory, it can lead to tensions and confrontations, potentially escalating into violence. This not only threatens the stability of the political system but also endangers the lives and well-being of citizens (Simpser, 2013).

VII. Impact on Development

The impact of vote buying extends beyond the realm of politics; it can also impede economic and social development. By distorting the allocation of resources and hampering effective governance, it undermines the conditions necessary for sustainable development. This, in turn, can hinder poverty reduction efforts and economic growth (Mvukiyehe, 2017).

VIII. International Perception

The prevalence of vote buying can also affect a country's international reputation. Nations that fail to uphold democratic principles and allow widespread vote buying may face diplomatic repercussions, including sanctions or reduced international support. This can harm a country's standing in the global community and impede its ability to engage in international partnerships (Lebas and Schiemer, 2019).

However, addressing the impact of vote buying on good governance requires a multifaceted approach. Strengthening electoral oversight and integrity mechanisms, enforcing anti-corruption laws, and raising awareness about the consequences of vote buying are essential steps (Treisman, 2017).The impact of vote buying on good governance is far-reaching and detrimental. It undermines democratic values, weakens accountability, distorts public policy, erodes institutions, perpetuates inequality, and can even lead to violence. Recognizing the corrosive effects of vote buying is crucial for safeguarding the integrity of elections and upholding the principles of good governance in any democracy.

Legal and ethical frameworks to address vote buying for good governance

The practice of vote buying, wherein candidates or political actors offer material incentives to voters in exchange for their support in elections, poses a significant threat to the integrity of democratic processes. To combat this issue, various legal and ethical frameworks have been implemented in democracies worldwide.

A. Legal Frameworks

*I. **Anti-Vote Buying Legislation:*** Legal frameworks to combat vote buying typically involve the enactment of anti-vote buying laws. These laws criminalize the act of offering, accepting, or soliciting any form of compensation in exchange for a vote. For instance, the United States has the Federal Corrupt Practices Act, which makes it illegal to pay or offer to pay for votes. These laws are designed to act as a deterrent and to punish those who engage in vote buying (Besley&Reynal-Querol, 2014). However, countries around the world have enacted laws to criminalize vote buying. These laws vary in scope and severity, but they generally prohibit the solicitation, offer, or acceptance of bribes in exchange for votes.

*ii. **Independent Election Commissions:*** Many countries have established independent election commissions responsible for overseeing and regulating elections. These commissions play a crucial role in ensuring fair and transparent electoral processes by enforcing rules against vote

buying, monitoring campaign financing, and promoting ethical conduct among candidates and political parties (Norris, 2015).

iii. International Conventions: Several international conventions address vote buying indirectly by promoting democratic principles and human rights. The United Nations Universal Declaration of Human Rights, the International Covenant on Civil and Political Rights, and the Inter-American Convention against Corruption all emphasize the importance of free and fair elections.

iv. Codes of Conduct: Political parties often develop and adhere to codes of conduct that outline ethical guidelines for their candidates and members. These codes typically prohibit vote buying and other unethical practices, emphasizing the importance of conducting campaigns that are based on principles of fairness, honesty, and transparency (Karp& Banducci, 2010).

B. Ethical Frameworks

I.Civil Society Initiatives: Civil society organizations, such as election monitoring groups and advocacy organizations, play a crucial role in promoting ethical behaviour during elections. These organizations monitor campaign activities, raise awareness, advocates for electoral integrity, educate voters on their rights, and report instances of vote buying to the relevant authorities (Birch, 2016).Non-governmental organizations (NGOs), such as Transparency International, have launched campaigns to educate voters about the negative consequences of vote buying and to encourage ethical voting.

ii. Transparency and Accountability: One crucial ethical framework to address vote buying revolves around transparency and accountability. Ensuring transparency in electoral financing is essential for maintaining the integrity of the electoral process. Scholars like Pessi and Suominen (2016) have emphasized the importance of disclosing campaign contributions and expenditures. Transparent reporting mechanisms can help identify instances of vote buying and enable appropriate legal action.

iii. Strengthening Electoral Institutions: Effective electoral institutions play a pivotal role in ensuring the fairness and integrity of elections. Scholars such as Norris (2014) have argued that strong electoral commissions, free from political interference, are essential for maintaining the ethical conduct of elections. Empowering these institutions can help prevent vote buying and promote good governance.

*iv. Social Norms and Values:*Changing social norms and values is an essential ethical framework in addressing vote buying. Researchers like Banerjee and Duflo (2019) have explored the role of cultural factors in vote buying. Encouraging ethical behavior through community engagement and dialogue can lead to long-term changes in voting practices.

C. Effectiveness of legal and ethical frameworks

Legal frameworks serve as the foundation for addressing vote buying. Countries employ various legislative measures to deter and penalize this practice. Research by Hyde and Marinov (2012) suggests that stronger legal sanctions can be effective in reducing vote buying. For instance, countries that impose harsher penalties for vote buying, such as disqualification of candidates or imprisonment, tend to witness a decline in this unethical practice. The threat of severe consequences acts as a deterrent for both buyers and sellers of votes.Moreover, electoral laws that regulate campaign financing and expenditure play a crucial role in curbing vote buying. A study by Brierley (2019) highlights the importance of transparency in campaign financing. When candidates are required to disclose their sources of funding and expenditures, it becomes harder to engage in covert vote buying schemes.

Strict enforcement of campaign finance regulations can enhance the effectiveness of legal frameworks in preventing vote buying.

In addition to legal measures, ethical frameworks also play a significant role in addressing vote buying. Elections should not only be about compliance with laws but also reflect the highest ethical standards. Political parties, candidates, and civil society organizations must collectively promote ethical behavior during elections. A study by Schaffer and Earl (2019) emphasizes the importance of civic education and awareness campaigns in promoting ethical voting. When voters are educated about their rights and the harmful consequences of vote buying, they are more likely to resist the temptation of accepting bribes. Ethical frameworks can include codes of conduct for candidates and political parties, as well as public pledges to uphold the principles of fair elections. International organizations like the United Nations and the Organization for Security and Co-operation in Europe (OSCE) have been instrumental in promoting legal and ethical frameworks to combat vote buying. These organizations provide technical assistance and monitor elections to ensure compliance with international standards. Research by Norris (2014) demonstrates that international election observation missions can have a positive impact on reducing vote buying. When countries invite international observers to monitor their elections, it signals a commitment to transparency and fairness. The presence of international observers can deter vote buying and provide recommendations for improving electoral processes.

However, addressing the issue of vote buying requires a multifaceted approach that combines legal and ethical frameworks. While anti-vote buying legislation and independent election commissions serve as essential legal safeguards, codes of conduct and civil society initiatives promote ethical conduct and public awareness. However, the effectiveness of these frameworks varies depending on the commitment of political actors and the enforcement capacity of institutions. Continued research and international collaboration are crucial in the ongoing effort to combat vote buying and safeguard the integrity of democratic elections.

CONCLUSION

Good governance is essential for the stability and prosperity of any nation, and one of its cornerstones is free and fair elections. However, the scourge of vote buying poses a significant threat to the integrity of electoral processes worldwide. It is a complex phenomenon influenced by various economic, political, social, and cultural factors. Its prevalence can have profound implications for good governance, as it distorts the electoral process, weakens political institutions, and erodes trust in democratic values.

Democracy is a cornerstone of modern governance, built upon a set of fundamental principles that include free and fair elections, political representation, and the protection of individual rights. One of the most concerning challenges to these principles is the practice of vote buying, a phenomenon where individuals or groups offer material incentives to voters in exchange for their support in an election. Addressing the issue of vote buying requires a multifaceted approach that combines legal and ethical frameworks. While anti-vote buying legislation and independent election commissions serve as essential legal safeguards, codes of conduct and civil society initiatives promote ethical conduct and public awareness. However, the impact of vote buying on good governance is far-reaching and detrimental. It undermines democratic values, weakens accountability, distorts public policy, erodes institutions, perpetuates inequality, and can even lead to violence. Recognizing the corrosive effects of vote buying is crucial for safeguarding the integrity of

elections and upholding the principles of good governance in any democracy.

RECOMMENDATIONS

In view of the dangers vote buying poses to democracy, the following recommendations are proffered:

1. The Independent National Electoral Commission (INEC) and the Economic and Financial Crimes Commission (EFCC) should develop a strategic collaborative framework for effective monitoring of political parties' campaign funds in order to effectively curb electoral fraud, including vote buying.
2. To enhance the secrecy of the ballot, the INEC should construct a collapsible voting cubicle that will make it difficult for party agents to see a voter thumbprint on the ballot paper. Actions that reveal the vote cast by voters should be criminalized.
3. Civil society groups should advocate and apply pressure for police and other law enforcement agencies to arrest, investigate and diligently prosecute those involved in the act of vote trading.
4. The National Assembly should fast-track deliberation and passage of the Bill establishing the National Electoral Offences Commission (NEOC) ahead of the 2019 general election. The NEOC, when established, should be well resourced to perform its statutory functions of arresting, investigating and prosecuting electoral offenders.
5. The Electoral Act should be amended to: empower citizens to effectively deploy social media tools in facilitating exposure of electoral fraud like vote buying, and prohibit the photographing of ballot papers by a voter or any person.
6. Media and civil society organizations need to intensify voter education and enlightenment campaigns on the negative implications of vote trading– particularly on how it raises the costs of elections, promotes political corruption and undermines good governance.

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IMPLEMENTATION OF GSM BASED GAS LEAKAGE DETECTOR

[1.] Anso, Sylvester Bassey, [2.] Udoh, Godwin Joseph, [3.] Emah, Ukeme Uduak

[1] Department of Computer Engineering Technology, Akwa Ibom State [2] Department of Computer Engineering Technology, Akwa Ibom State Polytechnic, Ikot Osurua.

Polytechnic, Ikot Osurua. [3] Department of Electrical/Electronic Engineering Akwa Ibom State Polytechnic

[1.] anso4real@gmail.com [2.] Kells54x@gmail.com [3.] askuduak@gmail.com

ABSTRACT

In recent years, the rate of death due explosion of Liquified Petroleum Gas has dramatically increased in Nigeria. In this paper, a method is proposed to implement a security system for detecting leakage of gas. This system detects and monitors the leakage of Liquid petroleum gas (LPG) using MQ-3 gas sensors to send signal to the microcontroller for the microcontroller to alerts the person about a gas leakage using a buzzer and by sending SMS to the specified mobile number with SIM900A GSM Module. Gas is supplied in pressurized steel cylinders. As this gas is heavier than air, when it leaks from the cylinder it flows along the floor and tends to settle in low spots such as basement to cause fire or suffocation if not dealt with. To handle gas leakages incident, this paper presents Implementation of GSM Based Gas Leakage detector. A system which consists of microcontroller, regulated power supply using 8705IC, SMS alert circuit and an MQ-3 gas sensor. The MQ-3 gas sensor has a high sensitivity to propane, butane, isobutene, natural gas and can also be used to detect smokes, combustible gases, especially methane. A GSM module (SIM900A) is used to quickly sent SMS alert while a 9v battery powers the system.

Keyword: *Liquified petroleum gas (LPG), Microcontroller ATmega 238 P, Gas sensor MQ-3*

1.0. INTRODUCTION

Gas detection system is used for the control of hazardous liquefied petroleum gas and other gases in an environment. People have worked in hazardous environment before the development of Gas detection system. The open flame light sources of pre-historic cave painters were sources of potentially deadly carbon monoxide and consumers of life-giving oxygen and in a poorly ventilated area could have eventually proved fatal. (Akshay D. Prabhu & Ashwin D. Pathak, 2017) Often the potential toxicity of the environment was only poorly recognized, if it was recognized at all. Fatalities and injuries were accepted as a risk of doing the job, or the tasks were given to unwilling workers under armed guard. Some of the first attempts to detect toxic atmospheres came in coal mines. Coal mines are notorious sources of combustible and toxic gases as well as low oxygen levels. Open flame lamps served as some of the first detection systems. A low oxygen environment would cause the flame to burn low, or become extinguished. An atmosphere rich in combustible gases would cause the flame to burn more brightly. However, too much combustible gas resulted in the very explosion that was trying to be avoided. A later improvement on this method was the flame lamp, which contained the flame inside a glass barrel and allowed the hot gases to escape through a flame arresting wire

mesh. Graduating marks were placed on the glass to allow a rough calculation of the presence of combustible gas or the absence of oxygen. While this method greatly improved the intrinsic safety of this detection method, a dropped lamp could still prove fatal in the wrong environment. Another attempt at an intrinsically safe detection method was also used in coal mining applications into the twentieth century. This was the use of small caged birds to detect toxic environments (the proverbial 'canary in a coal mine'). The concept was that these birds would exhibit the effects of the toxic environment before they became injurious to humans. As you can imagine, a healthy bird at the beginning of the work period was a vital requirement. While effective in certain applications, these birds were not capable of detecting all hazardous conditions.

Theoretical Framework:

Gas leakage is one of the major problems facing industrial sectors and some residents in Nigeria, through use of gas functioning vehicles such as Compressed Natural Gas (CNG) buses, cars etc and one of the method in controlling incidents associated with this menace is to installed a gas leakage detector device in the vulnerable place where gas is always in used on a daily basis. The GSM based Gas Leakage detectors, detect leaked Liquified Natural Gas using a MQ-3 gas sensor with SIM900a GMS module to send SMS alert to the person about a gas leakage. When the concentration of LNG on air exceeds a certain level, the sensor senses the leak gas and the output of the sensor goes LOW for the detection to be done by the gas through the microcontroller interfaced with the gas sensor and GSM module.

Objectives:

The implementation of GSM Based Gas Leakage Detection is importance in our society due to the increase numbers of gas leakages and explosion on a daily basis in the fire prone areas or localized region such as kitchen, buildings, power plant site, gas station, mining industries etc to detect Gas Leakage using MQ-3 gas sensor. The SMS alert circuit is setup by using GSM Module (SIM900A) which sends an alert message to a specified number. Once the gas leakage is detected, a sound alarm is produced to drawn attention for intervention and controlled. In case of fire explosion, the fire service team can response immediate after getting an SMS alert. The user can remotely determine the status of the system by sending codes to prompt the device via SMS. The gas leakage detector system is dynamic and can be installed in kitchen, rooms and offices. This system also has dual functionality as smoke detection with the MQ-3 gas sensor used for the implementation, ATMega 238P controller and GSM Module (SIM900A).

2.0 RELATED WORK:

In the previous paper for household gas leak detection devices using the ATMEGA 8 microcontroller, the

sensor works if the gas level is 2000 ppm, the buzzer as an alarm will sound indicating a gas leak occurred, and the LCD will display a written warning of gas leak (Evalina & A Azis, 2020). Development of a wireless leak detection system using various sensors and microcontrollers that make the system Portable and nondestructive techniques. In this system parameters such as Humadity, temperature, pressure, sound detection around gas leaks are detected using sensors and microcontrollers (Adsul et al., 2017) A new approach in the detection of LPG under ambient conditions, temperature and humidity that is kept constant during performance, integrated sensor fabrication is used to test different concentrations (in ppm) of LPG (Vasantakumaar et al., 2018). Design and application of SMS-based industry / home gas leak monitoring & detection system, this system is designed and implemented using MQ-9 gas sensors and microcontrollers verifying gas leakage, warning of gas leakage sent via SMS to homeowners (Ghosh, 2019), This research very important to overcome the negative impact of the occurrence of gas leaks in the home.

MATERIALS & METHODS

3.0 DESIGN METHOD:

Rapid Application Development (RAD) methodology was for implementation of this paper. The RAD methodology consists of planning/analysis, prototype cycle (design, interfacing and testing), implementation and maintenance. Top down design approach was adopted for the implemented design. The Microcontroller Arduino UNO modules, MQ-3 Sensor device, Liquid Crystal Display, LEDs, Regulated Power supply unit using 8705 IC, Resistors, Capacitors was made available first before the Arduino IDE software was installed in a system with window 8.1 operating system for verification and authentication of the design. The programing code for controlling the gas detector system was written in C language and compiled with Arduino IDE software using PC while Proteus 8.1 version was used in designing and simulating of the circuit diagram. The design work was implemented on breadboard successfully and the system was powered with regulated 9.v battery. In the proposed GSM Based Gas Leakage detector system, the applications contain both the monitoring and detection of gases which are very harmful in the surrounding. In the detection of the gas, the sensor which is used to sense many gases is MQ-3 sensor. After the detection of leakage in the gas, the sensor sends the signal to the Arduino UNO for further process where other hardware components are connected to each other through Arduino UNO board, it send the signal to the LCD display for displaying the alert message showing “Gas Exceed, SMS sent”, accordingly, the buzzer sound on continuously so that people in the surrounding will the alerted. The authenticated design was later implemented, tested and packaged.

HARDWARE DESIGN AND INTERFACING

The major modules/subunits required for the operation of the Gas Leakage Detector using GSM module are shown on the Proteus Simulated Circuit diagram in Fig. 3.1. The complete system is designed using Proteus and IDE Arduino software package before implement as shown in Figure 3.1 depicts the prototype design of the proposed gas leakage detector system which consists of a MQ-3 gas sensor, a standalone microcontroller ATmega 328, buzzers, LEDs, and accessory circuitry for sensor sensitivity adjustment. The proposed system can work with power drawn from a USB connector or regulated 9volt battery. It can also operate based on a constant DC power source. During testing, a lighter was used to replicate the LPG gas source. It was held open at a long distance to mimic low level gas concentration and was gradually brought closer to the sensor to mimic high level gas concentration. The proposed system exhibited an excellent performance with regard to detecting the gas leakage during practical testing. The System performs dual functions which are detecting of smoke and gas when necessary. The simulated circuit test showing a smoke level test scenario.

TESTING

This describes the tests carried out on each unit of the GSM based Gas Leakage System and their results. Various tests were performed on this research in the following order:

- Controller Unit
- Display Unit
- Power Supply Unit testing
- Alarm testing
- System testing
- Performance test for displaying of information as shown in Fig: 3.4.

CONTROLLER UNIT TESTING

The **ATmega328P** was tested by adjusting a meter to their different resistance part. The probes of the meter were placed end to end of each connector pin to be tested with the display Unit. The reading shown by the meter was cross checked with malfunction modules board / value of the component. If the pin fails to read on the meter or no light indication is made by system when a supply of 5v is sent to the pin, it can be said that the Microcontroller is bad.

PRINCIPLE OF OPERATIONS:

The GSM Based gas leakage detector system that has MQ-3 gas sensor connected to Atmega328p microcontroller Arduino board with LCD display (16 x 2) interfaced to the Arduino board to display the gas scanning level. If the gas level increases above the required programed level. The system shows 'Gas Level

Exceed and automatically sent SMS to a registered GSM mobile number. When the system is been power on. The MQ-3 gas sensor senses the surrounding to check the level of concentrated gas in the air and communicate with Atmega328p microcontroller, on receiving signal from the MQ-3 sensor on gas leakage, it triggers the GSM module receiver to sends an alert message to a mobile number registered with the Atmega328p microcontroller. We use C programming Language and Arduino software to define pin Mode for the system to transmit and receive signal from the Arduino Board to create communication between LCD display, MQ-3 gas sensors and GSM Module. The LCD display shows the gas is leaking while GSM Module automatically send SMS alert to the registered mobile number on the system.

SYSTEM PERFORMANCE / TESTING

The system cannot perform any task successfully without the software on PC. Since the prototype was simulated with Proteus. The code was written, complied and run on the prototype for validation using Proteus Professional 8.13. The burning process to ATmega 328 micro controller was done with Arduino IDB. The software was installed on win 8.1v. The ATmega 328 microcontroller Arduino board was selected from tool menu before connecting USB cable with Port 11 selected. To ensure serial communication, we used the software serial monitor to send message and get respond from the display before burning the code to the ATmega 328 microcontroller. The software runs A Sketch in Arduino IDE using the following steps

1. Open the Arduino IDE software.
2. Click File > Examples > Basics > Blink.
3. Click upload. Then observe your sketch blink the onboard LED. Note: you can add a through hole LED to pin13 and ground on the Arduino UNO.
4. Update the Arduino UNO code. Then upload the sketch, and watch the LED change.

The Arduino board gets the code from the computer and displayed it as a message on the display unit before a lighter was used to test the system which read the gas level present on the air.

4.0 RESULTS & DISCUSSION

Testing was carried out by releasing LPG into the atmosphere around the sensor by constantly pressing lighter to dispense gas on the air close to the gas sensor. The gas detector and response unit sense concentrated gas on the aired and automatically sent SMS to the user. The results of test carried out on the device at different times and days for concentration of gas in the air around the sensor. The device was tested placing the LPG device at different distances from the gas source. It was observed that when the LPG device was test by placing it at different distances from the gas source, the response time of the LPG system decreased as the distance from

the gas source increased. Also, it was observed that the sensitivity of the gas sensor was very high in clean air closer to the sensor. The gas sensor sensitivity varied with temperature while the reference voltage remained constant over time. At constant gas concentration, the sensed voltage will always be constant. The gas sensor has a very fast response to gas since the time difference between test results with same concentration is very small while the difference between the sensed voltages is very high.

5.0 SUMMARY:

The GMS based Gas Leakage detector with SMS alert was successfully implemented. The Detector System is device that can detects the presence of gases in an area, often as part of a safety system. It detects gas leakage and alert with SMS notification. When leakage occur, it will be sent SMS to the user about leakage either at home, offices or workplaces. This is a low-cost, low power, lightweight, portable, safe, user friendly, and simple system device for detecting gas. GSM based Gas leakage detection will not only provide us with significance in the healthy environment against any gaseous leakage pollution but will also lead to raising in our economy, because when gas leaks is not only contaminates the atmosphere but also wastage of gases will hurt our economy. The need for ensuring gas leakage safety in workplaces, homes, and offices is expected to be the key driving force for the market in the coming years through the use this research.

CHALLENGES

The implementation of the gas leakage detection came some challenges which was later resolved after several effort in ensuring a successfully research work. The major challenge encounter was selection of a right gas sensor that can detected both smoke and gas at the same time in case of fire outbreak incident before gas leakage or explosion. The challenge was resolve by replacing the sensor with MQ-3 against MQ-5 that was initial order for the research. Another challenge encounter during the course of the research was programming of the ATMega328 microcontroller. When running the code to be upload on the ATmega328. A library update was mistakenly installed on the Arduino IDE software which override some code and affect successfully uploading of the program. To resolve the problem; a lot of time was spent in debugged the error, verify which update was installed and uninstalled the updated file before the code was run successfully.

CONCLUSION:

A gas detector system was implemented using SIM900A GSM module. After testing the implemented system to detect the leakage of LPG gas using an MQ-3 gas sensor. The system detects gas leaks on the LCD screen and sent SMS to registered mobile number on the system. This MQ-3 sensor test is done by measuring the sensor output with the ATmega238 microcontroller when the LPG gas leakage is detected and the gas level is

540 ppm, it will be automatically written on the LCD screen and the buzzer will sound with SMS alert sent to a mobile. However, when the gas levels are reduced to less than 230 ppm, it will automatically disappear on the LCD and the buzzer will stop with SMS not sent. This test was conducted to determine the functionality of the MQ-3 sensor and GSM module. It is important to protect our environment with GSM Based gas leakage detector against explosion of gases and gas related accident. A system that can detect smoke and gas leakages simultaneously and SMS alert was successfully implemented. It was observed that when the LPG device was tested by placing it at different distances from the gas source, the response time of the LPG system decreased as the distance from the gas source increased and vice versa. The gas sensor's sensitivity varied with temperature while the reference voltage remained constant over time. This device can be deployed anywhere such as gas station, cooking place with gas or gas plant. This system will ensure that incident resulting from leakages of cooking gas or explosion from the cylinders are averted through quick response when even there is leakages.

RECOMMENDATION

To avoid gas leakage the research work is recommend for used as a security system that can create awareness for people to stay safe at home when there are dangerous blast accidents or a sign of explosion to occur in any giving time to prevent the accident. This paper is recommended at home, in a car, gas storage tank environment or in a service station for used in case of gas leakage.

* The implementation of this research is important in every home, offices and industries because there are many gases that can be harmful to organic life, such as humans or animals. This research helps people to upgrade their safety standards, comply statutory even though it has small sensitivity to detect alcohol, it can be used as liquor tester.

* The research has excellent sensitivity combined with a quick response time. It provides along lasting safety means for detecting the leakage of gas into the area of an appliance when the appliance is in a shutdown condition or not in operation.

* It provides a novel gas detection and monitoring system which is economical to manufacture and which may be readily installed in conventional trailers, boats or the like which are normally dependent upon a stored supply of pressurized gas.

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INTEGRATING SOCIAL PLANNING IN THE DEVELOPMENT PROCESS IN NIGERIA.

OKEKE Victor U. (RTP)

(Lecturer 3) 08038008276/08170491501

vokeke39@gmail.com

School of Environmental Design and Technology (SEDT),

Imo State Polytechnic – Omuma (Orlu Campus),Imo state-Nigeria.

KANU Kingsley Uchenna (RTP)

08061219684

Kanukingsleysly@gmail.com

Faculty of Environmental Science,

Nasarawa State University, Keffi-Nigeria.

ABSTRACT

Development planning in most developing countries is yet to achieve the goals of creating livable communities from a social perspective. This studytried to understand why this persists by analyzing the influence social planning has in the development agenda of planning agencies as opposed to physical planning in Nigeria using Imo state as a case study.Using PerloffModel of analyzing social planning practice, information from structured questionnairewasadministered on six heads of town planning agencies (two each from the three senatorial zones)serving as the primary source for data collection. The head of each agency have fifteen or more years of practical experience. This work used a simple percentage rating systemto test responses and the analysis revealed that the influence of social planningon development is 21.2% as against 78.8% of physical planning. This shows social planning has a very small influence in development planning cycleof the state. This work calls for continuous engagement with local communities to ascertain their priorities so that planners do not concentrate too much on physical planning and more importantly each plans should be filteredthrough the lens of social objectives before adopted forimplementation to deepen social outcomes in communities.

***Keywords**: Environmental Determinism, Social Planning.*

INTRODUCTION

Development is an important pursuit for man's existence that is why most progressive societies cherish the thought of attaining it. However experience has shown through policy documents and statements that many countries especially developing ones emphasize more on physical and economic planning for development. This has not translated into the much needed development, even as more resources are being devoted to infrastructural improvement yet many citizens are impoverished and are facing social exclusion from main stream society with poverty and ignorance rife. In as much as physical infrastructure and economic planning are important in developing a country, social improvement of individuals and communities are also essential in driving overall development which enables citizens to be able to participate meaningfully within their communities.

Many development practitioners have continued to emphasize the importance of physical planning as opposed to other aspects of planning, this stems from the traditional approach of physical planning in solving urban and rural socio-economic problems. This philosophy is partly drivenby modernist approach to development that emphasizes physical environmental determinism. This thought originated from fallout of the industrial age in Europe where rapid industrialization in Europe led to overcrowding, squalor, poverty, slum generation and disease prevalence. It is imperative to note that this method played an important role in providing sanity to the dilapidated nature of most city life during that era.

This method of planning for development also was the norm during post Second World War reconstruction which was so popular that it was copied by many emerging economies which saw wholesale development of new towns and slum clearance as a preferable approach to development. Unfortunately there seems to be a gap in development as many cities and rural areas in many countries have continued to face serious underdevelopment even when enormous amount of resources have been expended on the mode of development approach. This is so because physical environmental planning and development does not necessarily transcends to overall human development.

The study however takes a critical look at the role social planning plays in development planning using Imo state of Nigeria as a baseline study as well as analyzing ways of deepening the process to achieve greater benefits. It starts by understanding the concept of physical environmental determinism, planning as well as social planning and its importance in driving development goals.

ENVIRONMENTAL DETERMINISM

A concept intended to lay the groundwork for this work is environmental determinism and its importance in urban planning. Environmental determinism or physical environmental determinism as the case may be is an ideological thought that frames its understanding as being able to use an entity's surroundings to explain that entity's behaviour and level of development. It argues that individuals or communities are bound or liberated by their physical environment. Physical environmental determinism is the doctrine that human growth, development, and activities are controlled by the physical environment (Lethwaite, 1966). In buttressing the importance of the relationship between the physical environment and man's behaviour, Huntington (1975) emphasized that physical environment has had effects on the rate and level of development of various civilization.

Fedaku (2014) observed that physical environmental determinism was adopted by social scientists to understand and describe the effects of environment on human behaviour. It advocates that every society is formed and determined by its physical environment. That is everything in the physical environment of an individual (man-made or natural) can act as a resource or a barrier in the development of that individual. This goes to show that man's physical environment at some point influences his/her survival and well-being.

Physical environmental determinism envisages that the physical modification of the environment enhances the livelihood of man as evident by the role played by physical planners during the Industrial Revolution in Europe. Dueto mass migration into

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London living standards amongst many urban populations deteriorated rapidly due to poor planning while unsanitary living conditions became prevalent. This situation exacerbated the spread of diseases in large conurbations that located around factories and work places.

Cities though have long existed, the industrial city however presented a situation that affected the health, livelihoods and wellbeing of residents at an unprecedented level. Observing this the sociologist Friedrich Engel was able to document the debasing conditions of unplanned urbanization and industrialization on the working class of mid-19th century England, claiming that living spaces were so deteriorated they were largely "fit only for the accommodation of cattle" (Henderson, 1976: 318).

The modification carried out however depends on a society's perception of what and where it wants to be, the natural and climatic hindrances posed by the natural environment, its level of technological ingenuity, socio-cultural inclinations, societal advancement and its economic status as well as ability to live in peace with her neighbours. With this in my mind development cannot be wholly dependent on just the physical modification of the environment.

The assumption of the intrinsic relationship between man and his environment continues today within the urban planning profession in many countries. Modernists approach to development believed that changing the environmental landscape should be the preferred means of improving the lives of citizens especially for people in rundown settlements. This led to development of new towns and large scale slum clearance especially during the early part of the 20th century. This modernists approach has continued even when many new towns are being rundown within a short periods with their attendant social and economic shortcomings. From this Andrews (2003) sees the modification of the environment from the basis of active urban spaces which allows various types of activities in an area; these directly affect how people live their lives helping in modifying it at various levels.

The modernist mode of planning involving large sale demolition of rundown settlements and reconstruction under the direction of planning officials isolated many communities has been largely criticized. Jane Jacobs's critique of this practice was prominent in her book *The Death and Life of Great American Cities (1961)*. The lack of social planning inputs as criticized by Jacobs was due to large-scale clearance operations which destroyed the complex social fabric of cities and imposing an inhuman orderliness. Jacobs was not alone in her criticism. Beginning in the 1960s, urban social movements intensified calling for more social planning to be added to the physical planning approaches.

In as much as physical determinism dominated the planning approaches in the early part of the twentieth century, the era of enlightenment that swept through intellectual discourse was able to argue against physically altering the environment albeit through large scale physical development devoid of social and human development to bring a change in human perception and behaviour. This it did by arguing against the fact that the performance of a place can be measured solely by reference to its spatial form. Therefore critics believed that the quality of a place to bring about fulfilment does not solely rely on physical development but due to the joint effects of the place and the people who occupy it. This is very important for researchers who see social groups' behaviour as being reflected in urban spatial morphology.

More criticisms of physical determinism was presented by other urban researchers and scientists. One of whom was Gans whose publication in 1963, *"Social and Physical Planning for the Elimination of Urban Poverty",* called for a new approach in developing spatial entities. He advocated greater

emphasis on the social as well as the economic improvement of community life which is expected to provide greater opportunities for greater number of urban residents especially the poor and disadvantaged. This Gans referred to as *human renewal; community development;* or better still *social planning.* This was intended to help in changing the poverty mentality of those caught up in the poverty trap.

Other advocates argued for a shift in the direction of planning during this era. Most of these advocates emphasized on the importance of factors that necessitated development as opposed to development solely on physical modification of urban spaces. David Harvey who in his publication in 1973 "*Social Justice and the City",* advocated for a paradigm shift in development planning. The shift for him was for a sociological conception of space to replace the over reliance of geographical and morphological dependence of the development process. More scientist continued to push for different aspects of planning that dealt directly withimproving livelihoods and chances of people to live a better life which is the essence of social planning.

SOCIAL PLANNING

Mankind has always been confronted with limited resources leading to the problems of resource utilization in a rational way from which maximum benefits can be achieved in light of resource limitations. Therefore planning helps in managing these scare resources for the benefit of majority of mankind. Accordingly, planning emanates from scarce resources in comparison to the demand for same.

Consider this saying, "if you don't know where you are going, you would think all roads will get you there", puts planning in clearer perspective. This saying gives an insight into the importance of planning and how it can help in benefiting humans. Ogolo ((2019) assert that planning should be seen as opportunities and threats in the future and respectively exploit the opportunities and combat the threats as the case may be; for the purpose of achieving a desired end or goal.

Planningis a ubiquitous context that is applied in a formal as well as an informal sense. It is regarded as a simple and a complex action. It is simple in the fact it can be done by anybody like planning on when to travel or what to cook etc. It can also be seen in terms of complex arrangement involving planning for a city, national governments and international goals with complex inputs and analyzing combinations of variables to project future events involving billions of dollars which affects the lives of billions of people across different continents. Planning entails the activities that lead to the definition of objectives and to the determination of appropriate courses of action to achieve those objectives, (Ivancevich et al. 1994).It ispertinent to note that planning is as old as mankind and has been undertaken in many facets of human endeavour, including family, warfare, politics, administration and the social spheres (Ejumudo 2008).

As a development strategy it is the allocation and efficient utilization of resources (human and material) to improve the standard of living of the citizens. It therefore goes that planning entails the prioritization of resources in order to meet desired ends (Chukwu, 2020).Planning involves actions to be taken futuristically for the purpose of achieving organizational goals as well as thinking ahead by initiating and taking predetermined courses of actions and deciding in advance what should be done, how, when and by whom (Mohammed, 2020). Mohammed further stated that planning is among the most critical aspects of all managerial functions, while being an intellectually demanding process that requires that we consciously determine courses of

action and base those decisions which bridges the gap between where we are and where we want to be. Ogolo (2019) also see planning from a management perspective as a process by which managers analyze present conditions to determine ways of reaching a desired future state.

On its path social planning is deemed as an activity that is uniquely concern for social issues as well as being one that uses the ideals of planning to the direction of social reality (Prior, 2007). This it does by bringing to the forefront of planning issues of social concerns, social development, social transformation, social interests, social patterns, social networks and social policy. Social planning is not limited to a particular field even though its intended outcomes is socially inclined, its main aim however covers the reorganization of society for the overall development of society through economic, physical, technological, environmental approaches that is intended to guide society to achieving overall development.

In pursuit of human development, economic wellbeing is part of the benefit of that development process. However there is tendency to pursue capitalist goals as it helps in speeding profit that is re-invested for industry and employment for economic prosperity. History teaches that capitalism proffers efficient use of resources for profit and reduction of waste for economic growth and development, if pursued with such philosophy in mind it is likely to negatively affect some members of society that are not socially or economically adjusted to the economic realities of the period and if left without any intervention will live an unfulfilling if not brutal existence. Therefore social planning can be seen from an interventionist perspective as noted by Ferge (1979: 50) who describes it as a "palliative or corrective instrument for the machinations of capitalism".

Social planning as a discipline tries to create a better society for all as Prior and Partridge (2010) explains that in achieving positive social outcomes society can achieve a better level of community well-being. It is a process of providing development benefits from a human angle to an otherwise inanimate activity (planning) which is often pursued purely for infrastructural and economic objectives. This is reflected from the responses gathered by Prior and Partridge in 2010 from interviews collated from social planning professionals in Sydney Australia where they concluded that social planning provides the sort of planning that can be referred to as *soft planning* as opposed to infrastructural and economic planning.

The WHO Healthy Cities Projects, after 10 years of experience in planning and community action was able to develop a strong understanding that suggests that the prime determinants of health status are social and economic conditions (Wilkinson & Marmot, 1998). Therefore any development policy or strategy that tends to rely solely on physical modification as the only panacea for national development will not achieve total development of citizens. It is therefore pertinent that an integrated approach to planning should be applied. This study is not intended to overemphasize the importance of social planning. It is important however to note that its importance to society is extremely critical because if well implemented it has the tendency to help improve upon man's "*life of being*" regarding his "*lived experiences*" with the hope of helping to fully understand his natural and man-made environment for sustaining growth and development in the present as well as in the future.

The study helps to provide a working definition of social planning which it deems all encompassing. This it does by combining various aspects of development planning. Social planning is therefore a positive undertaking intended to transform a section or sections or all of society so that citizens of that society can be able to fulfill their potentials enabling every segment of that society to take advantage of both the natural, physical and human resources present in their environment in fulfilling predefined and designated goals which is stable and long lasting for just not one generation but multiple generations. It reflects the social goals imbedded in the overall development strategy of a country, region, city or rural entity.

In terms of what social planning does, Bromley (2003) assert that social is one of the most ambiguous and widest of adjectives that can precede planning and define planning to mean 'in the public interest; of general concern; people's interaction and participation; or a different sphere of endeavour apart from physical, environmental, economic or technological.' Though the *'lived experience'* of man is enhanced by critical physical infrastructure as well as economic prosperity, but the ability to harness both is often guaranteed through social planning.

Social planning tends to direct all other aspects of planning in achieving a maximum benefit for the generality of the public but acting as a filtering mechanism that tends to draw these planning activities to be consistently focused on the individual as well as the community without over emphasizing development of just the inanimate but to the welfare of man and society.

The constant fight for equitable distribution of societies' wealth and burden is among the goals of modern urban planning practices and is old as man's recorded history for why social development is important and why laws are continued being passed for justice and equality to be accorded all men. Unfortunately in many developing countries such as Nigeria, experience has shown that development often relies heavily on modernist's approach which emphasize more on physical development through massive construction of infrastructure or urban renewal projects.

The World Bank (2001) sees development from that social angle that empowers citizens either through physical and economic programmes that focus on the removal of social and institutional barriers to provide structural changes in gender relations as well as economic growth. Unfortunately too many programmes in many developing countries though comprehensively planned with enormous resources allocated by centrally controlled governments with little impact of the social have fallen short of achieving their aims. This is so because majority of the organs of government involved in implementation had defects with little or no appreciable impacts on the citizens (Abuiyada, 2018).

SOCIAL PLANNING IN IMO STATE

This section of the study tries to understand the level to which social planning is being adopted by town planning authorities in Imo state of Nigeria. Interviews were conducted with six heads of planning agencies from the three senatorial zones in the state in a random fashion. The heads of these agencies have over a hundred years of planning experience between them therefore it is expected that with that level of experience interaction with them is expected to provide useful insights of the current situation of social planning in the state.

The study adopts the 1963 Perloff model of what social planners are expected to do as professionals as test subjects as measures for understanding the situation in Imo state. They original list by Perloff is listed below,

a. Assessing and monitoring impacts of development plans
b. Preparing long term social development plans
c. Undertaking social research
d. Coordinating community services
e. Helping to locate community facilities
f. Enlisting grassroots participation in planning

However this study added more tests components

which are listed below to cover more aspects of social planning,

g. Promoting economic development in planning areas
h. Undertaking social housing schemes for the state and local governments
I. Planning for physically challenged and vulnerable groups in the society
j. Providing developments that are intended to reduce social and economic exclusion of citizens
k. Planning for the preservation and protection of communities' social and cultural heritage

This study evolves an expressive method of calculation using a rating system that presents the reality of social planning in the state as regards its role in development planning. Each test component is calculated using responses of the heads of planning agencies shortlisted over the total expected responses from which a percentage is derived from each row of test responses. At the end of the exercise a total score is initiated by calculating the total positive responses is divide by the total expected responses and multiplied by 100 to get the percentage of social planning influence on development planning in the state. This is presented numerically below;

Total positive responses x 100% = (total influence of social planning) %
Total expected responses

The rating system adopted is presented in the table below,

Table 1: Rating system adopted for overall influence of social planning test components on development planning for calculating the responses of respondents

S/N	Rated values in %	Type of Influence on Development Planning
1	0%	Influence: **None**
2	1 – 25%	Influence: **Very small**
3	26 – 39%	Influence: **Small**
4	40 – 55%	Influence: **Moderate**
5	56 – 70%	Influence: **Big**
6	71 – 100%	Influence: **Very Big**

For a clearer understanding the test components are tabulated and provided with spaces in the table for which respondents (1^{st}-6^{th}) tick which have actually been used when conducting planning operations in their various agencies. The response are either ticked as 1 (which represents a positive response) or 0 (as a negative response). A column is also provided to determine the total as well as in percentage the planning agencies use in their operations. This shows how widespread social planning is. The analysis is presented below in Table 1,

Table 2: Analyses of the responses to social planning test-components by six heads of planning agencies in Imo state of Nigeria

S/N	Social Planning Practices	1st	2nd	3rd	4th	5th	6th	Total
1	Assessing and monitoring impacts of development plans in the state	1	0	0	0	0	1	2 (33%)
2	Preparing long term social development plans	0	0	0	0	0	0	0
3	Undertaking social research	0	0	0	0	0	0	0
4	Coordinating community services	0	0	0	0	0	0	0
5	Helping to locate community facilities	1	1	1	1	1	1	6 (100%)
6	Enlisting grassroots participation in development planning activities	1	0	0	1	1	0	3 (50%)
7	Promoting socio-economic growth and development in planning areas	0	0	0	0	0	1	1 (16.7%)
8	Developing and implementing social housing programmes for low income families	0	0	0	0	0	0	0
9	Planning for physically vulnerable groups in the society	0	0	0	0	0	0	0
10	Planning intended to reduce social and economic exclusion of citizens	1	0	1	0	0	0	2 (33%)
11	Planning for the preservation and protection of communities' social and cultural heritage	0	0	0	0	0	0	0

Total positive responses x 100% = (total influence of social planning) %
Total expected responses

$$= \frac{14 \times 100}{66} \qquad = \mathbf{21.2\%}$$

The study therefore reveals that the total influence of social planning according to the analysis is 21.2%, which means that social planning has a very small influence in development planning in the state and planning for development is still heavily reliant on physical planning.

DISCUSSION

From interviews held with the heads of planning agencies in the three senatorial zones of the state there is a consensus that social planning is an integral part of development planning. However from the analysis of the data provided during the course of the study, this is where the consensus ends as the test components reveal. Also all the respondents see their work majorly in terms of the physical development of the state only. These has however affected the developing planning direction in the state and more detailed results of the analyses are presented in the preceding paragraphs.

Firstly in terms of the assessment and monitoring of impacts of development plans only two from the six respondents admitted to using this test component in their work, that is 33% of the responses. It therefore goes to show that not all planning agencies carryout follow-up, assessment and monitoring activities on plans to see the effects of the plans that are or were implemented and if the proper results of the plans are achieved in short or long run.

For the preparation of long term social development plans the response is that none of the planning agencies engage in this very important aspect of social and development planning. The implication of this is that there is seemingly no input within the development framework of the planning areas for social development of citizens which is at variance with the Regional Office for Africa of the UN-Habitat having cited that for development to be initiated requires innovation in different developmental and social aspects of society (Odunbaku, 2019). This is however interesting though not surprising as earlier stated the planning philosophy of most professionals in the state is largely tilted toward physical development planning with very little room for social planning activities as revealed by the responses to this test component.

In terms of carrying out research of social issues which is expected to provide focus on the deficiencies facing citizens, no social research activities is conducted. This is also revealing though not altogether unexpected because social planning continues to be relegated with most of the emphasis of development conspicuously centered on physical development planning. It is unfortunate that long term social issues are not factored into the overall development of the state with its attendant negative consequences for citizens as well as government.

One of the most striking revelation of the group is the fact that they have no input in coordinating community services within their areas of spheres. This is remarkable because planning for development entails the planning as well as coordinating community facilities and services intended to provide a higher standard of living for communities. This should in fact be a priority for physical development planners which unfortunately it is not. This shows the level disconnect between physical and social planning that is likely to continue to mitigate the overall development of citizens in the state.

Helping to locate community facilities is a major function of planning agencies and is usually carried through long term development plans (Master Plans). Therefore it is no surprise that all the responses i.e. 100 % agree that they are involved in helping to locate community facilities within their planning areas. The question this study however asks is if they do not conduct social researches what are the possibilities of the agencies being able to know exactly the social needs of the citizens to integrate in the short and long term plans of the Master Plans they are relying to drive development?

Enlisting grassroots participation in planning otherwise regarded to citizens participation in planning or advocacy has been a long standing practice. This is intended for citizens to provide inputs into the various development initiatives that planning agencies propose and implement. In this

case however only three heads of the agencies (50%) interviewed agreed that enlisting grassroots participation is part of their practice. This study views such as an anomaly as world over this is an established practice. Again this goes to the heart of the philosophy of planning in the state where physical planning is the other and many planners still view the profession as a specialist discipline for which they alone are equipped to carry out development.

Promoting socio-economic growth and development in planning areas is supposed to be an important function of planning agencies. Social and economic growth helps in the improvement of sustainable human settlement (Odunbaku, 2019). Unfortunately from the analysis onlyone respondents affirms. This begs the question as to what exactly do these planning agencies do if only one out six admits to promoting social and economic growth and development within their planning areas.

Housing is an important component of human living yet not everyone has the capacity to own them being both a social and economic right of citizens. Encouraging and developing social housing programmes especially for low income families is part of the development process that planners are involved in. Unfortunately none of the respondents carry out this activity in their agency. Inevitably housing will no doubt be in short supply especially for low income households who cannot afford the cost of owning homes.

The society has never been known to be equal because some of our citizens due to no fault of theirs are not able to achieve a better standard of living. This is where public administration intervene to help in creating avenues from which vulnerable members of the community can be able to achieve some measure good living. Unfortunately planning for physically vulnerable groups in the society has not been a goal of any of the planning agencies according to the responses presented by their heads. This in the long run negates the social development of a community that ultimately leads to social and economic exclusion for those affected.

Similar to the mandate of planning institutions to meet the needs of the physically vulnerable of the society is planning to reduce social and economic exclusion of citizens. This is done through policies that tends to empower citizens economically and socially so that they can participate fully in society's decision making processes. Here again the positive response is below the threshold as 33% of respondents engage in this type of planning. It is however not surprising since planning in the state is dominate by physical planning.

The social and cultural lives of a people is an important element that can help in driving development. Religious beliefs, ethics, customs, traditions, cultural artifacts and heritage, festivals and other aspects of the way of lives of a people can be an important factor in pursuing development. Social planning if properly harnessed can act as tool for improving social and economic wellbeing of the community as they can help in generating income for the local community. Planning for the preservation and protection of communities' social and cultural heritage as observed from responses is not in the agenda of any of the planning agencies as all the heads of agencies to not engaging in such activities within their planning agencies.

As is observed from the analysis there is a serious lack of social planning inputs in the workings of planning agencies in the state. Specifically the results from the calculated product value of total positive responses over total expected responses in percentage is 21.2%. With this result the study concludes that social planning plays very small role in development planning activities of planning agencies in Imo state.

RECOMMENDATIONS

This study proffers recommendations that are geared in trying to improve the role of social planning in Nigeria especially in Imo state. Social planning as proposed by this study is an important criteria for improving the overall planning and development processes in most developed countries. The study calls on planning agencies to be involved and also initiate long term social development plans and policies to take care of areas such as youth empowerment, gender equality, care for the elderly and disabled, social investment insurance schemes, improved access to government's decision making and poverty eradication programmes through a targeted approach to planning. This study does not believe that town planning authorities should be wholly concerned with only the physical modification of the environment for it is important that they are encouraged to incorporate other aspects of planning that can actively and positively influence the social realities of their constituencies within the state.

Following changes taking place within research and development circles in terms of the pursuit of sustainable development this study calls innovative approaches as well as abandoning the old ways and philosophies of the planning approach that overtly emphasize physical and design approaches to planning. This is without prejudice of the fact that many researchers especially in Nigeria are still very conscious of the history of planning and its strong relation to architecture, survey and engineering which unconsciously endeared the profession to pursue a more physical and design approach in its pursuit to achieving goals. Therefore there is an urgent need to review the contents of the curriculum and researches in departments of higher institutions to reflect the current changes and innovations of the planning profession to be seen as an all-inclusive discipline.

A major tool proposed by this study include engaging in social research in order to see the direct problems that communities are facing as well as long term changes that are taking place within various demographics in order to key in the specific solutions within the overall development plans. Also plans that are yet to be executed or the ones that are currently running or even those that have been completed should be scrutinized thoroughly using social impact analyses in order to ascertain their relevance to the overall objectives and goals of the development agency, organization or government body responsible for initiating such plans.

Also planning agencies all around the state should be viewed as locations where the government can have responses in the short term (feedback points) for many of her programmes and projects. Likewise only programmes and projects that has been certified through the filtering process that social planning provides should be initiated so that in the long run communities and the people own programmes and projects so that the top-bottom approach to planning would gradually cease to be an aspect of planning in Imo state.

In terms of economic opportunities economic planning by governments and their agencies should not overemphasize on economic returns and income generation for government. Every economic policy should accommodate different levels of economic activities that is spread viably both for large business people as well as small scale businesses to the improvement of the economic chances of the vast majority of citizens as this will likely help in spreading capital for the larger population while reducing poverty and thereby helping to increase the economic base of the people. The overemphasis of economic numbers should be link with the concerns of long term vulnerability calculations of every individual in the society.

Some of the agencies (50%) agree to allowing

grassroots participation in their work this is commendable though not adequate. This study believes that social planning calls for citizens to be part of any development plans that are to be initiated by government right from inception to the completion of these projects. This will help in improving service delivery as the project will have citizens' input. This is so because in the long run it is for the individual, community, region and nation that plans are made for and not for any physical structure or economic calculation but for people. It is also important because with time social demographics and behavioural attitudes often changes as they are influence by current realities that are likely to impact on the various needs of each segments of society.

In the case of housing provision for citizens the concept of social housing is specifically advocated. This can be achieved by embarking of social researches that are intended to add to the core initiatives of the physical and economic development plans. Observations in the state reveals severe housing shortage due to the fact that housing provision are in the hands of the private sector and based profit driven. This means that a large segment of society will continue to find it to acquire shelter. This study therefore recommends social housing as a remedy. This planning agencies should plan a mix in housing provision intended to take care of every segments of society helping to reduce segregation and social economic exclusion of lower income groups. This gives everybody in the community the opportunity to live in good neighbourhoods without being driven to the fringes of society in environmentally marginal areas due to their social and economic status.

One important aspect that social planning emphasizes that is often neglected by some branches of planning is planning for those that are physically challenged and vulnerable. Cognizance should be given to the physically and mentally challenged citizens in the community when plans are being prepared and this could be done by listening to needs of every segment of society when planning for physical infrastructure.

Development is not something that happens accidentally because it is a deliberate occurrence that is planned for using the resources, skills and intellect of both government and the governed to achieve desired goals that are beneficial to every segment of the society. According to Abuiyada (2018), development is dominated by western theories and models but one of the objectives of government planning institutions is to be able to meet the development challenges of her citizens by applying solutions that are suited to the prevailing circumstances of every region or country. Therefore it is important for planners to be equipped with the social tools that drives real development and this could be achieved if planners are versed in social planning techniques as is ascribed by this study.

More especially this study strongly advocates that social planning be instituted as an instrument for vetting and filtering any plan for development by various government development institutions. This can be instituted in the form social impact analysis and modeled from the environmental impact assessment. This will form an appropriate filtering process of understanding the costs and benefits of every development plans which can be rated to see the level at the which benefits and costs can be clearly stated as well creating areas within the social impact assessment for citizens to participate. This will clearly help in deepening the process of social planning and improving the rate of development in the state.

This study therefore aligns itself with the warnings of Prior and Partridge (2010: 6) who pointed out "*that the emergence of the notion of sustainability has emphasized that the ongoing wellbeing of living systems such as a city is as much dependent on the sustainability of its social aspects as other aspects such as its economic and physical structures or its environmental wellbeing."* It is important to combine physical planning and social planning ideas in developing the social dimensions of planning so that physical planning does not continue to take precedence over other aspects of planning and undermines the goals of sustainable development.

For planning entails all aspects of human development and should therefore be seen as a collaborative endeavour for the benefits of citizens. This was what probably led Webber (1968: 14) to succinctly advocate that,

"*...we can no longer speak of the physical city versus the social city or the economic city or the political city or the intellectual city. We can no longer dissociate a physical building, for example from the social meanings that it carries for its users and viewers or from the social and economic functions of the activities that is conducted within it. If distinguished at all, the distinction is that of constituent components as metals comprising an alloy. With improved understanding of economic and social systems, the idea of 'capital' is being extended beyond 'things' to encompass the human, intellectual and organizational resources as well. The skills and capacities of our populations, the accumulated knowledge and wisdom of our culture, the way in which we organize ourselves for the joint conduct of our affairs, all contribute to our productive capacities and wealth in ways that are inseparable from those of the physical equipment and natural resources we use".*

CONCLUSION

This study is a modest contribution to the literature regarding social planning as a planning option in Imo state and its importance in the overall planning and development agenda. It reflects on the planning practice as a whole while illuminating the benefits of social planning when fully understood and applied appropriately. The study also reflects on the importance of physical environmental determinism as a philosophy, its role as a planning ideology, its short comings and calls for a rational re-orientation by researchers opposed to the philosophy that only the physical manipulation of the environmental can guarantee well-being and development. The calls tilted towards a planning culture that was orientedtowardsachievingsocial objectives within the physical planning space.

In line with the importance which this study seeks to apportion social planning, it advocates that social planning and its many tools should always be used as filtering mechanism and moderating tool in directing planning objectives in order to achieve people and community oriented goals within the overall planning and development processes.

It is pertinent to note as is observed from the results of the study that there should be increased acceptance of social planning coupled with the philosophy of social sustainability as one of the core values of planning. Also training in the understanding of social planning should be increased at all levels of the planning profession both for registered professionals and students so as to deepen its understanding and use within the overall planning profession.

Planning according to Prior (2007) is concerned with the physical and the formal. Its contribution to society by delegation of the legislation for and production of built environment, should however not be taken for granted. Physical planning alone cannot provide all the development problems facing communities and countries therefore there is need for the integration of physical production with social requirements for an emergence of social planning dimensions within planning.

Weber (1968) however rightly encapsulate the motivation of this study with his above summation that we do not need to emphasize the living spaces

either the urban or rural is terms of a particular aspect of our developmental journey, rather we should view them in terms of the totality of how they can make lives worth living for every citizen. Therefore space should be regarded in totality promoting all aspects of living not just as physical, economic, international, political, technological, academic but as earlier stated as *"total spatial entities"* of which social planning is an important ingredient if that is to be achieved.

Also this study also calls for more studies to be carried out on social planning in deepening its usage and understanding. In so far as they are incorporated in the development process in helping planners and public administrators to accelerate total development of citizens and our spatial entities so that they can provide the much needed medium for a healthy and fulfilling life for every member of the society no matter the level of their social and economic status.

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INTERNET TECHNOLOGY FACTORS ON INFORMATION QUALITY AND SUPPLY CHAIN MANAGEMENT PERFORMANCE

goddyson.tamunoene@portharcourtpoly.edu.ng

Tamunoene Goddyson A.

Department of Computer Science

&

Mary Omodu

Department of Marketing

Port Harcourt Polytechnic, Port Harcourt

ABSTRACT

Organizational managers had built confidence on the capacity of theInternetinenhancing supply chain management decisionmaking via its tools in the provision of realtime information and enabling collaboration between trading partners. The practices of Supply Chain Management depend on information sharing, the Internet as a major information sharer enhances these practices which makes the operational performance within the organization simultaneously more effective. The role of the internet becomes more significant ininformation exchange thereby strengthening the relationship between suppliers and organization's managers. Till date, research on the relationship between the acceptance of internet technology applications factors on the information exchange and itsi nfluence on the performance of supply chain management still limited. This paper will investigate the internet technology acceptance factors such as trust, ease of use, usefulness, security, self-efficacy, self-commitment, management support and user technical support as the main antecedent for information sharing among the employees. It will further discussthe impact of information sharing towards supply chain management performance.There view of the previous research and in-depth theoretical review will justify the proposed relationship.

Keywords: Internet Application, Factors, Information Quality, Supply Chain Management.

INTRODUCTION

In 2016, the Ninth e-ecosystem technology plan was introduced and it concentrated in the integration of B2B technological applications within the agriculture, tourism, construction, manufacturing and retail sectors. Advance manufacturers of intelligent software, high technology packaging, automation and nano-processing need to increase their R&D in this area. All of these will increase global supply chain, reduce cost efficiency, and call for more schemes to advance of e-commerce adoption.

In new growing markets, the increased in volume of the consumption, imports and production in every high level of life enlarge the demand for and use of information (McFarland & Hamilton, 2019). Malaysia like other developing countries need to be more interested to the integration of information technology in its industry, (Eze& Mohamad, 2019; Zain, Kassim, & Mokhtar, 2020). Managers have believed that Internet can enhance SCM decision making by providing on real time information and enabling collaboration between trading partners (Gimènez & Louren, 2020). Zain, Rose, Abdullah and Masrom (2019) show that even though information technology strongly influence performance of industries in Malaysia seems very important, but the concentration was rewarded to understand the information technology acceptance still limited. They added that Information Technology can contribute to their agility if it is well perceived and utilized by employee. In the new economic which based on the knowledge, there are new activities needed to be completed which depend on the Information Communication Technology (ICT) service such as software and content development as well as Internet-based services which is an e-commerce solution. Furthermore, ICT infrastructure need to be adequate on the way to support access and delivery of information, and its direct to carry a knowledge-based economy. Therefore, to achieve great wide of network, it compulsory to achieve larger adoption of online multimedia and Internet –based applications. According to Khadaroo (2019) that the study of quality and types of information disclosed over the web (internet application) from user's perception should be studied in future research. Venkatesh and Davis (2016) motioned that millions of dollar are wasted on the systems or application that are rejected. They extended that; the key of the problem could be a user. According to Ramayah and Jantan (2022) despite these complimentary polices and infrastructures that provided by government, the technology acceptance was not high rated as expected. Edison and Geisller, (2020) argued that, some individuals are uncomfortable with technology change. These individuals could be consumers, workers, family members or even citizens (Ramayah & Jantan, 2022).They conclude the important of an extensive research to understand the phenomenon of technology acceptance, and to contribute in the helping managers and industries. All of these are required in persuading human being toward adoption of information technology.

Many companies have implemented and used point – of – sales scanners, which read in real time what the customer is going to buy or what the shop is selling, collect in the real time information to make decision of the orders from the stores, but also toward use, the internet in the direction of sending the information to their suppliers in anticipation of them to harmonize their productions to face the actual sales (Gimènez & Louren, 2020). Cagliano, Caniato and Spina (2020) highlight on how the internet offers a lot of solutions for the problems that face the companies. They concluded that supply chain performance quantitative research should focus on the impact of e-business. O'Keeff (2021)argues that the internet is playing an important role in information exchange,

and is strengthening the relationship between suppliers and organization's managers. Spengler and Schröter (2020) emphasized the need for future research to explore how web information sharing help all element of Supply chain.

According to Xiao-feng (2021) nowadays, an era with information explosion and how-to modern information technology while adopting the methods of supply chain management, which should be studied further by both managers and professor. Grieger (2020) discussed on electronic marketplaces research on Internet based (B2B) business to business marketplace in information sharing and calling for more supply chain management research within this field. Hus and Chen (2019) argued that technology dynamics can reduce the gap which appears during interaction process between SCM members. It will to enhance sharing information and other resource to serve customer orders. They directed for more empirical research in this field depend on other theories such as TAM model.

However, the internet technology applications will enhance Individual belief and organization performance, this paper investigated on Internet applications factors variables which enhance understanding of individual acceptance internet acceptance behavior from different sides.

Up to date the research on the acceptance of internet technology applications as the basis for information exchange and their influence on the performance of supply chain management still limited. Therefore, this paper theoretically investigated the Internet Technology Acceptance (ITA) factors, which did not receive adequate attention from both researchers and participations empirical particularly in e-Business and e-SCM. Keskinock and Tayur (2021) stated that internet revaluation is a new tool that support decision which can be used in operation management or management system. Khadaroo (2019) concluded that the study of quality and types of information disclosed over the web (internet application) from user's perception should be studied in future research. The gap in the literature is an acceptance of internet as channel such as e-mail, website, browser and company system; pervious research did not consider the impact of internet technology acceptance factors based in sharing information toward SCM performance.

LITERATURE REVIEW:

Supply chain structure and information technology: Lambert (2018) highlighted that network company structure of SC can be divided into three parts:

a. The member of supply chain,
b. The structural dimension of networks, and
c. The different types process link across supply chain.

The effective system integration will reduce the conflicting objectives of channel members and developing dynamic structure of SC (Sahin& Robinson, 2022). Cho and Hong (2016) mentioned that the supply network structure can be present in three dimensions:

(I) Formalization; rules procedures depending on cost negotiations or suppliers to follow, and increases the credibility and reduces any illegality,
(ii) High centralization which is lower risk than decentralized and can also easily maintain.
(iii) Complexity, the level of production will be increased with increased level of complexity.

Three major sources of uncertainty as identified by Davis (2020) include:

(I) Manufacturing uncertainty, system suspension will make the quality of production.
(ii) Demand uncertainty - Fluctuation Market demand and various consumers' preferences.
(iii) Supply uncertainty.

Usually, if the suppliers fail to commit to promised date. The following table show how the information sharing is very cuticle parts of SCM.

Table 1. Definition of SCM which is closer to the to the sharing information

AUTHORS	DEFINITIONS
Campeau & Higgins (2018)	"The management of upstream and downstream relationships in order to deliver superior customer value at less cost to the supply chain as whole".
Lambert & Cooper (2019)	Global Supply Chain Forums Defined SCM by as "….the integration of key business from end user through original suppliers that provides products, services and information that add value for customers and other stakeholders".
Sahin & Robinson, (2016)	"Supply chain consists of supplier/Vendors, manufacturers, distributors and retailers interconnected by transportation, information, and financial infrastructure to raise value to end consumer in term of products and services and to score high profit for each

The new initiative of SCM includes sharing information, foresting, planning information and replenishment of the inventory over the internet (Chon, Tan & Yen, 2019). Council of Logistics Management (CLM) defined logistic as: the part of supply chain process that plans, implements and controls the efficient, effective flow and storage of goods, service and related information from the point of origin to the point of consumption in order to meet customer requirements" (Lambert & Cooper 2019).The hard phenomena which appear in supply chain currently, is the bullwhip effect. This effect happens when the demands have a lot of changings from time to others because of the absent of the predictable (Mayeux, Chaib-draa, & D' Amours, 2016).

Synopsis of Technology Context

The technology in the context includes; Internet, World Wide Web (WWW), broadband and wireless technology (Lancioni, 2021). Other researcher defines technology as the all knowledge, products, processes, tools, methods and systems that employ goods and provide services (Khalil,2021). Richard, cited that Internet is a network that is used in the privateways or used only by a particular group or organization which uses the internet software and also TCP/ IP protocol. However, World Web Wide (W3) as a part of the internet have the useful of its transport function used like a system for storing, retrieving, formatting, by client –server architecture besides achieves some types of digital information, including text, hypermedia, graphic and sound (Richard,2021).

E-SCM and Internet Technology

Gimènez and Louren (2020) discussed the impact of the internet in SCM among different respects as follows:

(I) E-Commerce organizations sell and buy by Internet channels their products, get and provide their services. SCM processes have to identify to answer the challenges of this new channel. For example, the order fulfillment process, known as

e- fulfillment.

(ii) Information Sharing by using internet as a media to access and transmit data and information among SCM to different parts like suppliers, partners, and customers. that will provide the effective and efficient collaboration, e.g., procurement process will be called e-procurement,

(iii) Knowledge Sharing Stage requirement parts of SCM after sharing information accessing data analysis and modeling jointly make a better planning, orientation, controlling and decision making and,

(iv) Design an Efficient Supply. The internet allows user to access to the information and to have the knowledge faster and less cost, that need to be more emphasis on designing fast responsive chains. Van Hoek (2021) comments that:"e-supply chain is physical dimension on e-business with the role of achieving base level operational performance in the physical sphere(fulfillment)".

Croxton and Gracà-Dastugue (2021) and Cooper and Lambert (2019) unmasked the impact of Internet in SCM process to have different types as flow:

a. The Customer Relationship Management process,
b. The Customer Service Management process,
c. The Demand Management Process,
d. The e-fulfillment process,
e. The Manufacturing Flow Management Process,
f. The e- Procurement process,
g. The product Development and Commercialization process,
h. The Reverse Logistics & Returns Process,
I. Information flows,
j. Supply chain relationships,
k. Planning and Optimization and,
l. E-Supply Chan Management.

Farely (2021) cited that the philosophy of SCM focuses on how firms operate their suppliers' processes, technology, and capability to advance competitive advantage.

Quality Information Delivery (QID)

The information flow includes sales data, inventory information, order condition for tracking and tracing, sales forecast data, production and delivery schedule as well as capacity information and performance metrics (Scheer, Theling, & Loos, 2016). QID defined as solution to find the best way to deliver the right information to the right people at the right time (Soultion, 2008). The dropping of information quality has appeared when the information value is very poor reliability or validity (Moberg, Cutler, Gross, & Speh, 2016).

Full information sharing level will complete information to support the specific decision-making. This could include one or more of the following: production status and cost, transportation availability and quantity discount, inventory cost, inventory levels, various capacities, demand data from all channel members, and all planned promotional strategies(sahin & Robinson, 2016). The new businesses contentious to grow and flourish by using the internet in the exchange information speed, flexibility and timely to effect on the supply chain process (Lancioni, 2021).

Technology Acceptance Model

SCM is growing body of theory, testable model and empirical research (Lancioni, Schau& Smith, 2020).

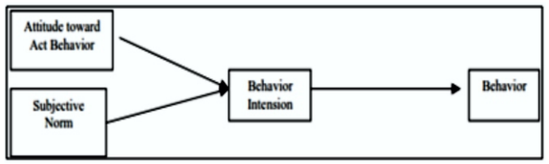
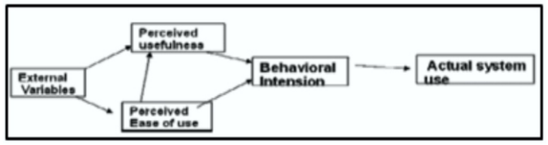


Figure 1. Describe Theory of Reason Action Fishbein and Ajzen (2019)

The most used theories for modeling user adopting of new technology are Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB) and Technology Acceptance Model (TAM).TRA is in fact the ancestor or antecedents of both TPB and TAM. It was initially suggested by Fred Davis 2018. The model is adapted from Theory of Reasoned Action (TRA), which was originally proposed by Fishbein and Ajzen in 2019.

Davis and Venkatesh (2021) extended theory and created TAM2 which incorporates additional theoretical constructions ranging social influence processes (subjective norm, voluntariness and image) and cognitive instrumental processes (job relevance, output quality, performance demonstrability, and the perceived ease of use (Davis, 2021).

Figure 2. Describe Model of Technology Acceptance Model by Davis 2021



This the final model without the attitude construct required in Davis (2018). Actually, the external variables will include system characteristics, user involvement in design, training and the nature of the implementation process. There are researchers found that the positive influence of behavior intention on actual system use (Chen, Gillenson, & Sherrell, 2016; Kim & Malhotra, 2019; Moon & Kim, 2021). Other Researchers noted TAM have weakness in the constructs (Agarwal & Prasad, 2021; Ha & Stoel, 2019). As a result, the theoretical needed to extend and incorporate different technologies users and organizational context (Hu, Chau, Sheng, & Tam, 2019).

EXTERNAL VARIABLES

The variables like self-effectiveness and decision of that (experience and organizational support) as factor that also affected the working computer anxiety, and consider the use of the perceived ease of use and perceived usefulness and finally seen the actual use of computer technology. McFarland and Hamilton (2019) studied computer anxiety, prior experience, system quality, others' use, organizational support and task structure and their influence on computer-efficacy, perceived usefulness, and perceived ease of use and system usage. Self-efficacy, computer experience and organizational support have been proved significant direct impact on the perceived ease of use. The result involve that the perceived ease of use plays a very important role in mediating the relationship between experience, anxiety, perceived ease of use and self-efficacy.

In addition, self-efficacy, Computer fear, perceived ease of use and usefulness partly mediate the effect of experience and organizational support on self-reported usage of behavior "(Igbaria and Iivari, 2018). Jiangutilized TAM in their empirical study about e-commerce user and behavior. Their model had five constructs: utilization of the Internet, consequences, near term, facilitating conditions and experience with the Internet. The significant positive relationship was found between utilization of the Internet and facilitating condition. Based on that there are extended the original TAM by adding new variables such as self-efficiency by Hong (2021/2016), cultural social influences by Malhotra and Galetta (2019), trust by Gefen et al (2020), Ha and Stoe (2019), experience by (Pikkarainen, Pikkarainen, Karjaluoto, & Pahnila, 2019). Commitment to system use by Kim and Malhotra (2019), User technical support and management support by Igbaria (2021) and privacy and security by Pikkarainen (2019).

Unmasking the Internet Technology Acceptance (ITA) Factors

Cooper and Zmud (2019) argued that the IT adoption process divided into six stages:

a. Initiation (active or passive search for opportunities);
b. Adoption (negotiation for backing IT implementation);
c. Adaptation (applying the IT and revising organizational procedures); (iv) acceptance (company member encourage to use IT);
d. Routinization (the use of the IT becomes standard);and
e. Infusion (efficiency is increased as a consequence of the IT use). Consequently, the most importance stage in our paper is acceptance stage.

In the next paragraph the paper will explain most common variables as antecedent to the quality in sharing information over the internet. So, depend on the TAM2 the main variables to support acceptance this kind of media, and to get quality in sharing an information, and finally to increase the performance of supply chain performance.

Perceived Usefulness defined as the extent to which a person believes using a particular system to enhance his or her job performance (i.e.,by reducing the time to accomplish a task or providing timely information) (Mathwick & Rigdon Malhotra2021. It is related to the work environment were also known as possible features of web site), (Ledder, Maupin, Sena, & Zhuang, 2021). Perceived Ease of Use is associated particularly with the technology in positive way related with higher performance or a degree to which a person believes that using a particular system would be free of effort (Jawahar, 2016).Speed of downloading of viewing web pages, able to finding a page that user knew existed, organizing the pages and information they gathered Lederer, Maupin, Sena, & Zhuang, 2021).Perceived Security requires prohibiting the disclosure of the important information and disallowing any infringement to the information system which related to the communication with partnership (Kolluru, Meredith &P.H, 200). They further argue that the contribution to create fire wall will protect the important information from any disclosure and to keep it just useful with SCM partners. Perceived Privacy appears in the responsibility to protect an information which reach to both parties to the organizations that collect personal information, and to organization they receive it secondary data (Liu & Arnett, 2016). More ever a greater access to data and move to internal secondary data uses all that need high coordination within company. Perceived Trust the interactivity gives consumers' assurance and that supports them to trust the website administrator (Wu & Chang 2019).Certain level of trust can be replaced by technology technical that safe the information and protect SCM systems from exploitation.VMI (Inventory Management Information) is almost definitely the first trust- based business link between suppliers and customers Barrat & Oliveira, 2021). Self-Efficacy defined by Comeau and Higgins (2018) as the belief that one has the ability or capability to perform exacting behavior. They highlighted that self-efficacy as a person's assessment of his/her ability to deal with particular system. From empirical and social psychological studies self-efficiency made to order Information as important effectiveness ofthe perceived user (Burkhard & Brass, 2019; Gist, Schwoerer, & Rosen, 2018; Hill, Smith, & Mann, 2016).User commitment requirement to support self-determined knowledge activity such as using, sharing, creation and renewal (Alavi & Leidner, 2021; KPMG,2021).

Commitment define as user's psychological attachment to system use" Kim and Malhotra (2019).Management Support is one of the more factors effecting sharing information andeffecting successfully of system Igbaria, 2019). Top management support is: "The degree of top manager understands of the specific benefits of and support for quality information sharing with supply chain partners Li and Lin (2016b)Management support is related with greater system success and lack of it is pointed as a barrier that effects utilization of information technology. Technical User Support There are some of components support SC practices such as education for supply chain practices, operation team the basic infrastructure –computers, warehouse space and third-party service (Ellarm, 2019).

CONCLUSION

The main purpose of this paper has been to Know which is the most factors of ITA that make users more acceptance to internet channel, and increase the SC performance. Perhaps their other factors need to investigated in this ground which offers opportunities for the further research. Therefore, the structure of SC is very wide and the sharing information is vital part in this constructor. This paper one of the few studies in SCM filed in manufacturing sector which measure the quality of information from different voices such as organization and user. The present study tried to cover these points that inter relationship between ITA and QID towards SC performance depend on TAM model, and adds new knowledge in theoretical, empirical and academics studies. This study has addressed only the theoretical relationship and it will analysis and collect data in another research.

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LITERACY EDUCATION AND LANGUAGE EDUCATION PANACEA FOR NATIONAL DEVELOPMENT

BY

OKAFOR, THEODORE MADU
SCHOOL OF GENERAL STUDIES,
IMO STATE POLYTECHNIC UMUAGWO
E-mail: theodoreokafor2022@gmail.com
PHONE: 08033295393

AND

OKORO, ISABELLA
SCHOOL OF GENERAL STUDIES
IMO STATE POLYTECHNIC

ABSTRACT

Following the Harare declaration in 1982, the most important educational object in most African nations was the eradication of illiteracy by the year 2000. Educational policies designed to achieve this objective led to vigorous and sustained campaign to universalize education for children and to initiate programmes and activities that would promote literacy among the youths and adults on a massive scale. it is important to state here that the goal of the nationally pursued literacy programmes was to assure sound basic education and scientific and technological literacy and capacity and thus to self-reliant development. The Federal Government of Nigeria recognizing the roles language plays in national development gave it a pride of place in the National Policy on Educational (2004). This policy adopted a language policy that is both multi-lingual and Bi-lingual and this includes the learning of Nigerian languages, English as a second and French as a foreign language. This is predicated on the belief that a good language base is a basic pre-requisite for successful achievement in schools and adult life. This paper examines how literacy education and language education could be used to accelerate national development and identifies the factors responsible for the prevailing high illiteracy rate as well as the factors hindering the teaching of language in Nigeria.

Keywords: Language, Literacy, Development, Self-reliant

INTRODUCTION

The demand to communicate is pervasive in our daily activities. In order to interact with others, man needs symbols that include language and many non-verbal behaviours used to achieve content and relational meanings (Woods, 2006). Meaning is located in what the speaker says and means, in what the listener thinks he means and in the way the text is constructed. Content meaning refers to the literal meanings which represent what the speaker means, while relational meaning denotes what the speaker means and that which the listener thinks. Language is a very important tool for social development both at individual and communal levels. In fact, the use to which language can be put cannot and should not be underestimated, and anything that can be done to facilitate easy communication should be encouraged. Basically, every language performs certain functions – communication, entertainment, rational, logical, critical and learning functions, for example. As an instrument of communication, language makes it possible for the people in an environment to interact and coexist. It paves way for continuity of society. Human beings get equipped for maximum self-realization and self-development through the use of language. it is the only road to acquiring education in a meaningful way. Thus, there is a close relationship between education and development.

Since the last half a century, the world has been struggling to attain the much desired level of literacy. Olajide (2002) remarks that regardless of their degree of industrialization, nations have suffered illiteracy, although the developing economies are the worst hit by the scourge. It is not very easy to determine who an illiterate person is, just as it is almost impossible to peg a final point at which illiteracy begins and ends. However Hillerich's (1978) view of an illiterate person as one who is unable to read and write well enough to perform social functions successfully seems attractive. However, one must observe that literacy goes beyond merely carrying out social functions as it also involves the ability to use numerals wisely, undertake risks and project adequately for the future (Olajide, 2012). Thus, formal certification alone does not guarantee that the recipient will always be able to cope with his socio-economic needs or engage relevantly in social functions. The implication of this is that classroom teaching of reading and writing cannot be useful unless it links the learners with the real tasks they would perform outside the school system. Therefore, the goal of reading and writing should be tied to a nation's aspiration, and must liberate the individuals as well as guide him/her in taking rational decisions about himself/herself in a constantly changing environment.

In fact, illiteracy has been identified as the most serious handicap for economic, social, political and technological development. Consequently, any government that sincerely wants to conquer poverty, hunger and disease must wage war against illiteracy. This explains why individuals, organizations and governments all over the world now lay huge emphasis on functional literacy. Egenti (2005) describes illiteracy thus:

Illiteracy, therefore, can be equated with ignorance and poverty. The person who is poor is hungry, suffer and probably will die if he happens to become ill. His main apparent handicap is lack of money because he is unemployed. His state of unemployment is likely to the result of his being ignorant and/or being illiterate. This vicious circle starts from illiteracy and ends at illiteracy. However, the long term rehabilitation plan for such a person should include getting him to be functionally educated, so that he could become productively employable.

The above assertion suggests that literacy can be a useful tool in the hands of anybody who wishes to make positive changes in the environment. A society with a high percentage of poor, ignorant and sick

persons cannot develop. Literacy education, therefore, has an important role to play in the rehabilitation of the vulnerable members of the society. Literacy, which is the basic communication skill that enables an individual to extend the range of his contact, can be used to re-enforce self-reliance and self-respects which are essential pre-requisites for purposeful living. This implies that literacy is not only necessary for an individual to function optimally in his immediate environment, but also for adapting to other environments, hence Okedara (1989) states that "literacy education can be acquired at the formal, informal or out of school." This shows that literacy education can be acquired at the formal, informal or no-formal level. Thus, literacy education can be obtained at the following levels in Nigeria.

a. Education at pre-primary and primary school levels.

b. Communication skills or literacy education at the secondary school level.

c. Literacy education as an aspect of adult education.

It should be noted that the goal of nationally pursued literacy programmes was to assure sound basic education which is fundamental to the strengthening of high levels of education and scientific and technological literacy and capacity and thus to self-reliant development (Nwabueze, 1995). However, with globalization efforts, the scope of literacy education has expanded considerably to include not only basic skills of reading, writing and calculating numbers, but also other functional skills such as technological skills that would make it possible for individuals to access and process information for the purpose of making their various businesses more productive. This is known today as computer literacy.

LANGUAGE POLICY IN NIGERIA

Language policy may be seen as government's statement of intention on the issue of language(s) for the nation. This may include the role of specific language in the society and the assignment of different functions to different languages, commitment of language(s) to the present, with projection for the future.

The experts who fashioned the national policy on education realize that language is fundamental to the education of the child. Therefore, in the National Policy on Education (2004), it was stated in section 1 sub-section 10 that "Government appreciates the importance of language as a means of promoting social interaction and national cohesion; and preserving culture". Thus, every child shall learn the language of the immediate environment. Furthermore, in the interest of national unity, it is expedient that every child shall be required to learn one of the three Nigerian languages: Hausa, Igbo and Yoruba.

The above statement of one of the explicit government's policy statements on the language of education in Nigeria.In addition, the 1979 constitution of the Federal Republic of Nigeria gives recognition to the English language as its paragraph 51 states that "the business of the National Assembly shall be conducted in English Language and in Hausa, Igbo and Yoruba when adequate arrangements have been made thereof".

THEORETICAL FRAMEWORK

Going by the available linguistic evidence, we notice that children are not born with a predisposition to learn any one language rather than any other. All children regardless of race, culture and perhaps parentage are born with the same built-in ability for learning languages tagged Language Acquisition Device (LAD). This is the argument of the mentalist/ innate theory as propounded by Jean Piaget. This theory assumes that the complete act of thought follows a fairly common sequence in this order: arousal of intellectual interest, preliminary explanation of the problem, formulation of ideas and

verification of the suitability. In this view, language learners are seen to be using their cognitive abilities in a creative way to work out hypothesis about the structure of the language. The mentalist theory is related to the innate theory of language acquisition. The argument is that children are born with an innate capacity for language development and every normal child has a human brain that is ready for speech. These natural language principles make up a child's "Language Acquisition Device". This is an amplification of the innate theory of language acquisition which holds that the child is pre-programmed to effectively internalize and operate language. In essence, language acquisition device is biologically in-built in the human organism hence the acquisition of a first language as distinct from the learning of a relatively short period from birth. Crystal (1987) observes that the child uses his LAD to make sense of the utterance heard around it, deriving from this 'primary linguistic data' hypothesis about the grammar of the language – what the sentences are, and how they are constructed. This knowledge is then used to produce sentences that, after a process of trial and error, correspond to those in adult speech: the child has learned a set of generalizations, or rules governing the way in which sentences are formed.

In the light of the above, learners formulate rules, try them out and if the rules are discovered to be inadequate, they alter them. Language is then perceived to be transitional and learners move from one stage to another in a systematic process. Given that children, irrespective of race, culture and percentage are born with the same in-built ability for learning languages, the primary function of language teaching should be geared towards activating the linguistic competence with which they are born.

At school age, which is at six, a child possesses an extensive knowledge of his first language, as it were, in his head. This, is most cases, is the mother-tongue which is the language used at home in the community, that is the language of the immediate community. It has been observed that when a child is taught in a language he understands, the benefits are immense. This is because the child obviously possesses the schemata that could easily be activated to lead to the understanding of the language of the school. Reading instruction will present little or no problem if the child is taught to read in his first language. In fact, the wholesome result of teaching a child to read in the language he brings to school is that he (the child) quickly becomes literate, thus achieving one of the cardinal objectives of the primary education, namely: permanent literacy. Similarly, the other subjects and the skills taught in a familiar language will not only be easily understood, but the child will also be able to perform his best during an evaluation exercise, for as Smith (1978) puts it, "a child's capacity to learn is often evaluated in terms of the language he speaks".

CHALLENGES FACING LITERACY EDUCATION AND LANGUAGE EDUCATION

Although the past and present government in Nigeria have tried to encourage literacy and language education, the fact remains that there are still many problems militating against literacy and language education. The situation is that a frightening proportion of the population is still battling with illiteracy.

One factor responsible for this is that the people have not been able to control their population. Although the successive governments and interested national and international organizations have made efforts geared towards tackling population problem, the unpredictable political terrain, religious bigotry, economic downturn and socio-cultural constraints tend to make nonsense of these efforts.

Again, the nation is yet to evolve quite stable and development-oriented educational policies. Although the national policy on education stresses

education for self and group development, its implementation has suffered a huge set back. Those charged with the execution of the policy have continued to pay lip-service to the programme. For instance, teachers who are supposed to drive the programme are badly equipped, disoriented and dejected. (Olajide). Research which would have rekindled literacy activities and motivate national development is either abandoned or haphazardly carried out. Even when grants are given to institutions for research, the grants are either misallocated or diverted. Educational policy makers tend to emphasize the sciences, engineering and medicine to the determinant of applied linguistics, reading, literacy and language education.

With regard to literacy education, the unfortunate situation is that literacy and literacy-related subjects and courses are hardly distinctly taught in the Nigerian school system. Literacy and reading are subsumed under language and literature. This arrangement robs literacy education of its desired attention.

Again, government's incentive for those studying adult literacy and education seem to have vanished. Religious interest in literacy development has also disappeared. These agencies now favour individuals, rather than national prosperity. The external aids from international bodies interested in literacy development hardly spread to the right quarters.

Another serious challenge facing literacy and language education is that language cannot be divorced from politics. Language planning in Nigeria has been highly politicized, Ker (2002). Government can legislate over which languages are to be used, but this may not actually bring about the desired solution to the problem as the majority of the users of each variable may not support it, especially in each state. Certainly, this will make the effort an exercise in futility.

THE ROLE OF LANGUAGE AND LITERACY EDUCATION IN NATIONAL DEVELOPMENT

Development is not only an economic phenomenon. It embraces more than the financial and material sides of people's lives. It is a multi-dimensional process involving the total re-organization and re-orientation of the entire political, social and economic system.

Rapid development takes place in a nation when her citizens enjoy the benefit of structural and technological growth mainly as a result of indigenous efforts. Such efforts cannot be made by any citizen who is functionally illiterate. UNESCO (1978) views functional literacy as "the possession of knowledge and skill in reading, writing and numeral by which the individual is able to act independently and desirably, in group ways, at all time". Thus, for the nation to achieve her desire of rapid development, her citizenry must be equipped with the requisite skill in reading, writing and numeracy as these are necessary for such individuals to act independently.

Lawal (1999) observes that one major role of literacy education is that it contributes to the development of the state. This is because literacy, in its variegated forms, serves to determine nationalism and national development. Hence, positive social, economic and technological changes can be effected by promoting literacy education and language education.

Again, functional literacy education and language education can be used to make an individual become productively employable. This, in turn, helps to raise the individual's living standard. This, in effect, has a major role to play in the rehabilitation of the vulnerable members of the society.

Literacy education and language education can also help to re-establish or re-in force self-reliance, which are essential pre-requisites for purposeful living (Egenti, 2005). Functional literacy education can be used to improve the professional practice of traditional psychiatric doctors and traditional mid-wives. According to him, functional literacy

education, which will be work-oriented, can be used to integrate the competent ones among them and their efficacious techniques into the scientific methods, thereby increasing and improving the treatment facilities for the mentally ill and expectant mothers.

Literacy education and language education can be used to rehabilitate the handicapped, namely the lame, the bind, the dumb, the deaf etc back into the society. When beggars liter the city, they become a big burden to the community. However, literacy education can empower them for useful living.

Human beings get equipped for maximum self-realization and self-development through literacy education. It is the only road to acquiring education in a meaningful way. In fact, one of the basic indices of development in any society is the level of literacy in that society.

Ani (2013) argues that at the non-formal level, language education and literacy education provide a wide range of opportunities for adults and other disadvantaged groups to acquire basic education relevant to their needs.

Writing on the role of language in national development, Achilike (2007) asserts that "it performs a veritable role in our society because it does not only bridge the gap between other languages, especially in a multi-ethnic society like Nigeria, but is also used as language of commerce and international relations". according to him, a good mastery of language creates job opportunities for clerks, journalists, teachers etc from the labour market. He adds that language is a veritable tool for knowledge impartation. and stresses that positive values, nationalism, enlightenment and development would be more easily fostered in students, if their language is opened to full linguistic and literacy development. Based on the above, one can comfortably assert that Nigeria's educational backwardness, lack of creativity and inability to develop her indigenous technology might have been caused by language problem. this is because it is through language that an individual's thought and its processes are expressed as well as acted upon practically.

RECOMMENDATIONS

According to UNESCO (1998), any government that tackles illiteracy with total commitment has set a pre-condition for favourable social change. therefore, government has the greatest stake in literacy development. Without appropriate political resolve, literacy education and language education cannot be effectively promoted in Nigeria. Government must explore every means of ensuring the right level of literacy development. To this end, government is advised to seek and obtain international support and cooperation, although international interest must be prevented from stifling the nation's initiative on literacy. There is need for Nigeria to insist on partnership with interested foreign bodies. As external aid alone cannot guarantee a healthy, secured and dynamic literacy environment, government should encourage literacy related exchange of people (especially intellectuals), ideas and information with the rest of the world.

Industries that specialize in producing education materials such as paper, books, teaching equipment local and massively should be established. This will help to prevent wasteful importation of such items.

Parents, philanthropists and donor agencies such as the Reading Association of Nigeria should lend support to the quest for literacy education and language education development. They can institute prizes for the outstanding teaching and learning of literacy or donate libraries and reading materials to Nigeria's institutions of higher learning.

Again, government has a role to pay in the area of evolving a stable and development oriented literacy programmes. Efforts should be made to increase the number of adult education centres in order to increase

accessibility to the teeming uneducated citizens.

Since functional literacy provides the basic communication skills that enable an individual to function optimally within his environment, it is hereby suggested that language teachers should be adequately equipped to cater for the need of learners. This can be achieved by structuring the language/literacy curricula of the teacher-training institutions in Nigeria.

Again, research grants meant to develop the education sector must not be misallocated. A good measure of the grant should be allocated to language in order to ensure literacy education and language education development. Educational managers saddled with the responsibility of allocating these grants should stop emphasizing the sciences and engineering to the detriment of language education.

CONCLUSION

Literacy education is a vital tool of national development and integration. The advantages inherent in sustainable literacy education have impelled Nigeria to embark on quite a number of literacy-related programmes in the last fifty years or so. However, the nation's level of literacy remains worrisomely low. The rate of illiteracy is influenced by lack of direction in language practices and factors". Language education can only bring about national development if the nation's language policy is such that provides adequate sense of direction at all levels of education. A re-engineering language policy will give literacy education a sense of direction at all levels. This, will in turn, impact positively in the environment.

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MACHINE LEARNING AND SUSTAINABLE NATIONAL DEVELOPMENT OF NIGERIA.

Chike David Ph.D MCPN, MNCS, MIEEE

Email: drchikedavid@gmail.com,

Phone No: 08035245067

COMPUTER SCIENCE DEPARTMENT

ABIA STATE POLYTECHNIC, ABA.

ABSTRACT

Machine learning is a field of artificial intelligence that involves the use of algorithms and statistical models to enable computers to learn from data and make decisions without being explicitly programmed. It has become an increasingly important tool in a wide range of industries, from finance and healthcare to transportation and marketing. In the context of national development, machine learning has the potential to drive economic growth, improve public services, and address social challenges. However, the adoption of machine learning also raises important questions and challenges, including issues related to data privacy, security and ethical concerns, as well as the potential for unintended consequences and the potential impact on employment and the labour market. This paper reviews the literature on the application of machine learning in national development contexts and discusses the potential benefits and risks, as well as the challenges and issues that need to be considered.

Keywords*: Machine learning, Artificial Intelligence, National Development, Data privacy, Employment and Labour market.*

INTRODUCTION

Machine learning is a field of artificial intelligence that involves the use of algorithms and statistical models to enable computers to learn from data and make decisions without being explicitly programmed. It has become an increasingly important tool in a wide range of industries, from finance and healthcare to transportation and marketing. In the context of national development, machine learning has the potential to drive economic growth, improve public services and address social challenges. For example machine learning can be used to optimize supply chains, improve disease diagnosis and treatment, and enhance transportation systems. It can also be used to predict and prevent natural disasters, improve energy efficiency, and address issues related to sustainability and environmental protection.

Despite these potential benefits, the adoption of machine learning in national development contexts also raises important questions and challenges. These include issues related to data privacy, security, and ethical concerns, as well as the potential for unintended consequences and the potential impact on

machine learning based tutoring systems can be effective in improving student performance on standardized tests. In transportation industry machine learning has been used to optimize routing and scheduling for delivery services (Wang et al.,2018) and improve the safety of self-driving vehicles (Li et al.,2016). In the field of marketing, machine learning has been used to improve targeted advertising and customer segmentation (Kumar et al.,2017). A study by Lee at al., (2019) found that machine learning can also be used to improve the accuracy of sales forecasts.

In addition to the benefits mentioned above, machine learning has also been used to address social challenges and improve public services. For example, machine learning has been used to predict and prevent natural disasters (Lin et al.,2017) and improve energy efficiency (Liu et al.,2016). It has also been used to address issues related sustainability and environmental protection (Zhang et al.,2018). Overall, the literature suggests that machine learning has the potential to bring significant benefits in a wide range of fields, but it is important to carefully consider the potential risks and ensure that it is used in an ethical and responsible manner.

There have also been several studies examining the potential impact of machine learning on employment and the labor market. A study by Fred and Osborne(2013) found that 47% of total U.S. employment is at high risk of being automated in the near future. However, other research has suggested that the impact of automation on employment may be more nuanced and depend on the specific tasks and industries being impacted (Acemoglu and Restrepo, 2017). A study by Arntz et al.(2016) found that while certain jobs may be automated, the adoption of machine learning may also create new job opportunities in fields such as data science and machine learning engineering. Overall, the literature suggests that the impact of machine learning on employment is complex and will depend on a variety of factors. Ensuring that the benefits of machine learning are shared equitably and that workers are protected will be important in mitigating any negative impacts on employment. In summary, the literature on machine learning suggests that it has the potential to bring significant benefits in a wide range of fields, including healthcare, finance, education, transportation, marketing and social and environmental issues. However, it is important to carefully consider the potential risks and ensure that it is used in an ethical and responsible manner, particularly in regards to data privacy and the potential for bias in algorithms.

Additionally, the impact of machine learning on employment and the labor market is an important consideration, and efforts should be made to ensure that the benefits of machine learning are shared equitably and that workers are protected. It is worth noting that the application of machine learning in different contexts may have different implications and challenges. For example, the adoption of machine learning in developing countries may be constrained by limited access to data, a lack of skilled personnel and limited resources (Alpaydin, 2018). Ensuring that machine learning is used in a responsible and transparent manner will be crucial in these contexts. There have also been concerns raised about the potential for machine learning to perpetuate existing social and economic inequities (Crowford et al , 2016). For example, the use of machine learning in hiring processes could potentially perpetuate existing biases if the training data is not diverse or if the algorithms are not designed to be fair and unbiased. Ensuring that machine learning is used in a way that promotes equity and social justice will be important. In conclusion, the literature on machine learning suggests that it has the potential to bring significant benefits in a wide range of fields, but it is important to carefully consider the potential risks and ensure that it is used in an ethical and responsible manner. The impact of machine learning on employment and the labor market, as well as the potential for machine learning to perpetuate existing inequalities, are also important considerations. Ensuring that the benefits of machine learning are shared equitably and that workers are protected, and using machine learning in a way that promotes equity and social justice, will be crucial in maximizing the potential of this technology.

Implications

Machine learning has the potential to have a positive impact on sustainable national development in Nigeria in a number of ways, here are a few examples:

Agriculture

Machine learning can be used to improve crop yields through precision agriculture. For instance machine learning algorithms can be used to analyze data from weather stations, satellite imagery, and soil sensors to optimize planting and harvesting times, predict crop yields, and identify pests and diseases.

Healthcare

Machine learning can be used to improve the efficiency and effectiveness of healthcare systems in Nigeria for example, machine learning algorithm can be used to analyze medical images for early detection of diseases, prediction of outbreaks of infectious diseases, and identify patients at high risk of complications. This helps improve public healthcare outcome and reduce healthcare costs.

Infrastructure

Machine learning can be used to improve the efficiency and safety of Nigeria's infrastructure. For example, it can be used to predict equipment failures in power plants, identify traffic patterns to optimize traffic flow, detect structural issues in bridges and buildings.

Education

Machine learning can be used to improve the quality of education in Nigeria generally. For instance machine learning algorithms can be used to analyze student data to identify learning gaps and outcome, provide personalized feedback to teachers and students.

Finance

Machine learning can be used to improve access to finance in Nigeria, particularly for small businesses and low-income individuals. For example, machine learning algorithms can be deployed in analysis of data from financial transactions and social media to identify credit worthy borrowers and reduce the cost of lending.

RECOMMENDATION

The following recommendations are outlined for Nigerian Government to ensure effective implementation of Machine learning for sustainable National Development:

Invest in Data Infrastructure

Machine learning relies heavily on large amount of quality data. Nigeria should invest in building a robust data infrastructure, including the development of national data platforms, data governance frameworks and data literacy programs.

Build a Skilled Workforce

Machine learning requires a skilled workforce, including data scientists, engineers and analysts. Nigeria should invest in training programs and education to develop this workforce for sustainable support of her infrastructure.

Encourage Collaboration

Machine learning is an interdisciplinary field, and it is important to encourage collaboration between experts in different fields, such as computer science, agriculture, healthcare and finance. Nigeria should promote collaboration between industry, government, and academia to develop and apply machine learning solutions.

Encourage Innovation

Nigeria should create an environment that encourages innovation in machine learning. This can be done by creating funding opportunities for research and development, promoting entrepreneurship and start-ups, and protecting intellectual property rights.

Addresses Ethical Issues

As machine learning applications are developed and deployed. It is important to consider and address ethical issues such as bias, transparency, and accountability. Nigeria should establish guidelines and regulations for the ethical use of machine learning and promote a culture of responsible data use.

Develop a National AI Roadmap

Nigeria should plan and develop a National AI roadmap that aligns with the National Economic Development, National Economic Recovery and National Economic Growth plans. This will help coordinate the efforts of government, industry, academia and development partners in a coordinated way and with a common goal in view. It is also important to mention that the United Nations has proposed Sustainable Development Goals (SDGs) as a way to drive sustainable development globally; Nigeria can align its development plans with these SDGs to ensure they will promote sustainable development and inclusive growth.

SUMMARY AND CONCLUSION

To harness sustainable development that will impact economy, security and otherwise the entire paraphernalia of government must be functional and accountable to the citizenry and every arm of government, security operatives, government functionaries, civil servants, industries, and entire population of Nigerians must be ready to embrace lasting change that will transform to a holistic change capable of harnessing the fortunes of this Nation. Machine learning implementation thus will improve efficiency and effectiveness. Let us rise to the challenges and change our nation.

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